
NORTH LONDON WASTE AUTHORITY
NORTH LONDON HEAT AND POWER
PROJECT

UTILITY STRATEGY

The Planning Act 2008 The Infrastructure
Planning (Applications: Prescribed
Forms and Procedure) Regulations 2009
Regulation 5 (2) (q)

AD05 ■ 10

Amec Foster Wheeler

Revision 0 |

October 2015

Any disclosure of this report to a third party is subject to this disclaimer. The report was prepared by Amec Foster Wheeler at the instruction of, and for use by our client, and takes into account the instructions and requirements of our client. It does not in any way constitute advice to any third party who is able to access it by any means. Amec Foster Wheeler excludes to the fullest extent lawfully permitted all liability whatsoever for any loss or damage howsoever arising from reliance on the contents of this report by any third party. We do not however exclude our liability (if any) for personal injury or death resulting from our negligence, for fraud or any other matter in relation to which we cannot legally exclude liability.

Contents

	Page
Executive summary	4
1 Introduction	6
1.1 Introduction	6
1.2 Purpose of this document	6
1.3 Structure of this strategy	6
1.4 The Applicant	7
1.5 The Application Site	7
1.6 Surrounding area	8
1.7 The Project	9
1.8 Stages of development	10
2 Summary of existing Edmonton EcoPark Utilities	11
2.1 Electricity	11
2.2 Gas	12
2.3 Heat networks	13
2.4 Surface and foul/combined water	13
2.5 Cooling water	17
2.6 Potable water	17
2.7 Wastewater	18
2.8 Telecoms	19
2.9 Other information	20
3 Summary of existing utilities - land to the east and land to the north of the Edmonton EcoPark	21
3.2 Land to the east of the Edmonton EcoPark	21
3.3 Land to the north of the Edmonton EcoPark	23
4 Required new utility infrastructure at Edmonton EcoPark	26
4.2 Electricity	26
4.3 Gas	28
4.4 Heat networks	29
4.5 Surface water and foul drainage systems	29
4.6 Water strategy	31
4.7 Wastewater	34
4.8 Telecommunications	34
4.9 Other information	34
5 Required new utility infrastructure on land to the east and land to the north of the Edmonton EcoPark	36
5.2 Land to the east of the Edmonton EcoPark	36
5.3 Land to the north of the Edmonton EcoPark	38

6	Planned diversions/impacts or stopping up and decommissioning of existing utilities	40
6.1	General	40
6.2	Electricity on the Edmonton EcoPark	40
6.3	Electricity for the land to the east of the Edmonton EcoPark	40
6.4	Gas on Edmonton EcoPark	43
6.5	Potable water on Edmonton EcoPark	43
6.6	Potable water on the land to the east of Edmonton EcoPark.	44
6.7	Wastewater treatment plant within Edmonton EcoPark	44
6.8	Foul/combined and surface water on the Edmonton EcoPark	44
6.9	Foul and industrial wastewater drainage system and surface water drainage system on land to the east of Edmonton EcoPark	45
6.10	Foul/combined and surface water drainage system on land to the north of Edmonton EcoPark	45
6.11	Cooling water pipes and water pumping station in the land to the north of Edmonton EcoPark	45
6.12	Telecommunications in the EcoPark	45
6.13	Telecommunications in the land to the north of Edmonton EcoPark	46
6.14	Telecommunications in the land to the east of Edmonton EcoPark	46
6.15	Summary of impacts on existing utilities within the Application Site	46
7	Statement of engagement with statutory undertakers and other affected parties	53

Figures

Figure 2.1: Detail of the pressure reduction system – angle 1

Figure 2.2: Detail of the pressure reduction system – angle 2

Figure 2.3: Oil separator

Figure 2.4: Pumps for surface water in the east Enfield Ditch.

Figure 2.5: Surface water drainage pumped to Enfield Ditch.

Tables

Table 4.1: Gas consumption

Table 4.2: Water consumption

Table 6.1: Clearance of Overhead Lines

Table 6.2: Clearances from National Grid's Energy Networks Association Technical Specification

Table 6.3: Affected utilities – Edmonton EcoPark

Table 6.4: Affected utilities- Edmonton EcoPark – land to the north of the Edmonton EcoPark

Table 6.5: Affected utilities- Edmonton EcoPark- land to the east of the Edmonton EcoPark

Table 7.1: Summary of Communications and Agreements with Utilities on the Edmonton EcoPark

Table 7.2: Summary of Communications and Agreements for utilities on land to the east of Edmonton EcoPark

Appendices

Appendix A	Existing Edmonton EcoPark utilities	A.1
Appendix B	Water balance for future Edmonton EcoPark	B.1
Appendix C	Supported drawings	C.1
Appendix D	Land to the east and north of the Edmonton EcoPark	D.1
Appendix E	List of communications with utility providers	E.1
Appendix F	Consents and agreements in principle	F.1

Glossary

See Project Glossary (AD01.05)

Executive summary

- i.i.i This Utility Strategy has been prepared to support the North London Waste Authority's (the Applicant's) application (the Application) for a Development Consent Order (DCO) made pursuant to the Planning Act 2008 (as amended).
- i.i.ii The Application is for the North London Heat and Power Project (the Project) comprising construction, operation and maintenance of an Energy Recovery Facility (ERF) of around 70 megawatts (MW_e) and associated development, including a Resource Recovery Facility (RRF) at the Edmonton EcoPark site in north London. The proposed ERF would replace the existing Energy from Waste (EfW) facility and other facilities at the Edmonton EcoPark.
- i.i.iii The purpose of this Utility Strategy is to provide an assessment of existing and new utility requirements within the Application Site that includes the Edmonton EcoPark, north of the Edmonton EcoPark and the east of the Edmonton EcoPark. The utilities identified in this strategy are Electricity, Gas, Potable Water, Surface Water, Waste Water and Telecommunications.
- i.i.iv The existing Energy from Waste (EfW) facility provides electricity generation on the Edmonton EcoPark and is made up of five steam turbines and generators that export electrical energy to the national grid. The existing Edmonton EcoPark has a current electricity demand of 6.6MVA. Some of the main consumers are the Existing EfW facility, the boilers and the cooling system. The Edmonton EcoPark is supplied by a low pressure and medium pressure gas main. Both mains come into the Edmonton EcoPark off Advent Way.
- i.i.v The current surface and foul water arrangements on the Edmonton EcoPark are complex due to the various expansions the Edmonton EcoPark has gone through. There are two drainage systems within the Edmonton EcoPark, one that is a combined drainage discharging treated effluent, surface water (contaminated) and domestic flows into the Chingford Sewer, and the second system collects rainwater runoff and discharges into Salmon's Brook or Enfield Ditch.
- i.i.vi Cooling water is currently extracted from the outfall of Deephams Sewage Treatment Works (STW) outflow channel and a small amount that is purged is also discharged into the Chingford Sewer which is combined with the treated water from the Wastewater Treatment Plant (WwTP).
- i.i.vii The existing EfW facility would be replaced with a proposed ERF and then would be demolished once the proposed ERF is fully operational. However, during the period of construction of the proposed ERF, the existing EfW facility would still be operational. Both the existing EfW facility and proposed ERF would not concurrently run at full capacity during the period of commissioning. The new utility requirements aim to keep both facilities running prior to the demolition of the existing EfW facility to ensure successful commissioning of the proposed ERF. The amount of gas needed would be large enough to cover both the existing

and new facilities during the transition period, and would require the installation of a new mains gas line into the Edmonton EcoPark site. The current mains gas lines would be decommissioned and may be removed if required.

- i.i.viii Surface and foul water drainage would be made simpler such that the discharge effluents would be separated and not combined. This reduces the costs associated with treating the effluent water as the volume of highly contaminated effluent streams are reduced.
- i.i.ix A new discharge effluent consent was issued by Thames Water Utilities Limited (TWUL) stipulating the consented limits into the Chingford Sewer and the maximum flow which may be discharged (refer to Appendix F Consents & Agreements in Principle).
- i.i.x A new raw pumping stations would be erected adjacent to Ardra Road to provide water to the ERF pre-treatment. Potable water would be supplied by TWUL only for potable use.
- i.i.xi This Utility Strategy provides an explanation of the various existing utilities in the north and east of the Edmonton EcoPark. The Temporary Laydown Area is in the east of the Edmonton EcoPark and it would require temporary utility connections during the period of construction. Most of the connection points for the Temporary Laydown Area would be from existing connections as far as possible.
- i.i.xii Communications with the various stakeholders have been carried out and a number of agreements in principal have been obtained from utility providers. The status of these communications are summarised in Section 7 of this strategy.

1 Introduction

1.1 Introduction

- 1.1.1 This Utility Strategy has been prepared to support North London Waste Authority's (the Applicant's) application (the Application) to the Secretary of State for Energy and Climate Change for a Development Consent Order (DCO) pursuant to Section 37 of the Planning Act 2008 (as amended).
- 1.1.2 The Application is for the North London Heat and Power Project (the Project) comprising the construction, operation and maintenance of an Energy Recovery Facility (ERF) capable of an electrical output of around 70 megawatts (MW_e) at the Edmonton EcoPark in north London with associated development, including a Resource Recovery Facility (RRF). The proposed ERF would replace the existing Energy from Waste (EfW) facility at the Edmonton EcoPark.
- 1.1.3 The Project is a Nationally Significant Infrastructure Project for the purposes of Section 14(1) (a) and section 15 in Part 3 of the Planning Act 2008 (as amended) because it involves the construction of a generating station that would have a capacity of more than 50MW_e.

1.2 Purpose of this document

- 1.2.1 This Assessment forms part of a suite of documents accompanying the Application submitted in accordance with the requirements set out in section 55 of the Planning Act (as amended) and Regulations 5, 6 and 7 of the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 (APFP Regulations 2009), and should be read alongside those documents (see Project Navigation Document (AD01.02)).

1.3 Structure of this strategy

- 1.3.1 Following this introduction the document sets out the following information:
- a. Section 2: summary of existing utilities on the Edmonton EcoPark;
 - b. Section 3: summary of existing utilities on land to the east and north of the Edmonton EcoPark;
 - c. Section 4: required new utility infrastructure on the Edmonton EcoPark;
 - d. Section 5: required new utility infrastructure on land to the east and north of the Edmonton EcoPark;
 - e. Section 6: planned diversions/stopping up, decommissioning of existing utilities and removal, and other ways existing utilities would be affected; and
 - f. Section 7: statement of engagement with statutory undertakers.

1.4 The Applicant

- 1.4.1 Established in 1986, the Applicant is a statutory authority whose principal responsibility is the disposal of waste collected by the seven north London boroughs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest (the Constituent Boroughs).
- 1.4.2 The Applicant is the UK's second largest waste disposal authority, handling approximately 3 per cent of the total national Local Authority Collected Waste (LACW) stream. Since 1994 the Applicant has managed its waste arising's predominantly through its waste management contract with LondonWaste Limited (LWL) and the use of the Existing EfW facility at the existing Edmonton EcoPark and landfill outside of London.

1.5 The Application Site

- 1.5.1 The Application Site, as shown on the Site Location Plans (A_0001 and A_0002 in the Book of Plans (AD02.01)), extends to approximately 22 hectares and is located wholly within the London Borough of Enfield (LB Enfield). The Application Site comprises the existing waste management site known as the Edmonton EcoPark where the permanent facilities would be located, part of Ardra Road, land around the existing water pumping station at Ardra Road, Deephams Farm Road, part of Lee Park Way and land to the west of the River Lee Navigation, and land to the north of Advent Way and east of the River Lee Navigation (part of which would form the Temporary Laydown Area and new Lee Park Way access road). The post code for the Edmonton EcoPark is N18 3AG and the grid reference is TQ 35750 92860.
- 1.5.2 The Application Site includes all land required to deliver the Project. This includes land that would be required temporarily to facilitate the development.
- 1.5.3 Both the Application Site and the Edmonton EcoPark (existing and proposed) are shown on Plan A_0003 and A_0004 contained within the Book of Plans (AD02.01). Throughout this report references to the Application Site refer to the proposed extent of the Project works, and Edmonton EcoPark refers to the operational site. Upon completion of the Project the operational site would consist of the Edmonton EcoPark and additional land required to provide new access arrangements and for a water pumping station adjacent to the Deephams Sewage Treatment Works outflow channel.

Edmonton EcoPark

- 1.5.4 The Edmonton EcoPark is an existing waste management complex of around 16 hectares, with an EfW facility which treats circa 540,000 tonnes per annum (tpa) of residual waste and generates around 40MW_e (gross) of electricity; an In-Vessel Composting (IVC) facility; a Bulky Waste Recycling Facility (BWRf) and Fuel Preparation Plant (FPP); an Incinerator Bottom Ash (IBA) Recycling Facility; a fleet management and maintenance facility; associated offices, car parking and plant required to

operate the facility; and a former wharf and single storey building utilised by the Edmonton Sea Cadets under a lease.

- 1.5.5 In order to construct the proposed ERF, the existing BWRP and FPP activities would be relocated within the Application Site; the IVC facility would be decommissioned and the IBA recycling would take place off-site.

Temporary Laydown Area and Lee Park Way access

- 1.5.6 The proposed Temporary Laydown Area is an area of open scrubland located to the east of the River Lee Navigation and north of Advent Way. There is no public access to this area. The Temporary Laydown Area would be reinstated after construction and would not form part of the ongoing operational site.

- 1.5.7 In addition to the Temporary Laydown Area the Application Site includes land to the east of the existing Edmonton EcoPark which would be used for the new Lee Park Way entrance and landscaping along the eastern boundary.

Deephams Farm Road access

- 1.5.8 The Application Site also includes Deephams Farm Road and part of Ardra Road with land currently occupied by the Existing EfW facility water pumping station between the junction of A1005 Meridian Way and Deephams Farm Road.

1.6 Surrounding area

- 1.6.1 The Application Site is located to the north of the A406 North Circular Road in an area that is predominantly industrial. The Lee Valley Regional Park (LVRP) is located to the east of the Edmonton EcoPark.

- 1.6.2 Land to the north and west of the Application Site is predominantly industrial in nature. Immediately to the north of the Edmonton EcoPark is an existing Materials Recovery Facility (MRF), which is operated by a commercial waste management company, alongside other industrial buildings. Further north is Deephams Sewage Treatment Works. Beyond the industrial area to the north-west is a residential area with Badma Close being the nearest residential street to the Application Site (approximately 60m from the nearest part of the boundary) and Zambezie Drive the nearest to the Edmonton EcoPark at approximately 125m west.

- 1.6.3 Eley Industrial Estate, located to the west of the Application Site, comprises a mixture of retail, industrial and warehouse units.

- 1.6.4 Advent Way is located to the south of the Application Site adjacent to the A406 North Circular Road. Beyond the A406 North Circular Road are retail and trading estates; this area is identified for future redevelopment to provide a housing-led mixed use development known as Meridian Water.

- 1.6.5 The LVRP and River Lee Navigation are immediately adjacent to the eastern boundary of the Edmonton EcoPark, and Lee Park Way, a private road which also forms part of National Cycle Network (NCN) Route 1,

runs alongside the River Lee Navigation. To the east of the River Lee Navigation is the William Girling Reservoir along with an area currently occupied by Camden Plant Ltd. which is used for the crushing, screening and stockpiling of waste concrete, soil and other recyclable materials from construction and demolition. The nearest residential areas to the east of the Application Site and LVRP are located at Lower Hall Lane, approximately 550m from the Edmonton EcoPark and 150m from the eastern edge of the Application Site.

1.7 The Project

- 1.7.1 The Project would replace the existing EfW facility at Edmonton EcoPark, which is expected to cease operations in around 2025, with a new and more efficient ERF which would produce energy from residual waste, and associated development, including temporary works required to facilitate construction, demolition and commissioning. The proposed ERF would surpass the requirement under the Waste Framework Directive (Directive 2008/98/EC) to achieve an efficiency rating in excess of the prescribed level, and would therefore be classified as a waste recovery operation rather than disposal.
- 1.7.2 The main features of the Project once the proposed ERF and permanent associated works are constructed and the existing EfW facility is demolished are set out in the Book of Plans (AD02.01) and comprise:
- a. a northern area of the Edmonton EcoPark accommodating the proposed ERF;
 - b. a southern area of the Edmonton EcoPark accommodating the RRF and a visitor, community and education centre with offices and a base for the Edmonton Sea Cadets ('EcoPark House');
 - c. a central space, where the existing EfW facility is currently located, which would be available for future waste-related development;
 - d. a new landscape area along the edge with the River Lee Navigation; and
 - e. new northern and eastern Edmonton EcoPark access points.
- 1.7.3 During construction there is a need to accommodate a Temporary Laydown Area outside of the future operational site because of space constraints. This would be used to provide parking and accommodation for temporary staff (offices, staff welfare facilities), storage and fabrication areas, and associated access and utilities.
- 1.7.4 Schedule 1 of the draft DCO (AD03.01) sets out the authorised development and the works are shown in the Book of Plans (AD02.01), supplemented by Illustrative Plans (included in the Design Code Principles, AD02.02) that set out the indicative form and location of buildings, structures, plant and equipment, in line with the limits of deviation established by the draft DCO (AD03.01).

1.8 Stages of development

- 1.8.1 The proposed ERF is intended to be operational before the end of 2025, but with the precise timing of the replacement to be determined. In order to do this, the following key steps are required:
- a. obtain a DCO for the new facility and associated developments;
 - b. obtain relevant environmental permit(s) and other licences, consents and permits needed;
 - c. identify a suitable technology supplier;
 - d. agree and arrange source(s) of funding;
 - e. enter into contract(s) for design, build and operation of new facility and associated development;
 - f. move to operation of new facility; and
 - g. decommission and demolish the existing EfW facility.
- 1.8.2 Site preparation and construction would be undertaken over a number of years and it is expected that the earliest construction would commence is 2019/20, although this may be later. Construction would be implemented in stages to ensure that essential waste management operations remain functioning throughout. This is especially relevant for the existing EfW facility and associated support facilities.
- 1.8.3 The stages of the Project are as follows:
- a. Stage 1a: site preparation and enabling works;
 - b. Stage 1b: construction of RRF, EcoPark House and commencement of use of Temporary Laydown Area;
 - c. Stage 1c: operation of RRF, EcoPark House and demolition/clearance of northern area;
 - d. Stage 1d: construction of proposed ERF;
 - e. Stage 2: commissioning of proposed ERF alongside operation of existing EfW facility, i.e. transition period;
 - f. Stage 3: operation of proposed ERF, RRF and EcoPark House, demolition of Existing EfW facility; and
 - g. Stage 4: operation of proposed ERF, RRF and EcoPark House, i.e. final operational situation.

2 Summary of existing Edmonton EcoPark Utilities

2.1 Electricity

Existing facilities

- 2.1.1 The Application Site extends to 22.2 hectares. Presently it accommodates an EfW facility, incorporating waste reception, steam raising, condensing and associated treatment processes. Multiple boilers supply five steam turbines and generators which export electrical energy to the national grid.
- 2.1.2 Other facilities on the Edmonton EcoPark include:
- a. intake pumping station (outside the Edmonton EcoPark but inside the Application Site);
 - b. effluent treatment plant;
 - c. clinical waste treatment facility (now closed);
 - d. offices and welfare facilities;
 - e. FPP;
 - f. BWRF;
 - g. IBA recycling facility; and
 - h. existing generation and electrical infrastructure
- 2.1.3 Whilst the rated output power of the five generators totals 52.7MWe, the practicable peak generation capacity of the facility is around 40MWe (gross) of electricity, equating to a net output to the local electricity grid of about 33MWe. The typical annual gross energy output is 290 GWh.
- 2.1.4 The Edmonton EcoPark incorporates its own step-up transformers to enable connection with the local electricity distribution network operator (DNO: UK Power Networks (UKPN)). The Edmonton EcoPark transformer compound receives the exported power which is conducted out of the Edmonton EcoPark via two UKPN 33 kV underground cable circuits to the UKPN Tottenham Grid Substation, approximately two kilometres away. The two UKPN cables circuits are shown on drawing 35180/LON/CVD/004/F in Appendix A to this Strategy. The Tottenham Grid Substation connects to the national super grid system that is adjacent to the UKPN 132 kV substation.

Electricity use at the EcoPark

- 2.1.5 The existing site has a maximum recorded imported electrical demand of 6.6MVA (from DNO figures) from all electrical consumers on the site, including the following:
- a. Existing EfW facility, incorporating the following load centres:
 - b. Bunker, hopper, residuals processes;
 - c. Boilers;
 - d. Flue gas precipitators;

- e. Ash disposal;
- f. Turbine alternator auxiliaries;
- g. Intake pumping station and;
- h. Cooling towers.
- i. Effluent treatment plant;
- j. Clinical waste facility;
- k. Office block;
- l. FPP;
- m. BWRf;
- n. IBA recycling facility;
- o. IVC centre;
- p. Transport facility/ maintenance, and
- q. Site lighting

2.1.6 All the above consumers are supplied with electricity through cables and other apparatus owned by LondonWaste Limited (LWL).

2.1.7 None of the above electricity consumers (including the cables and apparatus supplying these consumers with electricity) would remain following commissioning of the proposed ERF and demolition of the existing EfW facility.

2.1.8 In addition, other electricity cables within the EcoPark owned by LWL may be removed, relocated, or replaced.

2.2 Gas

2.2.1 The Edmonton EcoPark is supplied by two gas mains, one medium pressure and one low pressure, that connect to the local distribution network at Advent Way by National Grid. The low pressure gas mains pipe is a 250mm diameter pipe and this feeds the offices, welfare facilities and the contractors' compound within the Edmonton EcoPark. It also branches off to connect into the clinical waste building. The medium pressure gas mains pipe is also a 250mm diameter pipe and this pipe feeds the turbine hall of the existing EfW facility. Both pipes follow the access road north up to the compound building. The pressure supply for the turbine hall has been identified at two bar with a pressure reduction valve that brings the gas supply down to 300 mbar (see Figures 2.1 and 2.2).

2.2.2 Gas meters are owned by Gazprom and are located in the gas kiosk.

2.2.3 The gas supply to the turbine hall, offices, welfare facilities, contractors' compound and clinical waste is provided by a system of minor gas pipes all at 300 mbar owned by LWL.



Figure 2.1: Detail of the pressure reduction system – angle 1

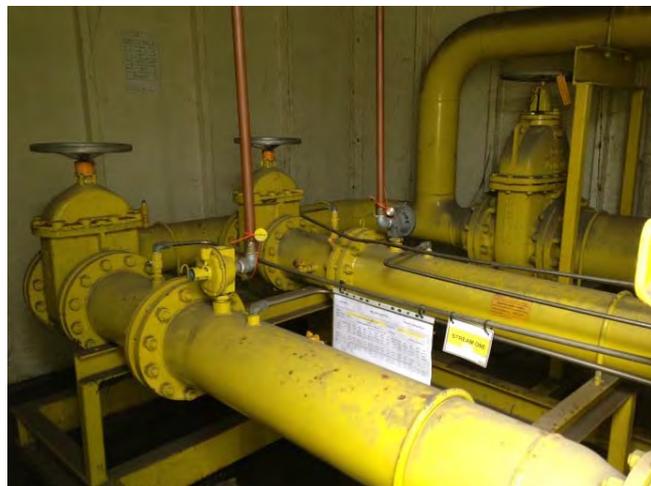


Figure 2.2: Detail of the pressure reduction system – angle 2

2.2.4 The gas main General Arrangement can be found in Appendix A, drawing 35180/LON/CVD/004/F.

2.3 Heat networks

2.3.1 At present there is no pipe work associated with the distribution of heat from the Edmonton EcoPark to heat networks.

2.4 Surface and foul/combined water

2.4.1 Due to the long history and use of the Edmonton EcoPark, a complex network of sewers has been developed to cope with various effluents including: process effluent flows from the existing EfW facility, domestic flow (from offices and other welfare facilities) and surface water flows. This network owned by LWL has evolved and grown throughout the years as new buildings and facilities have been added to the Edmonton EcoPark.

2.4.2 The Edmonton EcoPark is drained via two separate systems. These systems are shown on drawing number 35180/LON/CVD/002/D attached at Appendix A to this strategy. The first system is a combined drainage system (owned by LWL) that serves process effluent, surface water and domestic flows and discharges into the Chingford Sewer (the Chingford Sewer is a public sewer that is owned by Thames Water Utilities Limited (TWUL)). Further details of this first system are set out in paragraphs below. The second system is a surface water system (owned by LWL) that collects rainwater runoff from building roofs, roads and car parks and discharges either into Salmon's Brook or the Enfield Ditch, via two separate outfalls, the Southern and Northern Outfalls. According to historic records, pipe materials could be classified as either clay or concrete according to their diameter. Clay pipe diameters range from 100 up to 300mm and concrete pipe diameters range from 400mm upwards. Further details of this second system are set out in paragraphs below.

2.4.3 The current TWUL consent (ref: TDEE0804) to discharge trade effluent into the Chingford Sewer (public sewer) has the following conditions:

- a. the nature and composition of the trade effluent to be discharged under this consent is: waste liquids arising from incineration, clinical waste autoclaving, sharps sterilisation and vehicle washing process;
- b. The maximum quantity of the trade effluent which may be discharged on any one day of 24 hours determined from midnight should not exceed 5,682m³;
- c. The maximum rate at which the trade effluent may be discharged should not exceed 237m³ per hour;
- d. Other conditions with regard to concentration of substances, pH value, charges, etc. are given in the discharge consent.

Foul/combined drainage system (referred to in paragraph 2.4.2 above)

2.4.4 The Chingford Sewer crosses the Edmonton EcoPark from the south-east corner up to the western access road and exits the Edmonton EcoPark at the top northwest corner of the site. The sewer is served by a 1,200mm diameter pipe. The Angel Sewer, also a TWUL owned asset, connects to the Chingford Sewer at a point within the southern landscaped area of the Edmonton EcoPark. This sewer is served by a 450mm diameter pipe.

2.4.5 The combined sewer network (shown on drawing 35180/LON/CVD/002/D attached at Appendix A to this Strategy) is divided into three main branches which collect waters from the main entrance, the turbine hall, the existing EfW facility (west side), the cooling plant, part of the clinical waste building, the effluent water treatment plant, and part of the service road that serves the southern part of the ash recycling centre, the bulky waste storage area and the recycling facility.

Surface drainage system (referred to in paragraph 2.4.2 above)

- 2.4.6 Rainwater run-off from the soft landscaped areas of the Edmonton EcoPark infiltrates into the ground with a small amount lost through evaporation to the atmosphere.
- 2.4.7 There are three independent drainage systems for surface water:
- a. the north east area of the EcoPark is served by a drainage system which discharges into Enfield Ditch but this is currently sealed by plant debris which prevents water from draining from the Edmonton EcoPark via this route;
 - b. surface water from the northern area of the Edmonton EcoPark, comprising the bulky storage area, the ash recycling facility, the compost facility and the internal service road is directed to the outfall pipe at Salmons Brook. However this outfall has been sealed with a blind flange and surface water is now diverted into the foul/combined drainage owned by LWL. Before being connected to the foul/combined drainage, surface drainage passes through an oil and grease separator (see Figure 2.3). The surface drainage water is then attenuated by two attenuation tanks of 175,000 litres each. The attenuation tanks are served by two pumps of 10 l/s flow each that pump surface water to the foul drainage; and
 - c. rainfall run-off from the buildings and hardstanding areas in the east of the Edmonton EcoPark is discharged through the surface water drainage system, which passes through an oil and grease interceptor (see Figure 2.3). In the past there were three drainage systems but as two of them are now blocked, only one draining system is in use. Appendix A drawing 35180/LON/CVD/002/D details where the interceptor is and the hardstanding area served.



Figure 2.3: Oil separator

- 2.4.8 The only operative surface water discharge outfall is located on the east side of the Edmonton EcoPark. There is an attenuation tank of 400,000 litres overall capacity which is served by four pumps to pump the surface water to Enfield Ditch (see Figures 2.4 and 2.5).



Figure 2.4: Pumps for surface water in the east Enfield Ditch.



Figure 2.5: Surface water drainage pumped to Enfield Ditch.

- 2.4.9 This discharge is regulated by the Environment Agency (EA) through the Environmental Permit (ref: YP3033BE).
- 2.4.10 The drainage drawing can be found in Appendix A, and is drawing number 35180/LON/CVD/002/D.

2.5 Cooling water

- 2.5.1 A large volume of cooling water is required to condense the exhaust steam which has been raised from heat produced in the Existing EfW facility to drive the turbine to generate electricity. This cooling water is drawn from the Deephams STW outflow channel close to where it joins Salmon's Brook, via the water pumping station located off Ardra Road. The water pipes from the water pumping station on Ardra road run parallel to Salmon's Brook into the Edmonton EcoPark to feed the wet cooling towers. The water pumping station and the cooling water pipes are managed and maintained by LWL as leaseholder. The cooling water pumping station and its pipes are owned by Kennet Properties Ltd. The pipes for extraction are labelled on drawing 35180/LON/CVD/003/D.
- 2.5.2 The current cooling system has been designed as a closed system; however, a small purge drains to the Chingford Sewer on a continuous basis (via the compound culvert, where it is combined with the treated water coming from the Wastewater Treatment Plant (WwTP)).

2.6 Potable water

Potable water supply

- 2.6.1 The potable water supply is taken from the local distribution network which is owned and operated by TWUL. TWUL potable water pipes run from Advent Way and into the Edmonton EcoPark, which then connect to LWL-owned potable water pipes within the Edmonton EcoPark. The point of connection with the main TWUL network is at Advent Way, beside the entrance to the Edmonton EcoPark. Please see drawing number 35180/LON/CVD/003/D at Appendix A to this Strategy. An electromagnetic flow meter has been identified at the main entrance of the Edmonton EcoPark (along the eastern pavement of the access road just before the gate). The LWL potable water pipes are approximately 4" in diameter and their depth is approximately 1m. The pipe material is likely to be either cast or ductile iron. The LWL potable water pipes feed the existing EfW facility and run beneath the facility via a route under the main internal access road.
- 2.6.2 There is also a separate 200mm medium density polyethylene potable water pipe owned by TWUL which runs along the bank of Salmons Brook towards Deephams STW. This pipe does not supply the Edmonton EcoPark.

Uses of potable water

- 2.6.3 The following equipment, pipes, material are all owned by LWL:

Washing plant, equipment and hard surfaces

- a. Potable water is used throughout the Edmonton EcoPark for washing plant, equipment and hard surfaces. The used potable water is then passed through an interceptor and oil separator before it discharges through the foul water drainage system to the Chingford Sewer.

Personal hygiene and human consumption

- b. Potable Water is used for personal hygiene and human consumption throughout the Edmonton EcoPark and discharges through the foul water sewer system to the Chingford Sewer.

Dust suppression

- c. Potable water is used for the dust suppression system located in the Existing EfW facility, which consists of a water spray system. The water spray system is installed only in the tipping hall apron of the bunded area.

Fire suppression

- d. A fire suppression system is installed throughout the Edmonton EcoPark. It comprises:
 - fire sprinklers: offices, stores and turbine;
 - fire hoses: around the Edmonton EcoPark; and
 - fire extinguishers: around the Edmonton EcoPark.
- e. The fire suppression system is fed from a 100m³ storage tank supplied from the potable water main owned by TWUL and is pumped around the Edmonton EcoPark via electrical pumps or diesel fire pumps in the event of power failure both located within the ground floor of the existing EfW facility.

Demineralised water for producing steam

- f. Demineralised water is produced in the Demineralised Plant and is fed by the potable water main owned by LWL (supplied by the local distribution network in Advent Way owned and operated by TWUL). The Demineralised Plant is formed by a system of demineralised water with ion exchange, with an anion vessel and a cation vessel and a mixed bed. Capacity of the installation is 10m³/h. This demineralised water feeds the boiler, where the steam is raised.
- g. All of the potable water pipes on the Edmonton EcoPark are shown on drawing 35180/LON/CVD/003/D in Appendix A.

2.7 Wastewater

- 2.7.1 The Edmonton EcoPark WwTP owned by LWL accepts waste effluent from various areas within the Edmonton Ecopark; these include the turbine hall basement, boiler sumps and various run-off water points. The plant consists of screening, lime preparation, pH control, settlement and various filters.
- 2.7.2 The effluent is transported through a network of pipes within the Edmonton EcoPark. These pipes are shown in drawing 35180/LON/CVD/002/D. The effluent enters the WwTP via a brush screen; this screen removes solids greater than 5mm. The resulting effluent is then gravity fed to a sump containing three submersible pumps.

The effluent is then pumped to a clarifier tank and the sludge allowed to settle out. The sludge is then pumped to a dewatering skip where it is dewatered and the sludge is sent for disposal.

- 2.7.3 The resulting effluent from the clarifier is gravity fed into two flow-balancing tanks. From here it is pumped to a series of pH control tanks. The pH is controlled by the use of hydrochloric acid and lime. Ferric sulphate can also be dosed at this time if required to break up any trace oils.
- 2.7.4 Once the pH balancing has been completed the effluent is fed into a settlement tank and the precipitated hydroxides of metals are allowed to settle in this tank. Polyelectrolyte is also dosed into this tank to aid precipitation. The sludge that is formed is extracted by pumps and filter pressed. The resulting filter cakes are then taken for disposal.
- 2.7.5 The resulting effluent is again gravity fed to two lamellas; these offer a further method of solids removal. Any resulting sludge/solids are pumped to the filter press.
- 2.7.6 At this point the effluent plus any liquor from the filter press process is gravity fed to the sand filter-pumping tank. Polyelectrolyte is also added to this tank. The effluent is pumped through the sand filter. The filters are back washed on a timed cycle.
- 2.7.7 The treated effluent is then gravity fed to the final discharge compound channel where it is combined with the purge coming from the cooling system, foul drainage system and finally goes to the Chingford Sewer.
- 2.7.8 Discharges to the Chingford Sewer are regulated by the EA and TWUL.
- 2.7.9 A rising main has been identified running across the northern part of the Edmonton EcoPark starting at a pumping station located northeast of the BWRF up to the Effluent Treatment Plant. This pipe runs for approximately 307m length. It is understood that this pipe is sealed.
- 2.7.10 The Wastewater main pipe (gravity) can be found in Appendix A, drawing 35180/LON/CVD/002D.

2.8 Telecoms

- 2.8.1 The existing EfW facility and adjacent buildings are currently supplied by telecommunication cables owned by LWL and BT.
- 2.8.2 The telecommunication systems already available on the Edmonton EcoPark comprise telephone connections, internet connections, SCADA network, CCTV and signal cables for fire alarms, connecting back to the control centre which is located within the existing EfW facility. Telecommunication cables are distributed throughout the Edmonton EcoPark via a network of ducts between the buildings and along the pavements within the Edmonton EcoPark and housed within cable conduits and trays inside the buildings.
- 2.8.3 CCTV cameras are located in strategic locations around the Edmonton EcoPark and they are used to monitor the movement of vehicles in and

around the different facilities of the site. They are also used for security purposes.

2.8.4 CCTV cameras and cables are shown on drawing 35180/LON/CVD/005/B in Appendix A of this Strategy.

2.8.5 The location of existing BT cables and apparatus is shown on drawing 35180/LON/SKT/006/C.

2.9 Other information

2.9.1 Appendix A sets out a schematic water mass balance 35180/LON/PRD/001/G has been included to understand existing capacity of the EcoPark.

3 Summary of existing utilities - land to the east and land to the north of the Edmonton EcoPark

3.1.1 The following sections cover the existing utilities that could be affected by the development of the Temporary Laydown Area (east of the Edmonton EcoPark), and along the Deephams Farm Road access during the period of construction at the Edmonton EcoPark.

3.2 Land to the east of the Edmonton EcoPark

3.2.1 Section 3.2 will cover the relevant utilities in the following areas:

- a. Temporary Laydown Area;
- b. River Lee Navigation towpath entrance to the bridge over the River Lee Navigation;
- c. Lee Park Way entrance from the roundabout off Advent Way; and
- d. additional areas to be landscaped to the east of the Temporary Laydown Area.

UK Power Networks – electricity

3.2.2 There is an overhead 11 kV line that runs west to east along the northern boundary of the proposed Temporary Laydown Area (there is a second 11kV overhead line that runs parallel to the line above; however, this is outside of the red line boundary). This overhead line is shown on drawing number 35180/GOS/CVD/004 Rev A in Appendix A. There are also other abandoned/disused UKPN distribution cables which should at all times be considered live.

3.2.3 Cables identified within this part of the red line boundary are as follows:

- a. three UKPN cables running from the north of the Temporary Laydown Area. All three of these cables run through the proposed Temporary Laydown Area and towards the North Circular Road. The outer most cable branches into two; the first branch crosses over the River Lee Navigation on a dedicated cable bridge and runs along the eastern edge of the Edmonton EcoPark through the wharf area within the Edmonton EcoPark;
- b. two cables enter the western edge of the proposed Temporary Laydown Area and run parallel to the River Lee Navigation towards and across the North Circular Road; and
- c. there are a number of other electricity cables located around the south eastern area of the proposed Temporary Laydown Area.

3.2.4 An electric cable terminates in the Temporary Laydown Area east of the junction of Lee Park Way with Advent Way, then cuts across the roundabout off Advent Way and continues across North Circular Road. This cable crosses a junction box represented in the drawing 35180/GOS/CVD/004/A as a black box.

3.2.5 The relevant cables in Paragraphs 3.2.3 and 3.2.4 can be found in Appendix A 35180/GOS/CVD/004/A.

National Grid

3.2.6 The relevant National Grid apparatus are the following:

- a. Two National Grid 275 kV (overhead) transmission lines; and
- b. Two National Grid underground control cable (pilot).

3.2.7 Two overhead tower transmission lines operating at 275kV run over the proposed Temporary Laydown Area and other land to the east of the Edmonton EcoPark within the red line boundary. These lines have the potential to be designed for 400kV operation (which is relevant to the necessary clearances described in Section 6 of this Strategy).

3.2.8 Two existing National Grid control (pilot) cables run through the proposed Temporary Laydown Area: one along the western boundary and the other diagonally across the proposed car park area.

3.2.9 The apparatus and cables mentioned in Paragraph 3.2.6 can be found in Appendix A 35180/GOS/CVD/004/A.

Gas

3.2.10 There is no existing gas infrastructure.

Thames Water Utilities Limited – sludge mains

3.2.11 TWUL indicates that there are sludge main pipes (305mm diameter) that run underneath the River Lee Navigation and then south parallel to the land east of the river and cut through the tip of the entrance to Lee Park Way. TWUL confirmed that these are active sludge mains.

3.2.12 This can be found on drawing 35180/GOS/CVD/004/A Appendix A.

Thames Water Utilities Limited – water mains

3.2.13 TWUL owns five potable water mains that run along the east of the River Lee Navigation. Two pipes are 4" distribution mains with one of them expanding to 6" as it bends left around the Temporary Laydown Area. The other two are 54" and 84" raw water pipes and the fifth pipe is a 42" trunk main. The two distribution mains pipes continue to run down towards the south, merge/terminate at the hydrants, and then continue across the North Circular Road. The Raw Water pipes continue underground across the North Circular Road and past the Lee Valley Trading Estate. The Trunk Main pipe terminates/merges at a hydrant on the edge of the Temporary Laydown Area.

3.2.14 A 355mm water main owned and operated by TWUL runs along Advent Way and cuts across the entrance to Lee Park Way.

3.2.15 The relevant water main pipes mentioned in 3.2.13 and 3.2.14 can be found in drawing 35180/GOS/CVD/004/A Appendix A.

Thames Water Utilities Limited – combined sewer

- 3.2.16 The Chingford Sewer crosses the south western section of the Application Site. This can be found on drawing 35180/GOS/CVD/004/A Appendix A.

BT

- 3.2.17 A BT cable runs along the eastern edge of the Edmonton EcoPark toward the location of the proposed RRF.
- 3.2.18 BT cables cut cross the entrance to Lee Park Way as it comes around the roundabout off Advent Way.
- 3.2.19 The relevant BT cables in Paragraphs 3.2.17 and 3.2.18 can be found in Appendix A 35180/GOS/CVD/004/A.

3.3 Land to the north of the Edmonton EcoPark

- 3.3.1 Section 3.3 will cover the relevant utilities in the following areas:
- a. Deephams Farm Road;
 - b. Ardra Road; and
 - c. cooling water pumping station.

UKPN – electricity

- 3.3.2 Cables owned by UKPN have been identified in different sections of this area and can be found in Appendix A 35180/GOS/CVD/003/A. This drawing shows there are multiple electricity cables that run across and/or parallel to Deephams Farm Road, Ardra Road from the northern boundary of the Edmonton EcoPark toward the junction of Ardra Road and Meridian Way, and also underneath the eastern bank to Salmon's Brook running south toward the Edmonton EcoPark.

National Grid Gas

- 3.3.3 A gas pipe owned by National Grid originating from Meridian Way leads into Ardra Road, running adjacent to Ardra Road, and has three branches. The first branch feeds the Lee Valley industrial estate, the second feeds into the bend of Ardra road and the third branches down southwards towards the Edmonton EcoPark and ends within the top northern quarter of Deephams Farm Road. These gas pipes are shown in Appendix A 35180/GOS/CVD/003/A.

Thames Water Utilities Limited – potable water mains

- 3.3.4 Information provided by TWUL indicates that there is a 200mm diameter potable water main which starts from Advent Way that runs along the Edmonton EcoPark parallel to Salmon's Brook, and continues through Deepham's Farm Road, Ardra Road and ends just before Meridian Way. A branch from this main turns right into Ardra Road that heads towards the Biffa owned MRF. Details of this water main can be found in Appendix A 35180/GOS/CVD/003/A.

Thames Water Utilities Limited - foul and surface water drainage

- 3.3.5 Deephams Farm Road is understood (from site investigations) to have a surface water drainage system running underneath it that has four outfalls to Salmon's Brook. Both the ownership and exact location of the pipes that comprise this surface water drainage system are not known despite site, utilities and title investigations being carried out.
- 3.3.6 There are two different drainage systems that run under Ardra Road as follows:
- a. the Chingford Sewer, the combined foul and surface water drainage, runs under the southern edge of Deephams Farm road and north towards Meridian Way. The same sewer also branches into Ardra Road. The route is shown on drawing 35180/GOS/CVD/003/A; and
 - b. there is a surface water sewer, owned by TWUL that cuts across the northern quarter of Deephams Farm Road. The route is shown on drawing 35180/GOS/CVD/003/A.

LondonWaste Limited

- 3.3.7 There is a water pumping station on land adjacent to Ardra Road. The water pipes from the water pumping station on Ardra Road run parallel to Salmon's Brook into the Edmonton EcoPark to feed the wet cooling towers.
- 3.3.8 There is an electrical switch room (which is shown as a small black square on Drawing 31580/GOS/CVD/003/A) that supplies power to the assets inside the cooling pumping station. The switchroom is fed by two cable circuits which travel along Deephams Farm Road and Ardra Road.
- 3.3.9 The water pumping station, switchroom and the cooling water pipes are managed and maintained by LWL as leaseholder. The water pumping station and its pipes are owned by Kennet Properties Ltd.
- 3.3.10 The surface water drainage in the pumping station area drains to the Deephams SWT outflow channel.

Vodafone

- 3.3.11 Data telecom cable(s) owned by Vodafone cut across the top of Ardra Road just within the Application Site before the junction with Meridian Way and this can be found in Appendix A 35180/GOS/CVD/003/A.

BT

- 3.3.12 The following are related BT cables and can be found in Appendix A 35180/GOS/CVD/003/A:
- a. data telecom cable(s) that cuts across Deephams Farm Road;
 - b. data cable(s) that runs under Ardra Road; and
 - c. data cable(s) that runs under the bank of Salmon's Brook.

Zayo

- 3.3.13 The following are Zayo cable(s) and can be found in Appendix A 35180/GOS/CVD/003/A:
- a. data cable(s) owned by Zayo that runs parallel to Meridian Way and underneath the entrance into Ardra road.

Virgin

- 3.3.14 Data telecom cable(s) owned by Virgin cut across the top of Ardra Road just within the Application Site before the junction with Meridian Way and this can be found in Appendix A 35180/GOS/CVD/003/A.

4 Required new utility infrastructure at Edmonton EcoPark

- 4.1.1 This section describes the required new utility infrastructure and covers electricity, water, surface water and foul drainage, telecommunications, gas apparatus and gas connections. Please also see Section 6 which describes planned diversions and the impacts of existing utilities.
- 4.1.2 The latest requirements are set out below. Section 4.2 indicates the level of electrical export from the proposed ERF and includes figures and the outcome of discussions with UKPN. Section 4.3 explains demand and gas-related infrastructure required to operate both the existing EfW facility and proposed ERF. This section also includes discussions with National Grid Gas. Section 4.5 details all water requirements for process and also for general uses. Surface water drainage and foul water drainage would be two separate systems. All surface water would discharge into the Enfield Ditch and new foul drainage would connect into the existing Chingford and Angel sewer. Some proposed new telecommunications connections have been identified on the Edmonton EcoPark and is further detailed in Section 4.8.
- 4.1.3 Various utility providers have confirmed services could be provided to the processes associated with both the existing EfW facility and proposed ERF while they are run in tandem during the Stage 2 (commissioning of the proposed ERF) but could not support both facilities if operated at full capacity. During Stage 2 both the existing EfW facility and the proposed ERF would not be operated together at full capacity. Communications with utilities providers to date are summarised in this Strategy and can be found in Appendix E.

4.2 Electricity

Proposed Edmonton EcoPark development

- 4.2.1 It is intended to re-develop the Edmonton EcoPark with the construction of a proposed ERF generating electricity using residual waste as a fuel and capable of an electrical output of around 70MW_e (gross).

Anticipated Edmonton EcoPark electrical consumers

- 4.2.2 At completion and during periods of nil generation i.e. generator outage, the proposed ERF and the other Edmonton EcoPark facilities would act as net importers (consumers) of electricity.
- 4.2.3 The proposed ERF would comprise a single turbine generator fed by two process lines, with associated supporting balance of plant and common services. The anticipated typical consumption of these loads (in MVA) is approximately 9MVA.
- 4.2.4 Other electrical consumers in the Edmonton EcoPark are estimated to make-up an additional 1.65MVA and would include the following:
- a. RRF;
 - b. weighbridge offices;

- c. EcoPark House (including welfare facilities for 110 persons, office accommodation for 50 persons, and visitor areas);
- d. vehicle parking compound;
- e. other services on the Edmonton EcoPark including site lighting, pumping etc.; and;
- f. firefighting (centralised- assume 500kVA, but diversified to zero).

4.2.5 These consumers in the Edmonton EcoPark would be supplied via an 11kV network originating within the proposed ERF.

Proposed total electrical load

4.2.6 From the above data that total electrical load drawn (imported) by the Edmonton EcoPark (in the absence of any generation) would typically amount to approximately 10.65MVA.

4.2.7 The existing EfW facility would remain in use until such time as the proposed ERF has been successfully commissioned and is of proven reliability. It is anticipated that the proposed ERF commissioning stage would last 12 months, during which time the waste treatment process would progressively transfer from solely using the existing EfW facility to only using the proposed ERF. Both facilities would not be running at full capacity at the same time.

4.2.8 During the proposed ERF's commissioning stage, the anticipated load drawn by the Edmonton EcoPark (in the absence of any generation) could potentially amount to 17.7MVA (6.6MVA for the existing EfW facility and 10.1MVA for the proposed ERF and other electrical consumers). The 6.6MVA is understood to be the maximum import load that the Edmonton EcoPark has drawn from UKPN under conditions of nil generation, hence all existing consumers such as bulky waste recycling and waste transfer activities would be included in this worst case figure. The extent to which their inclusion remains valid depends upon at what stage such existing facilities are demolished in the commissioning plan.

Proposed electrical export

4.2.9 It is expected that a maximum of around 70MW_e gross of electrical power export would be available from the electricity generating turbine when operating in power only mode (i.e. without the heat load of a district heating network). This figure would be reduced by a demand of approximately 11MW_e associated with the electrical consumers identified above. Hence the anticipated maximum net export of the Edmonton EcoPark would be circa 59MW_e.

4.2.10 During the commissioning stage, where both the existing EfW facility and the proposed ERF would be operating simultaneously (but not at full output), it is likely that the export limit of 70MW_e could be achieved for short periods of time when sufficient waste is available.

4.2.11 In order to conduct the increased electrical power export off the Edmonton EcoPark, it is proposed that two additional electricity cable circuits would be laid in parallel with the existing two cable circuits, with their termination

at the 33kV Substation as shown on drawing 35180/LON/CVD/014/E. The existing two UKPN-owned electricity cable circuits would be retained and updated.

- 4.2.12 Each of the existing two electrical circuits comprise a group of three cables, with differing types of cable being used for the five different sections of the route length. The upgrading would involve the installation of new polymeric cables in place of the two sections that comprise existing oil-filled cables, thereby improving the existing circuit rating. The old oil-filled cabling would subsequently be drained and the associated oil handling apparatus removed before being abandoned in situ.

During the period of construction

- 4.2.13 The cables shown on drawing 35180/LON/CVD/014/E represent the final design that is envisaged for the Edmonton EcoPark. Prior to construction, the final configuration would be determined as part of detailed design. However, the proposed concept can be found in Section 6.1.

4.3 Gas

- 4.3.1 The proposed ERF would have two boiler lines. Each boiler would incorporate between two and four burners. The non-typical demand would occur during start-ups and shut downs of the boilers. The minimum peak flow of gas to operate one boiler line at a time is 8,000m³/hr. Natural gas with a NCV of 35.7MJ/m³ and a minimum peak flow of 8,000m³/hr corresponds to 79,333kW.

- 4.3.2 A summary of the gas consumption under different boiler start up and shut down scenarios is set out below. The calculations are based on 8000m³/hr and gas with a NCV of 35.7MJ/m³ which would generate 79,333kW per hour:

Table 4.1: Gas consumption

	kW/hr			
Start up one boiler (estimated to be 8 hours)	634,667			
Shut down one boiler (estimated to be 4 hours)	317,333			
Consumption for 1 boiler at a time (with 1 start-up & 1 shut down)	952,000			
Quantity of combustion lines	Two as there are two new boilers			
Number of start-ups and shut downs per line per year	1	2	4	8
Annual consumption	1,904,000.00	3,808,000.00	7,616,000.00	15,232,000.00

- 4.3.3 To achieve optimal flexibility, both process lines (i.e. both boilers) need to be able to start up and shut down independently. This corresponds to an 'optimal flexibility' peak flow of 16,000m³/hr of natural gas. Natural gas with a NCV of 35.7MJ/m³ and an optimal flexibility peak flow of 16,000m³/hr corresponds to 158,666kW per hour. This demand should be sufficient to cover both facilities during the transition period.
- 4.3.4 Following the completion of National Grid's GT1 survey, National Grid confirmed that the nearest main with sufficient capacity (which is 200m away from the application site boundary) is a medium pressure main at two bar. National Grid requires the connection to be made into the existing two bar main, hence a new pipe is required to be laid in the position shown in 35180/LON/CVD/014/E up to the new gas kiosk. This would ensure the ability of the existing EfW facility and the proposed ERF to run in parallel during the transition period. An application for a connection to the nearest gas main which has sufficient capacity (which is 200 meters away from the Application Site boundary) would be made to National Grid closer to the time of the actual works taking place. This would entail a fee to National Grid to perform a pre-quote survey before producing the full quotation for the connection works involved.
- 4.3.5 The new gas pipe and kiosk drawing can be found in Appendix C titled 35180/LON/CVD/014/E.
- 4.3.6 The existing medium and low pressure gas pipes owned by National Grid Gas would be decommissioned. The gas meters owned by Gazprom would also be decommissioned.
- 4.3.7 Communications are ongoing with National Grid Gas and Gazprom in relation to this. A summary of communications can be found in Appendix E.

4.4 Heat networks

- 4.4.1 A heat network system does not form part of the application for a DCO (DCO). However, within the Application Site, safeguarded routes have been identified to enable the export of heat off-site.
- 4.4.2 The heat pipe route as detailed in the CHP Strategy (AD05.05) has been selected to avoid any clash with other significant utilities on the Edmonton EcoPark.

4.5 Surface water and foul drainage systems

- 4.5.1 There would be two new drainage systems, one for the surface water drainage and the other for domestic foul wastewater. Domestic foul wastewater would be transferred by gravity wherever possible into the existing Chingford Sewer. When gravity discharge is not possible, the flow would be pumped. Surface water drainage would also be transferred by gravity wherever possible into the Enfield Ditch after flows have passed through oil interceptors and attenuation tanks to be located within the Edmonton EcoPark. Spillages, fire water and runoff containment would be held in water attenuation tanks and could be tankered and treated off-site

if needed. The location of the pipes comprising the new drainage systems would be determined during detail design stage.

Surface water drainage system

- 4.5.2 The rainwater run-off from the soft landscaped areas of the Edmonton EcoPark would infiltrate into the ground, be managed via flood attenuation measures, or evaporate to the atmosphere. On the spill control strategy drawing that can be found in Appendix C (35180/LON/CVD/010/D), there are three tanks labelled in green titled V1, V2 and V3. These tanks would hold the surface water before it is pumped into the Enfield Ditch.
- 4.5.3 Rainwater run-off from hardstanding areas that is combined with any vehicle fuel spills and fire fighting runoff would be sent to an oil interceptor in order to remove oils and grease. An attenuation system made up of attenuation tanks, including a hydrobrake structure or similar, is required to achieve the required greenfield runoff rate prior to being discharged into the Enfield Ditch. Spent firewater would be contained and where possible treated for re-use in the thermal process. Untreated water would be tankered off-site to be treated elsewhere if needed.
- 4.5.4 Existing surface water and foul drainage systems may be decommissioned and removed. For further details on the Surface water drainage system please refer to the Preliminary Drainage Strategy (Appendix C of the Flood Risk Assessment (AD05.14)).

Foul water drainage system

- 4.5.5 The foul drainage system would be designed to connect to and service those areas of the Edmonton EcoPark and buildings that include areas of human activity such as toilets, welfare and messing facilities. New foul drainage would be connected to the existing Chingford and Angel Sewer. This is shown in drawing 35180/LON/CVD/012/F as connection point 3.
- 4.5.6 The RRF would be constructed over the Chingford and Angel Sewers which cross the Edmonton EcoPark. As a consequence of this, the Chingford and Angel Sewers need to be diverted. An agreement in principle has been reached with TWUL for diversion of these sewers and also to build over them. This agreement in principle also covers the construction of four external access manholes to provide access to the sewers. This diversion is considered to be the most suitable for the new Edmonton EcoPark design. See Appendix C (35180/LON/CVD/012/F) for the proposed layout of the diverted pipes.
- 4.5.7 The existing connection to the Chingford Sewer (shown on drawing 35180/LON/CVD/002/D) in the vicinity of the contractors' compound would be decommissioned once the proposed ERF is fully operational. This work would be part of the existing EfW facility decommissioning and would be undertaken by TWUL. Agreement with TWUL will be sought at a later time.

4.6 Water strategy

- 4.6.1 The water balance for the proposed ERF is detailed in the following paragraphs.
- 4.6.2 Water supply for the Edmonton EcoPark would come from two sources: TWUL mains for potable water and Deephams STW outflow channel for the rest of the water required within the Edmonton EcoPark.
- 4.6.3 A new raw water pumping station is required to be constructed adjacent to Ardra Road. New raw water pipes are also required to connect the new water pumping station to the pre-treatment plant within the proposed ERF. These new pipes would be laid along the eastern bank of Salmons Brook. The pre-treated water drawn from Deephams STW outflow channel would feed the boilers, demineralised water plant, and FGT (including process pit). For emergency purposes, the water required for the firefighting system could be fed directly from Deephams STW outflow channel.
- 4.6.4 Communications with TWUL regarding a new Trade Effluent Agreement have concluded. TWUL have issued a new consent for the discharge of trade effluent into a public sewer (Chingford Sewer) for the proposed Edmonton EcoPark with approved discharge limits. A copy of the consent can be found in Appendix F.
- 4.6.5 The water inputs and outputs can be found in Tables 4.1 under Paragraph 4.9.2.
- 4.6.6 The details of water systems are provided below:

Deephams Sewage Treatment Works treated water

- a. It is proposed to draw 130m³/h of water from the Deephams STW outflow channel via the new water pumping station adjacent to Ardra Road. The water would undergo filtering followed by treatment in a pre-treatment plant. The pre-treated water drawn from Deephams STW outflow channel would feed the demineralised plant, and FGT (including process pit). For emergency purposes, the water required for the firefighting system could be fed directly from Deephams STW outflow channel.

Demineralised water for producing steam

- b. Demineralised water would be produced in the Demineralised Plant and would be fed by the pre-treated water in the pre-treated water treatment plant. The Demineralised Plant would need a feed of 20m³/h from the water pumping station. A typical design of a demineralised plant could be formed by a system of ion exchange chains or a reverse osmosis. In both cases a reject of 5m³/h is expected. Demineralised water (also known as make-up water) would be required to replenish water within the boiler lost through natural evaporation and also from blow down (boiler circuit cleaning) whereby residual solids are flushed from within the boiler system. The blow down from the boiler is estimated to be 10 per cent of the boiler infeed stream.

Flue Gas Treatment

- c. Waste combustion would result in the production of gases consisting of water vapour, carbon dioxide and excess air. This mixture of combustion gases is termed 'flue gas' and carries components including acid gases, organic substances, heavy metals and fly ash particles that require treatment.
- d. There are a range of FGT technologies available for use, and as the final option has not been determined at this point. To determine the maximum water demand it is assumed a wet scrubbing technology would be installed.
- e. The process pit and FGT consumptions are part of the thermal processes. The consumption requirement for the wet FGT is 100m³/h and the consumption requirement for the Process Pit is 10m³/h. The process pit collects reject water that in turn helps feed the slag treatment. There would be a small amount of water from these main processes that would feed into other uses such as smaller coolers etc.
- f. If a Wet FGT System is selected as the technology for the FGT, a WwTP would need to be installed in the proposed ERF. The average treated water of this facility is between 15-40m³/h and the WwTP would be designed to 60m³/h. The variation in average consumption is because of a combination of factors such as air supply for combustion, waste composition and plant configuration for heat recovery.

Mains potable water from Thames Water Utilities Limited

- g. It is proposed to draw 11.1 m³/h of water from a mains potable water to be installed within the Edmonton EcoPark. An agreement in principle has been reached with TWUL for the connection into an existing 355mm pipe that can supply the required amount of potable water. The communication with TWUL is summarised in Appendix E. This would require the installation of a new potable water supply pipe within the Edmonton EcoPark along the edge of Salmon's Brook to supply the RRF and proposed ERF. The drawing showing the new pipe to be installed within the Edmonton EcoPark and the new connection point can be found in drawing 35180/LON/CVD/013/D Appendix C. If required, the potable water main would also be capable of feeding the Demineralised Plant, thermal processes (including process pit), plant cleaning for the proposed ERF, as well as potable uses.
- h. The existing connection (including valves and meter reading) to the potable water main located in the entrance of the Edmonton EcoPark would be decommissioned and may be removed once the new facilities are fully operational. Agreement with TWUL for the decommissioning of the existing potable water connection would be sought at a later time.

Personal hygiene and human consumption

- i. Potable water would be used for personal hygiene and human consumption throughout the Edmonton EcoPark and would discharge through the foul water sewer system. In order to calculate the maximum loads of potable water, it is estimated on average that 150 people would be working at the Edmonton EcoPark. Potable use is estimated to be 1.1m³/h and this would discharge into the Chingford Sewer.

Plant cleaning

- j. Approximately 10m³/h of potable water would be needed to clean the proposed ERF plant. This is for routine cleaning of plant surfaces and assumes that there are no spillages or contamination. The consumed plant cleaning water is assumed in this Strategy to evaporate after use.

Rainwater from roofs

- k. Rainwater from roofs is estimated to be 0.74m³/h. Before use in any part of the Edmonton EcoPark the rainwater would undergo elementary filtering and disinfection. Rainwater would be collected in reservoirs, and the filtering would reduce the total suspended solids to less than 1mg/l.

Washing plant, equipment and hard surfaces

- l. The wash-down area would require an amount of 0.5m³/h of water that would be supplied by rainwater that falls off the roofs. The collected rainwater would be filtered and disinfected prior to use anywhere on the Edmonton EcoPark. Waste would be delivered to and transported within the Edmonton EcoPark by Refuse Collection Vehicles (RCVs) or Heavy Goods Vehicles (HGVs) so a specialist vehicle wash area would be provided. In addition, special hoses for cleaning areas at the various site functions would be allocated.
- m. The wash-down area would contain a sealed drainage system as any discharges are likely to be contaminated. They would first discharge into the FGT WwTP to be treated before being discharged into Chingford Sewer.

Dust suppression

- n. Treated rainwater would be used for the dust suppression system in the RRF and proposed ERF, which would consist of a water spray system. The water spray system would be installed in the tipping halls, proposed ERF and the bunded RRF. The dust suppression system is estimated to need 0.2m³/h of water.

Firefighting system

- o. The future firefighting systems and demands are not defined in detail. However, broadly based on similar sized projects the firewater flows and volumes would be approximately 1,000m³ for the proposed ERF

and 450m³ for the RRF. Fire water would be pumped into sprinkler systems via dedicated pumps drawing from holding tanks. The tanks would be fed from the rainwater with an emergency line from the mains potable water.

- p. In an emergency, the contaminated firewater runoff would be directed to a storage containment system, where it would be tested and treated before discharge. Secondary and tertiary containment options would be analysed as part of the detailed design.

4.7 Wastewater

4.7.1 A new WwTP would be constructed and would be connected to the Chingford Sewer through connection point 1 shown in the drawing 35180/LON/CVD/012/F. The WwTP would have the ability to treat a number of streams requiring treatment prior to entering the Chingford Sewer.

4.7.2 The streams that would need treatment include:

- a. blowdown from the boiler (in normal operation slowdown would flow to the process pit but in case of an emergency it could be treated in the WwTP);
- b. effluents from the FGT (if Wet FGT selected);
- c. effluents from the raw water treatment plant;
- d. effluents from the Demineralised Plant (in normal operation would flow to the process pit but in case of an emergency it can be treated in the WwTP);
- e. effluents from the Wash down areas; and
- f. effluents from the Gully waste.

4.7.3 TWUL has granted a discharge consent for the discharge of waste water from the proposed WwTP.

4.8 Telecommunications

4.8.1 BT Openreach had previously provided plans showing existing BT apparatus. The plans were superimposed onto the new Edmonton EcoPark layout and affected BT apparatus are shown on the drawing in Appendix C 35180/LON/SKT/006/C. Existing BT apparatus may need to be removed/relocated however there are still ongoing communications with BT.

4.8.2 A new telecommunications system would be laid within the EcoPark and reconnected to BT services.

4.9 Other information

4.9.1 The schematic for the water balance (future capacity) can be found in Appendix B.

4.9.2 The following table list the water abstractions and discharges point and flows.

Table 4.2: Water consumption

Description	Input flows	Output flows
	m ³ /h	m ³ /h
Imported water to the facility		
Raw water (Deephams STW)	130	-
Potable water (TWUL main)	11.1	-
Rainwater (from roofs)	0.74	-
Water consumption in the facility		
Boiler	15	1.5
Thermal process, FGT and process pit	110	40
ERF plant cleaning	10	-
Washing operations	0.5	0.5
Potable uses	1.1	1.1
Non-potable uses	0.03	-
Fire and dust suppression systems	0.2	-
Discharges from the facility		
Chingford sewer (2 connections)	-	
Option #1: FGT WWTP effluent	-	Up to 60
Option #3: Potable and non-potable uses	-	1.1
Enfield Ditch	-	tbc

5 Required new utility infrastructure on land to the east and land to the north of the Edmonton EcoPark

5.1.1 The required new utility infrastructure covers electricity, water, surface water and foul drainage and telecommunications.

5.2 Land to the east of the Edmonton EcoPark

5.2.1 The Temporary Laydown Area would be established at the beginning of the construction stage and would provide the following site establishment facilities for the duration of the project, until demobilisation (completion and removal of the physical and manpower resources from a construction site at the completion of the project):

- a. site offices;
- b. storage of construction materials, plant and machinery;
- c. fabrication/sub-assembly; and
- d. construction staff and contractor vehicle parking.

5.2.2 It is estimated that the Temporary Laydown Area would need to cater for approximately 150 persons, rising to 600 persons at the peak of construction. This proposed site accommodation would cover 3,000m² and be in the form of stacked modular accommodation units.

Electricity supplies

5.2.3 Based on an allowance of 3kW per 9m² of office/accommodation unit, a winter demand of 1,000kW could be anticipated. Additionally, an allowance of 50kW for area lighting and 200kW to cover fabrication sheds at the Edmonton EcoPark should be made. It would therefore be necessary to make a connection application to UKPN for the provision of around 1,315kVA (1,250 kW at 0.95 pf) low voltage power supply. This would be derived by UKPN from their local 11kV distribution system, and would need to be in place for the duration of the construction process, albeit with a reduced capacity as the construction activities wind down in their latter stages. UKPN would be responsible for providing this electricity and the source of this supply is ongoing.

5.2.4 A new street lighting system would be required to be installed along Lee Park Way. To enable this, new electricity cables and associated apparatus are required to be laid. The route of these cables would be determined at the detailed design stage.

Potable water

5.2.5 It is anticipated that water would be required in the Temporary Laydown Area for the following purposes:

- a. domestic and welfare facilities for onsite staff;
- b. cleaning of materials/ equipment storage areas (including high pressure washer, tool and equipment washing);
- c. pre-construction activities (such as hydraulic tests); and

d. firefighting systems.

- 5.2.6 Depending on the type of use, different water qualities would be required. However the demand for non-potable water would be much lower than the demand for potable water and therefore, in order to minimise connection requirements, it is recommended that only potable water is supplied to the Temporary Laydown Area.
- 5.2.7 Based on an allowance of 125 litres per person per day, the volumetric range of potable water to be supplied would be 0.8 to 3.1m³/h for 150 to 600 workers respectively. An additional demand of 0.5 to 1.0m³/h is anticipated for cleaning and pre-construction activities however this would need to be confirmed by the ERF contractors.
- 5.2.8 A connection application has been made to TWUL for the supply of 1.3 to 4.1m³/h of potable water to the Temporary Laydown Area. An agreement in principal has been reached with TWUL and the proposed new connection would be from an existing 6" main that runs along the east of the Temporary Laydown Area. The agreed connection point is shown on drawing 35180/GOS/CVD/002/D Appendix D. New water pipes would need to be laid by the Applicant from the new connection point to the Temporary Laydown Area water consumers however the proposed pipe route would be identified during detailed design. The connection would need to be in place for the duration of the construction process, albeit with a reduced water consumption as the construction activities wind down in the latter stages.
- 5.2.9 Access to the following TWUL potable pipes could be limited during the period of construction and use of the Temporary Laydown Area:
- a. the five pipes that run along the east of the River as mentioned in Paragraph 3.2.13; and
 - b. the 355mm feeder main that runs along Advent Way and cuts across the entrance to Lee Park Way as mentioned in Paragraph 3.2.14.

Foul and industrial wastewater

- 5.2.10 Effluents originating from the domestic and welfare facilities and materials/storage areas (washing and pre-construction activities) on the Temporary Laydown Area would be transferred by a new gravity drainage system wherever possible into a septic tank that would be periodically drained and the effluent tankered elsewhere for treatment. If gravity discharge is not possible, the flow would be pumped to the septic tank. This drainage system would be constructed within the proposed Temporary Laydown Area.
- 5.2.11 A typical domestic foul wastewater composition is expected from the domestic and welfare facilities. However, Chemical Oxygen Demand (COD) and Suspended Solids (SS) could be potentially high in effluents from storage areas due to the presence of oil and suspended solids. This wastewater would also be pumped or transferred by gravity into another septic tank and tankered off the Temporary Laydown Area periodically.

Surface water drainage system

- 5.2.12 A new surface water drainage system would be designed during detailed design.
- 5.2.13 It has been proposed to drain the surface water into the River Lee Navigation, however further consultation is needed with the Canal and River Trust (CRT). The attenuation and treatment could be provided by the SuDS (Sustainable Drainage System) in the form of swales, filter strips, oil interceptors, below ground tanks or a retention pond. The proposed surface water drainage system is further detailed in the Flood Risk Assessment (AD05.14).

Sludge mains

- 5.2.14 A car park would be built over the active sludge mains that run along the River Lee Navigation within the Temporary Laydown Area. TWUL have confirmed that no diversion of pipes or build-over agreements are needed, even though the sludge mains are active, as the mains would remain unaffected. A summary of communications with TWUL regarding the sludge mains can be found in Appendix E.
- 5.2.15 The following pipe may not be affected during the period of construction and use of the Temporary Laydown Area:
 - a. Sludge mains owned and operated by TWUL as mentioned in Paragraph 3.2.11.

Sewers

- 5.2.16 The following pipe may not be affected during the period of construction and use of the Temporary Laydown Area:
 - a. TWUL combined sewer as mentioned in Paragraph 3.2.16.

Telecommunications

- 5.2.17 Telephone, internet and CCTV cameras would be needed in the Temporary Laydown Area. The telephone and internet cables would be connected to a BT connection point located just to the east of the entrance onto Lee Park Way from Advent Way as shown on drawing 35180/GOC/CVD/002/D. The design of this system would be developed during detailed design.
- 5.2.18 Access to the BT cables that cuts across the entrance to Lee Park Way could be limited while the landscaping of the entrance to Lee Park Way is undertaken.

5.3 Land to the north of the Edmonton EcoPark

Electricity

- 5.3.1 Electricity supplies would be required for the proposed Deephams Farm Road access to the Edmonton EcoPark in order to both illuminate Deephams Farm Road and to supply the new raw water pumping station.

Ardra Road would not require any kind of lighting as the existing lighting is already suitable.

5.3.2 New street lighting, including appropriate cabling, would be installed along Deephams Park Road. It may be necessary for an existing BT cable to be re-located or otherwise diverted.

5.3.3 A new electricity cable would be required from the Edmonton EcoPark to the new water pumping station. This cable would be laid within the bank of Salmon's Brook, and would not affect any existing infrastructure. This new electricity cable would either run under or over the existing Combined Sewer shown on Drawing 31580/GOS/CVD/003/A. The cable presently feeding the existing pumping station and the switchgear would be decommissioned.

5.3.4 Therefore, new piping and cabling would use current routes. If this assumption changes, a further study would be undertaken to finalise the configuration of new and existing utilities in the area.

Raw water

5.3.5 The existing pumping station would be demolished and replaced with a new water pumping station adjacent to the location of the existing water pumping station. New raw water pipes would be laid and these new pipes would run from the new pumping station south under the eastern bank of Salmon's Brook and down to the Edmonton EcoPark in order to feed the pre-treatment plant.

Surface water drainage

5.3.6 The existing Surface Water Drainage system that is believed to run under Deephams Farm Road (ownership and exact location unknown) would need to be removed. In its place a new surface water drainage system draining to the Edmonton EcoPark would be laid.

Foul/combined water drainage

5.3.7 No new foul/combined water drainage infrastructure would be required.

Potable Water

5.3.8 No new potable water infrastructure would be required.

Gas

5.3.9 No new gas infrastructure would be required.

Telecoms

5.3.10 CCTV camera(s) would be needed along Deephams Farm Road. The design of this system will be developed during detailed design.

5.3.11 A telephone line may also be required along Deephams Farm Road.

5.3.12 A BT cable extending across the northern section of Deephams Farm Road, as shown on drawing 35180/GOS/CVD/001/C. This cable may be repositioned due to the proposed works to Deephams Farm Road.

6 Planned diversions/impacts or stopping up and decommissioning of existing utilities

6.1 General

- 6.1.1 Access to all existing utilities within the Application Site would be affected during construction works. The following sections describe physical impacts only to existing utilities within the Application Site.
- 6.1.2 If a utility is not detailed within this section, it would not be physically affected by the proposed works.

6.2 Electricity on the Edmonton EcoPark

- 6.2.1 During the transition stage of the project, when both the existing EfW facility and the proposed ERF processes would be operating simultaneously (for a limited period of time and not at full capacity), it is likely that the export limit of 70MW_e could be achieved for short periods of time when sufficient waste is available.
- 6.2.2 The uprating would involve the installation of new cables in parallel with the existing cables and by installing new polymeric cables in place of the oil-filled sections of cable to provide a connection of increased rating.
- 6.2.3 It is anticipated (though yet to be agreed with UKPN) that the uprated grid connection cabling (two underground cable circuits from the UKPN Tottenham Grid Substation) would be connected into UKPN owned switchgear to be located in the proposed ERF's 33kV Substation. Therefore there would be a total of four proposed electricity cable circuits and their route is as shown on drawing 35180/LON/CVD/014/E. In order to operate both the existing EfW facility and the proposed ERF simultaneously as outlined above, it would be necessary to provide interlinking cable circuits between the proposed ERF's 33kV Substation and the existing UKPN 33kV apparatus located in the existing EfW facility substation, in order for the existing EfW facility to remain connected to the grid and hence in operation. Drawing 35180/LON/CVD/014/E shows the location of the existing EfW facility substation and the proposed ERF 33kV Substation. (The specific details concerning this interlinking cabling and the manner in which it would be installed has yet to be agreed with UKPN.
- 6.2.4 UKPN owns equipment that is located within the existing EfW facility and its substation. The intention is to decommission the UKPN-owned equipment within the existing EfW facility and its substation.
- 6.2.5 In addition, other electricity cables within the Edmonton EcoPark owned by LWL would possibly be replaced or relocated.

6.3 Electricity for the land to the east of the Edmonton EcoPark

- 6.3.1 The laying of the new electricity cables could affect the following electricity apparatus:

- a. the electric cable and any associated apparatus owned by UKPN within the boundary of the Application Site as shown on drawing number 31580/GOS/CVD/002/D may need to be diverted; and
 - b. National Grid underground (pilot) control cables may need to be repositioned.
- 6.3.2 UKPN would be asked to divert the existing 11kV overhead line that runs within the land to the east of the Edmonton EcoPark outside of the Temporary Laydown Area.
- 6.3.3 The following are apparatus that are unlikely to be affected during the period of construction and use of the Temporary Laydown Area as necessary clearances would be observed to avoid them:
- a. two overhead tower transmission lines operating at 275 kV owned by National Grid as per Paragraph 3.2.6;
 - b. UKPN cables that cross the River Lee Navigation as per Paragraph 3.2.3; and
 - c. UKPN cables that continue down towards the roundabout off Advent Way as per Paragraph 3.2.6.
- 6.3.4 For the avoidance of doubt, the required new electricity cables for street lighting along Lee Park Way would not affect any existing utilities in this part of the Application Site.

Clearance to maintain for electricity overhead lines

- 6.3.5 The existence of two overhead tower transmission lines owned by National Grid operating at 275 kV running over the proposed Temporary Laydown Area would mean that any work undertaken in the vicinity should comply with the clearance dimensions detailed below. An approved work procedure would be drafted in order to ensure compliance with any stipulated clearances.

Table 6.1: Clearance of Overhead Lines

Lowest point of line	Ground level	Difference	Applicable safety zone: minimum clearance	Resulting clearance: freeboard	Comments
Northern boundary of area TL1 (parking): under circuit ZBC: 25.5m	11.5	14	Item 3: road surface: 6.1 m road routes >9.2 m min.	4.8 m	Means must be taken to preclude use of telescopic cranes in this area, unless jib height can be mechanically limited.
Site access TL7 (Ramp): under circuit ZBD: 32m	14	18	Item 4: road surface with potential 'Skycradle' use >10.5 m min.	7.5 m	No issues

Lowest point of line	Ground level	Difference	Applicable safety zone: minimum clearance	Resulting clearance: freeboard	Comments
Southern edge of areas TL1 (parking) & TL2 (offices): 32m	15 m	17	Item 6: building with ladders/ access platform >5.1 m min.	11.9 m	No issue, apart from modular site office delivery, or the stacking of multiple units.

6.3.6 The following tower transmission clearances have also been stipulated by National Grid:

- a. any construction under the lines should allow for possible upgrade of the line;
- b. it is the responsibility of the third party to ensure safety clearances are met by their proposed operations by using the bottom conductor attachment points as reference benchmarks; and
- c. clearances must be maintained if the conductors swing (blow-out) to a maximum of 45 degrees during very strong winds.

6.3.7 The clearances set out below in Table 6.2 have been extracted from National Grid's Energy Networks Association Technical Specification 43-8.

Table 6.2: Clearances from National Grid's Energy Networks Association Technical Specification

Description of clearance	Minimum clearance (metre) at 400 kV
To ground	7.6
To normal road surface	8.1
To road surface of designated '6.1 metre high load' routes	9.2
To motorway or other road surface where 'skycradle' can be used	10.5
To motorway road surface where scaffolding is to be used on: i) normal 3 lane motorways, ii) elevated 2 lane motorways	16.3 13.3
To any object/building on which a person may stand, including ladders, access platform etc	5.3
To any object to which access is not required AND on which a person cannot stand or lean a ladder	3.1
To trees under or adjacent to line and i) unable to support ladder/climb, ii) capable of supporting ladder/climber, iii) trees falling towards line with line conductors hanging vertically only	3.1 5.3 3.1
To trees in orchards and hop gardens	5.3
To irrigators, slurry guns and high pressure hoses	30

- 6.3.8 The drawings stipulating clearances from National Grid can be found in Appendix C: National Grid Safety Clearances.
- 6.3.9 In the light of Table 6.2 above, the use of stacked modular office/accommodation units and their craneage would need to be limited in the vicinity of the overhead lines.
- 6.3.10 Similarly, cognisance must be taken of the 11kV overhead line running on the northern boundary of the Temporary Laydown Area owned by UKPN.
- 6.3.11 As per Section 3, the Temporary Laydown Area would tap into the existing 11kV UKPN distribution system and any impact the new electricity cables could have on existing utilities would be considered at a later stage of design with UKPN.
- 6.3.12 Electricity supplies would be required for the proposed Deephams Farm Road access to the Edmonton EcoPark in order to both illuminate Deephams Farm Road and to supply the new water pumping station. It is not proposed to make changes to the lighting on Ardra Road as the existing lighting is suitable.
- 6.3.13 New street lighting, including appropriate cabling, would be installed along Deephams Park Road. It may be necessary for an existing BT cable to be re-located or otherwise diverted.
- 6.3.14 A new electricity cable would be required from the Edmonton EcoPark to the new water pumping station. This cable would be laid within the bank of Salmon's Brook, and would not affect any existing infrastructure. This new electricity cable would either run under or over the existing combined sewer shown on Drawing 31580/GOS/CVD/003/A.
- 6.3.15 The cable presently feeding the existing water pumping station and the switchgear would be decommissioned. Therefore, new piping and cabling would use current routes. If this assumption changes, a further study would be undertaken to finalise the configuration of new and existing utilities in the area.

6.4 Gas on Edmonton EcoPark

- 6.4.1 The existing medium and low pressure gas pipes within the Edmonton EcoPark that are owned by National Grid Gas would be decommissioned. The gas meters owned by Gazprom located within the Edmonton EcoPark would also be decommissioned.
- 6.4.2 Section 2.2 of this Strategy describes the gas infrastructure inside the Edmonton EcoPark owned by LWL. These systems and the connections to the mains pipes would be removed.
- 6.4.3 Please see Section 4.3 for details of the new connection in order to connect the new gas pipes.

6.5 Potable water on Edmonton EcoPark

- 6.5.1 The potable water supply, which is taken from the local distribution network owned and operated by TWUL and running from Advent Way and into the Edmonton EcoPark, would be decommissioned and would likely

be removed. The point of connection with the main TWUL network is at Advent Way, beside the entrance to the Edmonton EcoPark (see drawing 35180/LON/CVD/003/D in Appendix A). All material in the supply system comprising an electromagnetic flow meter would be removed.

- 6.5.2 The potable water infrastructure inside the Edmonton EcoPark owned by LWL and the connection to the TWUL pipe supply would be removed.
- 6.5.3 A new connection with the TWUL main would be required as stated in Paragraph g.

6.6 Potable water on the land to the east of Edmonton EcoPark.

- 6.6.1 A new potable water pipe would need to be laid and connected to the existing TWUL potable water main. A connection application has been made to TWUL for the supply of 1.3 to 4.1m³/h of potable water to the Temporary Laydown Area. An agreement in principal has been reached with TWUL and the proposed new connection would be from an existing 6" main that runs along the east of the Temporary Laydown Area. The agreed connection point is shown on drawing 35180/GOS/CVD/002/D in Appendix D.
- 6.6.2 The proposed potable water system in the Temporary Laydown Area would not physically affect any existing utilities.
- 6.6.3 Access to the following TWUL potable pipes could be limited during the period of construction and use of the Temporary Laydown Area:
 - a. the five pipes that run along the east of the River Lee Navigation as mentioned in Paragraph 3.2.13; and
 - b. the 355mm feeder main that runs along Advent Way and cuts across the entrance to Lee Park Way as mentioned in Paragraph 3.2.14.

6.7 Wastewater treatment plant within Edmonton EcoPark

- 6.7.1 The existing WwTP, including networks of pipes transporting the effluent, would be decommissioned and removed.
- 6.7.2 A new connection named as connection 1 would be required in order to connect the new WwTP into the Chingford Sewer (see Drawing 35180/LON/CVD/012/F).

6.8 Foul/combined and surface water on the Edmonton EcoPark

- 6.8.1 Section 2.4 of this Strategy describes the surface and foul drainage inside the Edmonton EcoPark owned by LWL. These drainage systems and the connections to the Chingford sewer would be removed. Paragraph 4.5.5 details the new connection to the Chingford Sewer that would be required for the new foul drainage system.
- 6.8.2 Due to layout requirements, the building of the RRF would be constructed over the Chingford and Angel sewers crossing the Edmonton EcoPark. As

a consequence of this, the Chingford and Angel sewers would need to be diverted. Therefore an agreement in principle has been reached with TWUL for diversion of these sewers and also to build over them. This agreement in principle also covers the construction of four external access manholes to provide access to the sewers from outside the RRF. This would enable TWUL to maintain its access to the sewers (see Drawing 35180/LON/CVD/012/F).

6.9 Foul and industrial wastewater drainage system and surface water drainage system on land to the east of Edmonton EcoPark

6.9.1 The new foul and industrial drainage system would not affect any existing utilities. Details of the new system are provided in Paragraph 6.2.11.

6.9.2 The new surface water drainage system would not affect any existing utilities. Details of the new system are provided in Paragraph 6.2.14.

6.10 Foul/combined and surface water drainage system on land to the north of Edmonton EcoPark

6.10.1 As a consequence of laying new raw water pipes from the new water pumping station, it may be necessary to reposition the section of the existing surface water drainage system owned by TWUL that runs underneath the eastern bank of Salmon's Brook. This section is shown on drawing 35180/GOS/CVD/003/A.

6.10.2 The existing surface water drainage system that is believed to run under Deephams Farm Road (ownership and exact location unknown) would need to be removed. In its place a new surface water drainage system draining to the Edmonton EcoPark would be laid. Details of the new system are provided in Paragraph 5.3.7.

6.11 Cooling water pipes and water pumping station in the land to the north of Edmonton EcoPark

6.11.1 Cooling water pipes from the existing water pumping station adjacent to Ardra Road would be decommissioned and removed.

6.11.2 The existing water pumping station would be decommissioned and demolished.

6.11.3 The construction of the new water pumping station and laying of the new raw water pipes would not affect any existing utilities. Details of the new system are provided in Paragraph 6.3.6.

6.12 Telecommunications in the EcoPark

6.12.1 Existing BT apparatus as shown on the drawing in Appendix C 35180/LON/SKT/006/C may need to be removed/relocated, however there are ongoing communications with BT to establish if works would be required.

6.12.2 A new telecommunications system would be laid within the Edmonton EcoPark and reconnected to BT services.

6.13 Telecommunications in the land to the north of Edmonton EcoPark

6.13.1 CCTV camera(s) would be needed along Deephams Farm Road. The design of this system would be developed during the detailed design.

6.13.2 A telephone line may also be required along Deephams Farm Road.

6.14 Telecommunications in the land to the east of Edmonton EcoPark

6.14.1 Telephone, internet and CCTV cameras would be needed in the Temporary Laydown Area. The telephone and internet cables would be connected to a BT connection point located just to the east of the entrance onto Lee Park Way from Advent Way as shown on drawing 35180/GOS/CVD/002/D. The design of this system would be developed during the detailed design.

6.14.2 Access to the BT cables that cut across the entrance to Lee Park Way could be limited to the period during which landscaping works to the entrance to Lee Park Way are undertaken.

6.15 Summary of impacts on existing utilities within the Application Site

6.15.1 The following tables (Tables 6.3 to 6.5) summarise utility, stakeholders, nature of impact, apparatus affected, works planned and drawing(s) where the utility can be identified.

Table 6.3: Affected utilities – Edmonton EcoPark

Owner	Utility affected	Nature of impact	Apparatus	Works to be done	Drawing number
TWUL	Potable water	PHYSICAL	Potable water pipe (approx. 6) near Advent Way	Decommission and remove where necessary	35180/LON/CVD/003/D Appendix A
			New potable pipe (approx. 6 m) near Advent Way to be connected with Edmonton EcoPark internal network	New pipe to be connected	35180/LON/CVD/013/D Appendix C
TWUL	Combined sewer	PHYSICAL	Chingford Sewer	Diversion and build over and 2 (possibly 3) new connections into the sewer.	35180/LON/CVD/012/F Appendix C
			Existing foul/combined connection discharge into the Chingford Sewer	Decommission of the existing connection	35180/LON/CVD/002/D Appendix A
TWUL	Combined sewer	PHYSICAL	Angel Sewer	Diversion and build over	35180/LON/CVD/012/F Appendix C
National Grid Gas	Gas	PHYSICAL	Main medium pressure gas pipe running within easement strip	Decommission and remove	35180/LON/CVD/004/F Appendix A
			Main low pressure gas pipe running along Salmon's Brook until LondonWaste accommodation and parking area.	Decommission and remove	35180/LON/CVD/014/E Appendix C
UKPN	Electricity	PHYSICAL	Main Electricity Cables circuit (x2) running along easement strip	New Cables circuit (x2) to be laid to export energy from proposed ERF to the UKPN Network. The existing two electricity cables would be retained and upgraded.	35180/LON/CVD/004/F Appendix A
			New cables to interlink	Temporary works that	35180/LON/CVD/014/F

Owner	Utility affected	Nature of impact	Apparatus	Works to be done	Drawing number
			proposed ERF with existing EfW facility	would be decommissioned when the existing EfW facility is decommissioned	Appendix C
			Equipment that is located within the existing EfW facility and its substation.	Decommission and remove if necessary	
LWL	Electricity	PHYSICAL	High and low voltage cables supplying power to all equipment and systems in the existing EfW facility	Apparatus and cables would be removed, relocated, or replaced.	The exact location of these pipes would be determined during pre-construction site investigations.
LWL	Gas	PHYSICAL	Minor gas pipes supplying gas to the turbine hall, offices, welfare facilities, contractors compound and clinical waste	These pipes would be removed.	The exact location of these pipes would be determined during pre-construction site investigations.
LWL	Potable Water	PHYSICAL	Pipes and accessories supplying potable water to the existing EfW facility, visitors centre and offices	These pipes would be removed.	The exact location of these pipes would be determined during pre-construction site investigations.
LWL	Surface Drainage System	PHYSICAL	Pipes and accessories collection surface drainage. Attenuation tanks Pumps and other equipment	These pipes would be removed	The exact location of these pipes would be determined during pre-construction site investigations.
LWL	Foul/Combined Drainage System	PHYSICAL	Pipes and accessories Attenuation tanks Pumps and other equipment	These pipes would be removed	The exact location of these pipes would be determined during pre-construction site investigations.
LWL	WwTP	PHYSICAL	WwTP and pipes	Decommissioned and removed	35180/LON/CVD/0002/D

Owner	Utility affected	Nature of impact	Apparatus	Works to be done	Drawing number
BT	Data telecom	PHYSICAL	Apparatus and cables across Edmonton EcoPark	Decommissioned and Remove or relocation Connect new telecommunications cables to BT services	35180/LON/SKT/006/C Appendix C
LWL	Data cables, CCTV system.	PHYSICAL	Cables and apparatus	Decommissioned and remove	35180/LON/CVD/005/B

Table 6.4: Affected utilities- Edmonton EcoPark – land to the north of the Edmonton EcoPark

Owner	Utility affected	Nature of impact	Apparatus	Works to be done	Drawing number
National Grid Gas	Gas	Limited access. ACCESS RIGHTS	Gas pipe originating from Meridian Way into Ardra Road that runs adjacent to Ardra Road and has three branches. The first branch feeds the Lee Valley industrial estate, the second feeds into the bend of Ardra road and the third branches down southwards towards the Edmonton EcoPark.	None	35180/GOS/CVD/003/A Appendix A
TWUL	Surface water sewer	PHYSICAL	Surface water sewer that cuts across top quarter of Deephams Farm Road	Reposition the pipes.	35180/GOS/CVD/003/A Appendix A
TWUL	Combined sewer	Limited access. ACCESS RIGHTS	Chingford Sewer under bank to Salmon's Brook	None	35180/GOS/CVD/003/A Appendix A
Unknown	Surface water drainage system	PHYSICAL	Pipes associated with the surface water drainage system that whose pipes are believed to run under Deephams Farm Road	Remove and construct a new surface water drainage system draining to the Edmonton EcoPark	
TWUL	Potable water	Limited access. ACCESS RIGHTS	Potable 200mm diameter water main starts from Advent Way that runs along the Edmonton EcoPark parallel to Salmon's Brook, and continues through Deepham's Farm Road, Ardra Road and	None	35180/GOS/CVD/003/A Appendix A

Owner	Utility affected	Nature of impact	Apparatus	Works to be done	Drawing number
			ends just before Meridian Way. A branch from this main turns right into Ardra Road that heads towards the Biffa owned MRF		
UKPN	Electricity	PHYSICAL	Multiple electricity cables that run across and/or parallel to Deephams Farm Road, Ardra Road from the northern boundary of the Edmonton EcoPark toward the junction of Ardra Road and Meridian Way, and also underneath the eastern bank to Salmon's Brook running south toward the Edmonton EcoPark.	The electrical cable under the eastern bank of Salmon's Brook would be disconnected and decommissioned. New pumping station: Lay a new electricity cable from the Edmonton EcoPark to the new water pumping station within the bank of Salmon's Brook. Cable supplying the existing pumping station would be disconnected, decommissioned and may be removed.	35180/GOS/CVD/003/A Appendix A
UKPN	Electricity	PHYSICAL	The existing electrical substation (shown as a small black square on Drawing 31580/GOS/CVD/003 Revision A).	The electrical substation would be replaced or refurbished.	35180/GOS/CVD/003/A Appendix A
Vodafone	Data telecom	Limited access. ACCESS RIGHTS	Cable that cuts across the top of Ardra Road just inside the Application Site before the junction with Meridian Way	None	35180/GOS/CVD/003/A Appendix A
Virgin	Data telecom	Limited access. ACCESS RIGHTS	Cable that cuts across the top of Ardra Road just inside the Application Site before the junction with Meridian Way	None	35180/GOS/CVD/003/A Appendix A
BT	Data Telecom	PHYSICAL	Cable that cuts across Deephams Farm Road	Possible repositioning due to works along Deephams Farm Road	35180/GOS/CVD/003/A Appendix A

Owner	Utility affected	Nature of impact	Apparatus	Works to be done	Drawing number
BT	Data Telecom	Limited access. ACCESS RIGHTS	Cable running under Ardra Road	None	35180/GOS/CVD/003/A Appendix A
BT	Data Telecom	Limited access. ACCESS RIGHTS	Cable that runs under bank to Salmons Brook	None	35180/GOS/CVD/003/A Appendix A
ZAYO	Data Telecom	Limited access. ACCESS RIGHTS	Cable that runs parallel to Meridian Way and underneath the entrance into Ardra Road.	None	35180/GOS/CVD/003/A Appendix A

Table 6.5: Affected utilities- Edmonton EcoPark- land to the east of the Edmonton EcoPark

Owner	Utility Affected	Nature of impact	Apparatus	Works to be done	Drawing number
TWUL	Sludge Mains	Limited access during limited time ACCESS RIGHTS	Sludge mains (x2)	None	35180/GOS/CVD/004/A Appendix A
BT	Data telecom	Limited access during limited time ACCESS RIGHTS	Cables cut cross the entrance to Lee Park Way as it comes around the roundabout off Advent Way.	None	35180/GOS/CVD/002/D Appendix A
BT	Connection to BT junction box	PHYSICAL	Connection to BT junction box.	Connection to BT junction box to create data and telecom link	35180/GOS/CVD/002/D Appendix A
UKPN	Electricity	Limited access during limited time ACCESS RIGHTS	Three cables running from the north of the River Lee Navigation towards the area to the east of the Edmonton EcoPark.	None	35180/GOS/CVD/004/A Appendix A
UKPN	Electricity	PHYSICAL	Cable located within Laydown area from the substation located within the periphery of	Reposition or divert	35180/GOS/CVD/004/A

Owner	Utility Affected	Nature of impact	Apparatus	Works to be done	Drawing number
			the red line boundary which then cuts across the roundabout off Advent Way and continues across the North Circular Road		Appendix A
UKPN	Electricity	PHYSICAL	Overhead line (11KV)	Reposition or divert	35180/GOS/CVD/004/A Appendix A
National Grid	Pilot / control cable	Limited access during limited time ACCESS RIGHTS	Underground cable runs through the proposed Temporary Laydown Area carpark	Potentially divert	35180/GOS/CVD/004/A Appendix A
National Grid UK Transmissions	Electricity	ACCESS RIGHTS	Two Overhead cables (275 kV) and towers	Internal working procedures would maintain clearance. No interference	35180/GOS/CVD/004/A Appendix A
TWUL	Potable water	Physical connection into the 6". Limited access during limited time to the others. ACCESS RIGHTS	Five potable water pipes that run along the east of the proposed Temporary Laydown Area.	New pipe to be connected to the 6" pipe and laid to supply potable water to the proposed Temporary Laydown Area	35180/GOS/CVD/002/D Appendix A
			355mm main owned and operated by TWUL runs along Advent Way and cuts across the entrance to Lee Park Way	No works defined at the moment	
TWUL	Combined Sewer	Limited access during limited time ACCESS RIGHTS	Chingford Sewer crosses the south western section of the Application Site.	None	35180/GOS/CVD/004/A Appendix A

7 Statement of engagement with statutory undertakers and other affected parties

7.1.1 The following are the stakeholders that have been contacted to ensure the availability of the utilities for the proposed development. In Appendix E, communications with the various stakeholders have been summarised:

- a. National Grid;
- b. UKPN;
- c. National Grid Gas;
- d. TWUL; and
- e. BT.

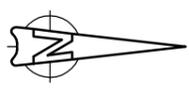
Table 7.1: Summary of Communications and Agreements with Utilities on the Edmonton EcoPark

Description	Reference	Agreement
TWUL		
Potable water main connection	50056336	Agreed in principal connection to main Advent Way pipe 355mm diameter, With a max flow of 140m ³ /h
Sewage-foul connections	1012536393	On hold, as TWUL has required detail design of 3 connections to Chingford Sewer. Connections points are approved, but TWUL requires additional information and detail design.
Sewage diversion and build over	As per meeting 15.03.2015	Agreed in principal build over and diversion of the Angel Sewer under certain premises detailed in Appendix E.
Discharge application for water treated in the WwTP	734611 TDEEOBN1	TWUL consent approved: consent to be found in Appendix F
National Grid Gas		
New supply	180002447	Agreed connection for supply in a MP pipe at 200m from the boundary of the site.

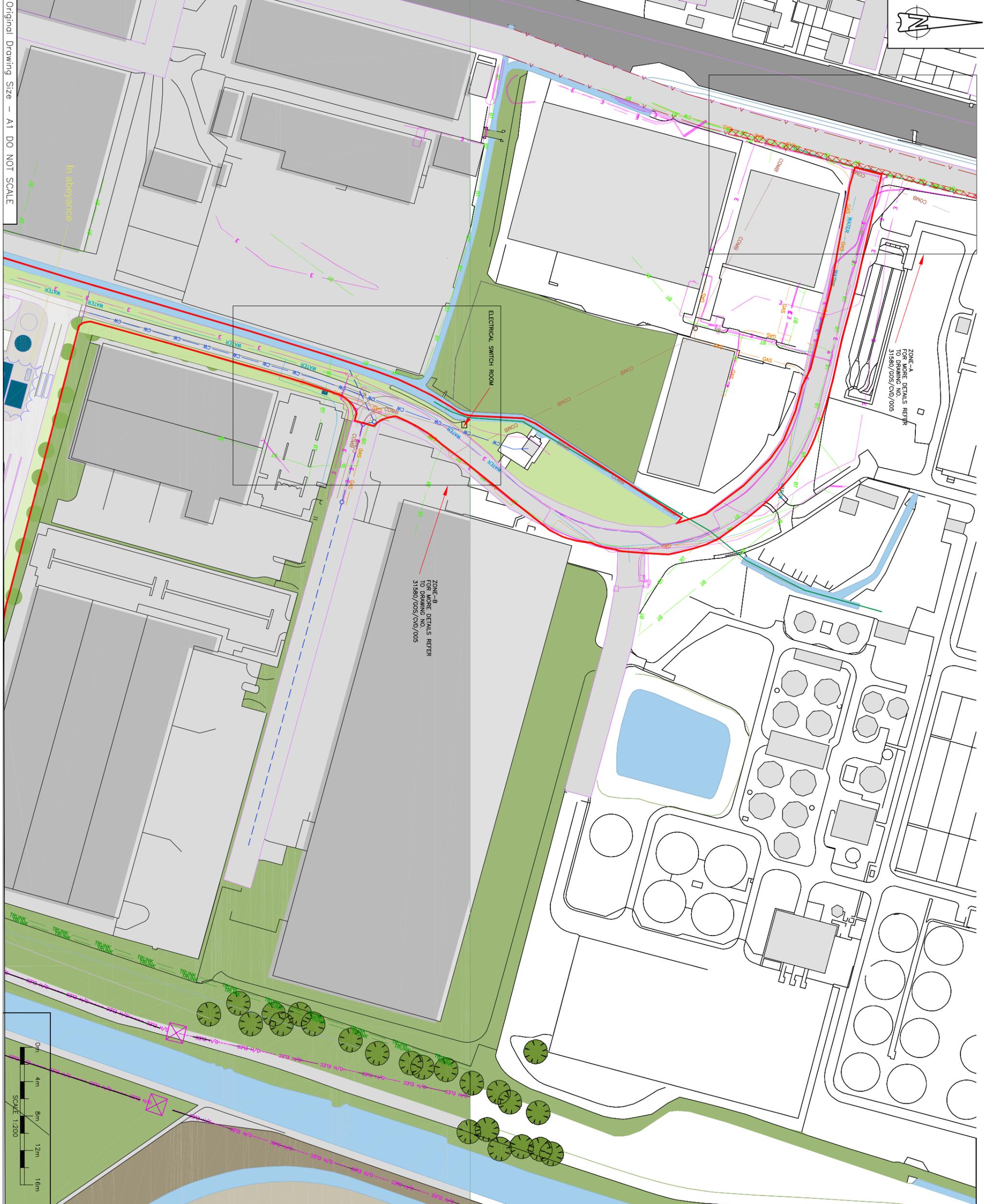
Table 7.2: Summary of Communications and Agreements for utilities on land to the east of Edmonton EcoPark

Description	Reference	Agreement
TWUL		
Sludge main pipes	1012791669	Parking would be constructed close to where the sludge lines run and this is acceptable to TWUL
Potable Water Main Connection	Ref IRef:1013072322 Private Land Notice,Ref;50072524,Edmonton EcoPark, Advent Way, London, N18 3AG	Agreed in principal connection to Main Advent Way Pipe 6" diameter of 1.3 to 4,1m ³ /h.
BT		
Telecommunications	Email with BT (Openreach) 16/7/15	Ongoing – awaiting confirmation from BT if connection points for the offices in the Temporary Laydown Area can tap into existing connections on the periphery of Advent Way
National Grid		
Overhead cables	Email with National Grid (Land and Business Development) 28/4/15	Cable clearances and profile drawings

Appendix A: Existing Edmonton EcoPark utilities



Original Drawing Size - A1 DO NOT SCALE



DESCRIPTION

REV	DATE	APP	CHK	APP
A	21.08.2015	MB	AD	JA

REVISIONS

REV	DATE	OWN	CHK	APP

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
 2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE.
 3. GRID COORDINATES RELATE TO ORDNANCE SURVEY NATIONAL GRID.

LEGEND:

- SURFACE WATER SEWER-OWNED BY THAMES WATER
- WATER MAIN-OWNED BY THAMES WATER
- COMB - COMBINED SEWER-CHINGFORD SEWER OWNED BY THAMES WATER
- CW - COOLING WATER
- BT - BT CABLE
- GAS - GAS MAIN-OWNED BY NATIONAL GRID
- E - ELECTRIC CABLE-OWNED BY UKPN
- V - DATA CABLE (OWNED BY VIRGIN)
- EXISTING DRAINAGE PIPE
- DATA CABLE TRENCH INCLUDING VOIP/PHONE, ZAVNO AND VIRGIN

SCALES: 1:200
 PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT
 DRAWING TITLE:
EXISTING UTILITIES IN LAND TO THE NORTH OF EDMONTON ECOPARK

CLIENT:



nlwo
 NLWA
 18 BEROL HOUSE
 20 TOTTENHAM HALE
 N17 9LJ
 TEL: (0208) 4895730
 DDO APPLICATION REF:

PARTNERSHIP HOUSE,
 REGENT PARK ROAD,
 NEWCASTLE UPON TYNE
 NE3 3AF
 TEL: (0191) 2726100
 FAX: (0191) 2726515

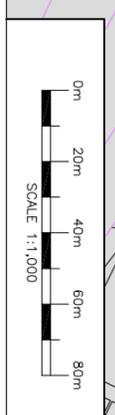
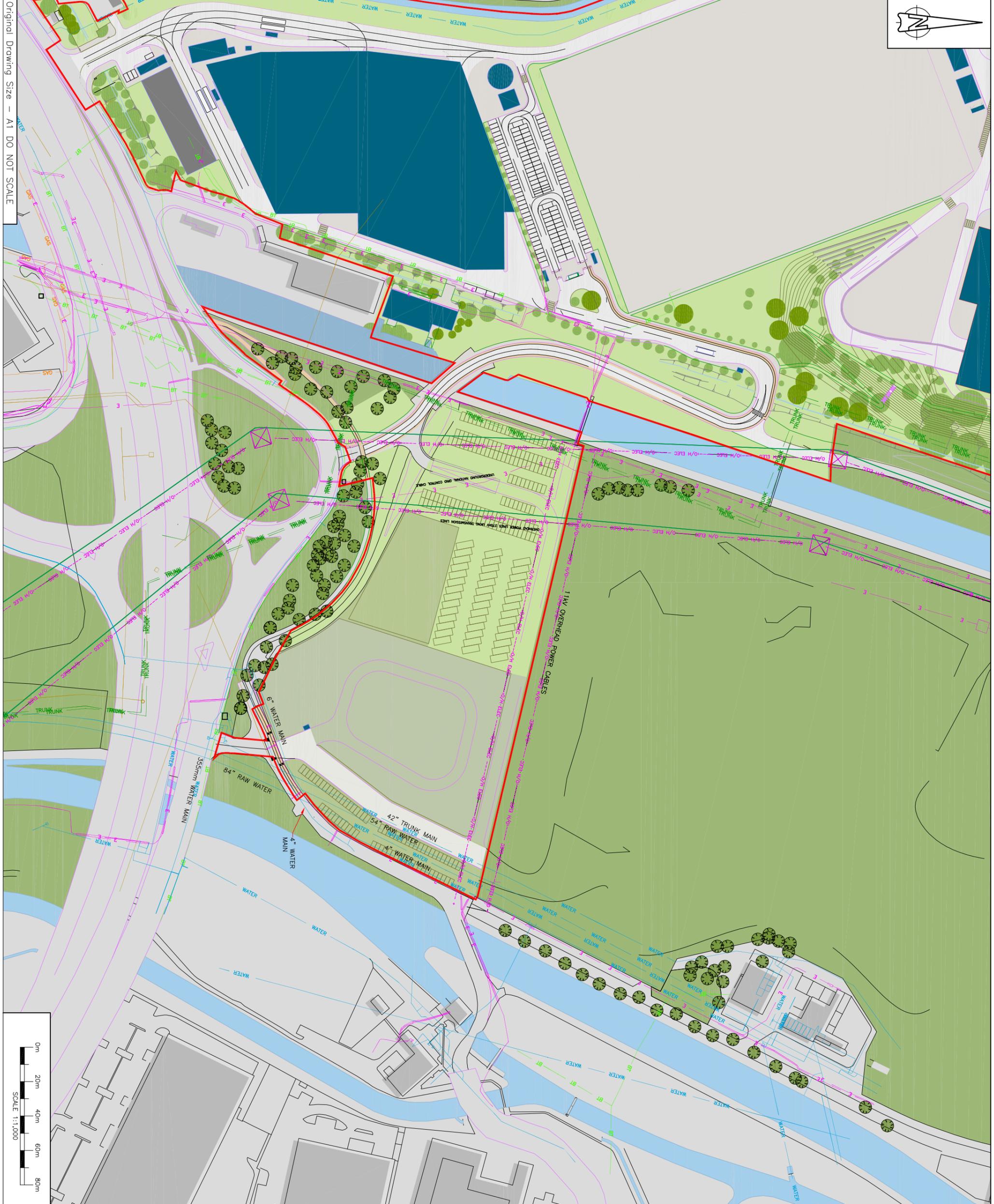


amec
 foster
 wheeler

DRAWING No. **35180/GOS/CVD/003** REV. **A**



Original Drawing Size - A1 DO NOT SCALE



DESCRIPTION

REV	DATE	APP	CHK	APP
A	21.08.2015			

REVISIONS

REV	DATE	APP	CHK	APP

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE.
3. LOCATIONS OF EXISTING SERVICES ARE INDICATED BY DASHED LINES. THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN RECORD POSITIONS OF ALL SERVICES PRIOR TO EXCAVATION.
4. GRID COORDINATES RELATE TO ORDNANCE SURVEY NATIONAL GRID.
5. IF NOT INDICATED OTHERWISE, ELECTRICAL CABLES ARE OWNED BY UKPN.

LEGEND:

- WATER MAIN—OWNED BY THAMES WATER
- COMB THAMES SEWERS—OWNED BY THAMES WATER
- TRUNK SLUDGE TRUNK MAIN—OWNED BY THAMES WATER
- BT CABLE NATIONAL GRID GAS & ELECTRICITY TRANSMISSION
- O/H ELEC EXISTING 275KV OVERHEAD ELECTRIC CABLE
- E ELECTRIC CABLE (SEE NOTES IN DRAWING FOR OWNERSHIP)

SCALES: 1:1,000
 PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT
 DRAWING TITLE:
EXISTING UTILITIES IN LAND TO THE EAST OF EDMONTON ECOPARK

CLIENT:



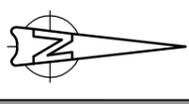
nlwo
 18 BEROL HOUSE
 20 TOTTENHAM HALE
 N17 9JL
 TEL: (0208) 4895730
 DDO APPLICATION REF:

PARTNERSHIP HOUSE,
 FERGUSON PARK ROAD,
 NEWCASTLE UPON TYNE
 NE3 3AF
 TEL: (0191) 2726100
 FAX: (0191) 2726515

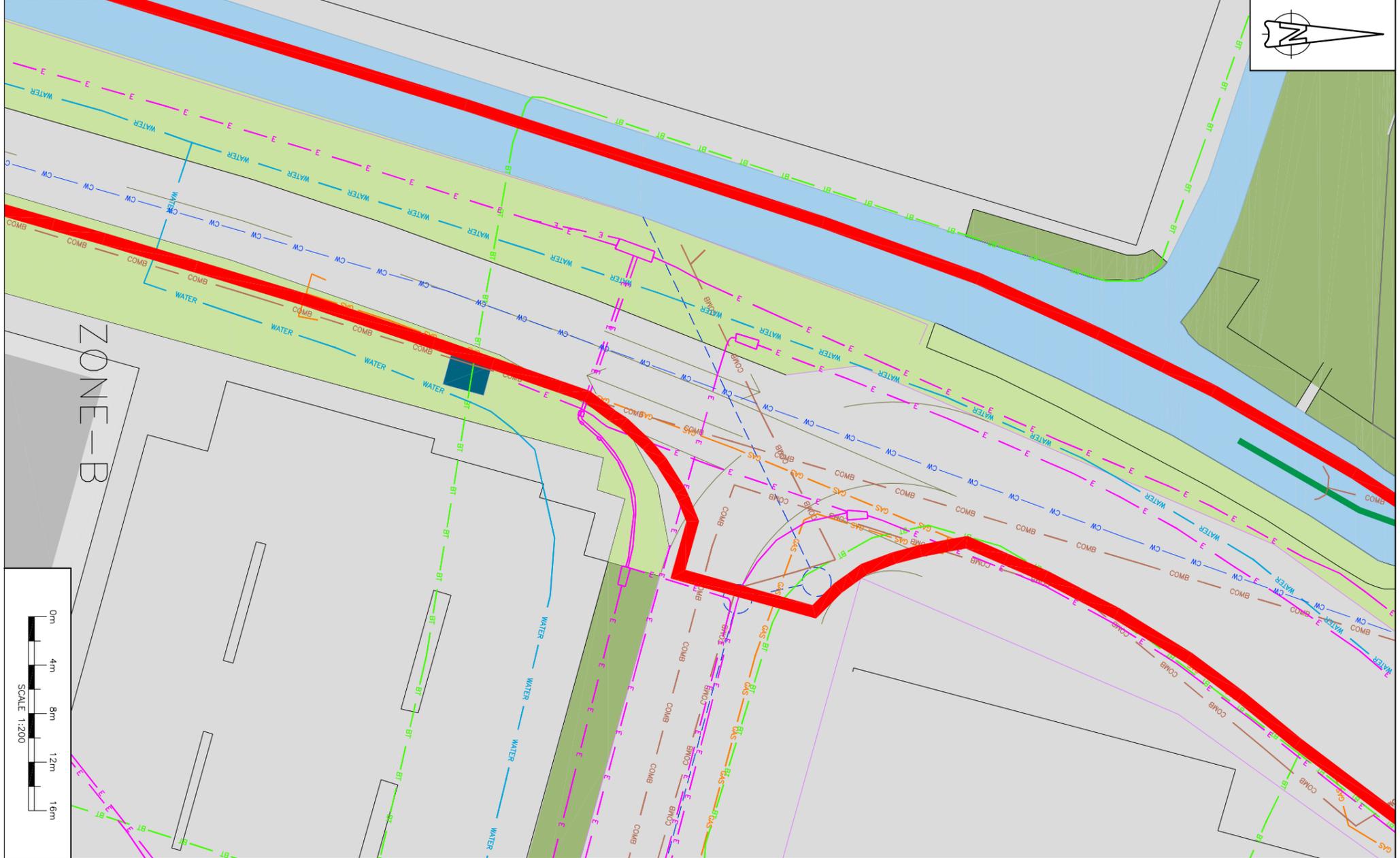
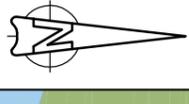
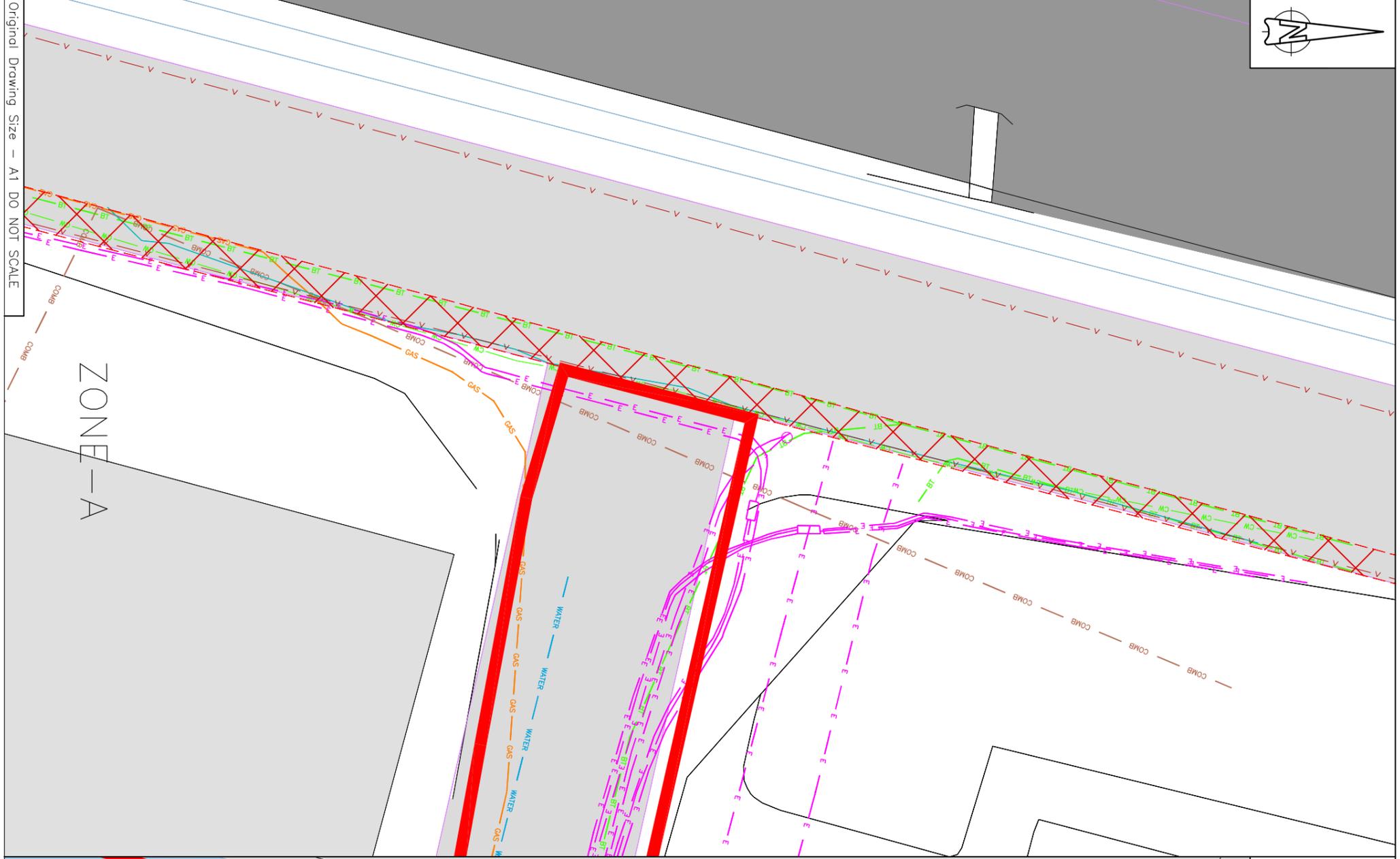


amec
 foster
 wheeler

DRAWING No. 35180/GOS/CVD/004
 REV. A



Original Drawing Size - A1 DO NOT SCALE



DESCRIPTION

REV	DATE	DWN	CHK	APP
A	21.08.2015	MJB	AD	JA

REVISIONS

REV	DATE	DWN	CHK	APP

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE.
3. GRID COORDINATES RELATE TO ORDNANCE SURVEY NATIONAL GRID.

LEGEND:

- SURFACE WATER SEWER-OWNED BY THAMES WATER
- WATER MAIN-OWNED BY THAMES WATER
- COMBINED SEWER-CHINGFORD SEWER OWNED BY THAMES WATER
- CW - COOLING WATER
- BT - BT CABLE
- GAS - GAS MAIN-OWNED BY NATIONAL GRID
- E - ELECTRIC CABLE-OWNED BY UKPN
- DATA CABLE (OWNED BY VIRGIN)
- DATA CABLE TRENCH INCLUDING VOIP/VODAFONE, ZAVNO AND VIRGIN

SCALES: 1:200
 PROJECT TITLE:
 NORTH LONDON HEAT AND
 POWER PROJECT

DRAWING TITLE:
 EXISTING UTILITIES IN LAND TO THE
 NORTH OF EDMONTON ECOPARK

CLIENT:



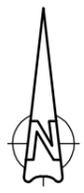
nlwo
 NLWA
 1B BEROL HOUSE
 20 TOTTENHAM HALE
 N17 9LJ
 TEL: (0208) 4895730

DOO APPLICATION REF:

PARTNERSHIP HOUSE,
 REGENT PARK ROAD,
 NEWCASTLE UPON TYNE
 NE3 3AF
 TEL: (0191) 2726100
 FAX: (0191) 2726515



DRAWING No. 35180/GOS/CVD/005
 REV. A



DESCRIPTION

REV	DATE	CHK	APP
A	06/08 2014	AC	JA

REVISIONS

REV	DATE	CHK	APP
B	02/10 2014	AC	JA
C	09/02 2015	EG	JA
B	24/06 2015	MS	JA

NOTES:

- SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKER'S DRAWINGS ARE AVAILABLE.

LEGEND:

	EXISTING SITE BOUNDARY
	SEWER (OWNED BY THAMES WATER) EFFLUENT TO WWTW (OWNED BY LWA)
	FULL WATER SEWER (OWNED BY LWA)
	SURFACE WATER SEWER TO ENFIELD DITCH (OWNED BY LWA)
	SURFACE WATER SEWER TO SALMON'S BROOK (OWNED BY LWA)

SCALES: 1:1250
 PROJECT TITLE:
 NORTH LONDON HEAT AND POWER PROJECT

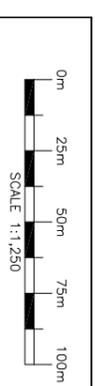
DRAWING TITLE:
 EXISTING EDMONTON ECOPARK SERVICES FOUL AND SURFACE WATER DRAINAGE, AND WASTE WATER EFFLUENT LINE

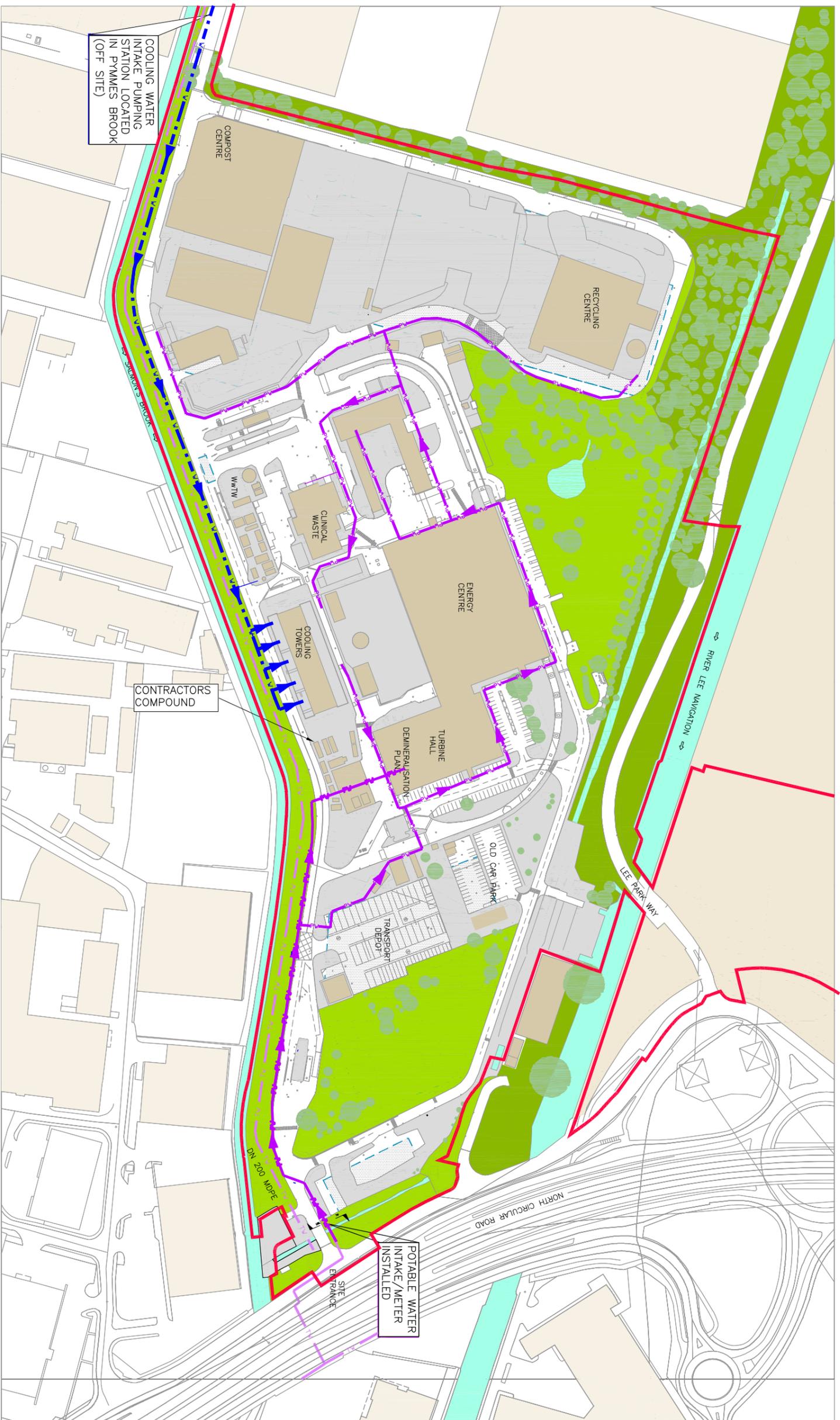
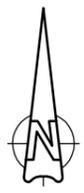
CLIENT:

nlwo
 18 BERGOL HOUSE
 20 TOTTENHAM HALE
 N17 9JL
 TEL: (0208) 4895730

DOO APPLICATION REF:
 [] DOC REF No: []

17 ANGEL GATE, CITY ROAD, LONDON, EC1V 2SH.
 TEL: (0207) 8431400 FAX: (0207) 8431410





DESCRIPTION

REV	DATE	DESCRIPTION	DWN	CHK	APP
A	06/09/2014	FIRST ISSUE	AC	EG	JA

REVISIONS					
REV	DATE	DESCRIPTION	DWN	CHK	APP
B	07/11/2014	POTABLE WATER MAIN (THAMES WATER) ADDED	MS	EG	JA
C	09/02/2015	AMEC FOSTER WHEELER LOOP	MS	EG	JA
D	24/08/2015	MINOR AMENDMENTS TO DRAWING	MS	EG	JA

NOTES:

- SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKER'S INFORMATION. COPIES OF THE ORIGINAL DRAWINGS ARE AVAILABLE.

LEGEND:

- EXISTING SITE BOUNDARY
- FRESH WATER MAIN (OWNED BY LWL)
- POTABLE WATER MAIN (OWNED BY LWL)
- POTABLE WATER MAIN (OWNED BY THAMES WATER)

SCALES: 1:1250

PROJECT TITLE:
NORTH LONDON HEAT AND
NORTH PROJECT

DRAWING TITLE:
EXISTING EDMONTON
EOPARK SERVICES
POTABLE WATER
AND FRESH COOLING WATER

CLIENT:

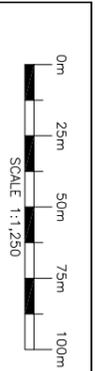


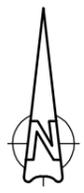
DOO APPLICATION REF: []
DOC REF No: []



17 ANGEL GATE, CITY ROAD, LONDON, EC1V 2SH
TEL: (0207) 8431400 FAX: (0207) 8431410

DRAWING No. 35180/LON/CVD/003/D





DESCRIPTION

REV	DATE	DESCRIPTION	DWN	CHK	APP
A	06/08/2014	FIRST ISSUE	AC	ECA	JA
REVISIONS					
B	02/10/2014		AC	ECA	JA
C	02/04/2015	ADDITION OF NEW MAIN GAS PIPE	MS	ECA	JA
D	15/04/2015	ADDITION OF EXISTING GAS MAIN AND REMOVAL OF PROPOSED WORKS	MS	ECA	JA
E	24/06/2015	AMENDED NOTES	MS	ECA	JA
F	02/08/2015	AMENDED GAS MAIN	MS	AD	ECA

NOTES:

- SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKER'S INFORMATION. COPIES OF THE ORIGINAL DRAWINGS ARE AVAILABLE.
- MAIN POWER CABLES ARE UKPN PROPERTY
- GAS PIPES ARE NATIONAL GRID PROPERTY

LEGEND:

- SITE BOUNDARY
- - - - MAIN GAS PIPE-LP (OWNED BY NATIONAL GRID)
- ELECTRICAL CABLE (OWNED BY LWL)
- - - - POWER CABLE CIRCUITS (X2) (OWNED BY UKPN)
- - - - ELECTRICITY CABLES

SCALES: 1:1250

PROJECT TITLE:
NORTH LONDON HEAT AND
NORTH PROJECT

DRAWING TITLE:

EXISTING EDMONTON
EOPARK SERVICES
GAS AND ELECTRICAL CABLES

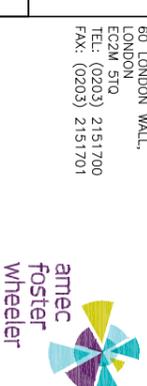
CLIENT:

nlwo
NORTH LONDON WATER
NORTH LONDON HEAT AND
NORTH PROJECT

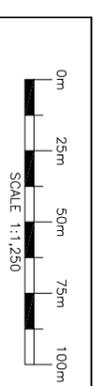
NLWA
1B BEROL HOUSE
2 TOTTENHAM HALE
N17 9LJ
TEL: (0208) 4895730

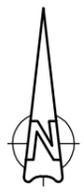
DOO APPLICATION REF:
[] DOC REF No: []

60, LONDON WALL,
LONDON
E02M 1TOO
TEL: (0203) 2151700
FAX: (0203) 2151701



DRAWING No. 35180/LON/CVD/004/F





DESCRIPTION

REV	DATE	APP	CHK	AC	EDA	JA
A	19/09/24					

REVISIONS

REV	DATE	APP	CHK	MS	EG	JA
B	24/05/2019					

NOTES:						
1. SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKER'S INFORMATION. COPIES OF THE ORIGINAL DRAWINGS ARE AVAILABLE.						
2. ALL CABLES ARE LWL PROPERTY						

- LEGEND:**
- EXISTING SITE BOUNDARY
 - CCTV CABLES (OWNED BY LWL)
 - ➔ CCTV CAMERAS (OWNED BY LWL)

SCALES: 1:1250

PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT

DRAWING TITLE:
EXISTING EDMONTON
ECPARK SERVICES
CCTV CABLES

CLIENT:

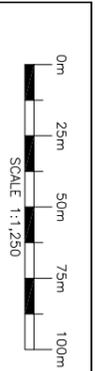


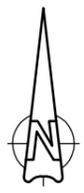
DOC APPLICATION REF: []
DOC REF No: []



17 ANGEL GATE, CITY ROAD, LONDON, EC1V 2SH
TEL: (0207) 8431400 FAX: (0207) 8431410

DRAWING No. 35180/LON/CVD/005/B





DESCRIPTION

REV	DATE	CHK	APP
A	06/08 2014	AC	ECA JA

REVISIONS

REV	DATE	DESC	CHK	APP
B	24/05 2015	ADDED BT CABLES	MS	EG JA

NOTES:

- SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKER'S INFORMATION. COPIES OF THE ORIGINAL DRAWINGS ARE AVAILABLE.
- TELECOM CABLES ARE OWNED BY LNU.
- BT CABLES ARE OWNED BY BT

- LEGEND:
- EXISTING SITE BOUNDARY
 - TELECOM CABLES (OWNED BY LNU)
 - - - BT CABLES (OWNED BY BT)

SCALES: 1:1250

PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT

DRAWING TITLE:
EXISTING EDMONTON EOPARK SERVICES TELECOM CABLES AND BT CABLES

CLIENT:



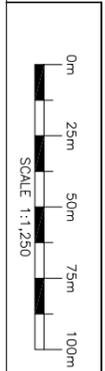
nlwo
NORTH LONDON WATER AND SEWERAGE
18 BEROL HOUSE
20 TOTTENHAM HALL
N17 9LJ
TEL: (0208) 4895730

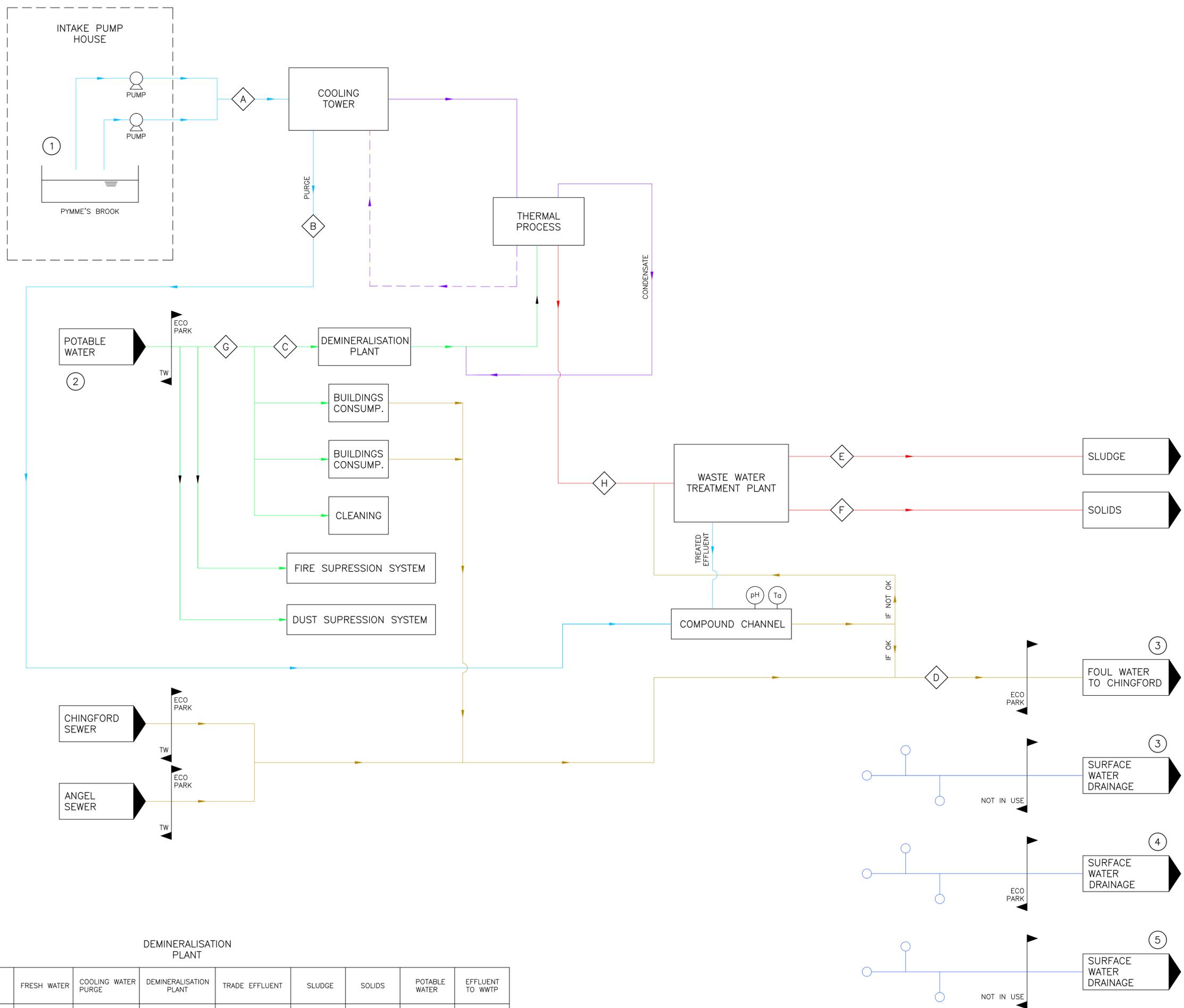
DOC APPLICATION REF: []

DOC REF No: []

17 ANGEL GATE, CITY ROAD, LONDON, EC1V 2SH
TEL: (0207) 8431400 FAX: (0207) 8431410

DRAWING No. 35180/LON/CVD/006/B





DESCRIPTION					
REV	DATE	DESCRIPTION	DWN	CHK	APP
C	03/09/2014	FIRST ISSUE	AC	EG	JA
REVISIONS					
REV	DATE	DESCRIPTION	DWN	CHK	APP
B	24/10/2014	MINOR TEXT AMENDMENTS TO DRAWING.	MS	EG	JA
C	07/11/2014	MINOR TEXT AMENDMENTS TO DRAWING.	MS	EG	JA
D	14/11/2014	TABLE AMENDMENTS	MS	EG	JA
E	26/11/2014	TABLE AMENDMENTS	MS	EG	JA
F	19/01/2015	TABLE AMENDMENTS	MS	EG	JA
G	09/02/2015	DRAWING AMENDED TO INCLUDE THERMAL PROCESS	MS	EG	JA

- NOTES:
- LEGEND:
- FRESH WATER
 - WASTE WATER EFFLUENT
 - COOLING WATER
 - RETURN COOLING WATER
 - POTABLE WATER
 - SURFACE WATER DRAINAGE
- ① PYMME'S BROOK CHANNEL
 - ② MAIN ENTRANCE
 - ③ SALMON'S BROOK [NOT IN USE], CONNECTED TO FOUL SYSTEM
 - ④ SOUTHERN CONNECTION TO ENFIELD DITCH
 - ⑤ NORTHERN CONNECTION TO ENFIELD DITCH [NOT IN USE]

SCALES: NOT TO SCALE

PROJECT TITLE:
EDMONTON UTILITIES STRATEGY

DRAWING TITLE:
WATER UTILITIES FLOW DIAGRAM

CLIENT:

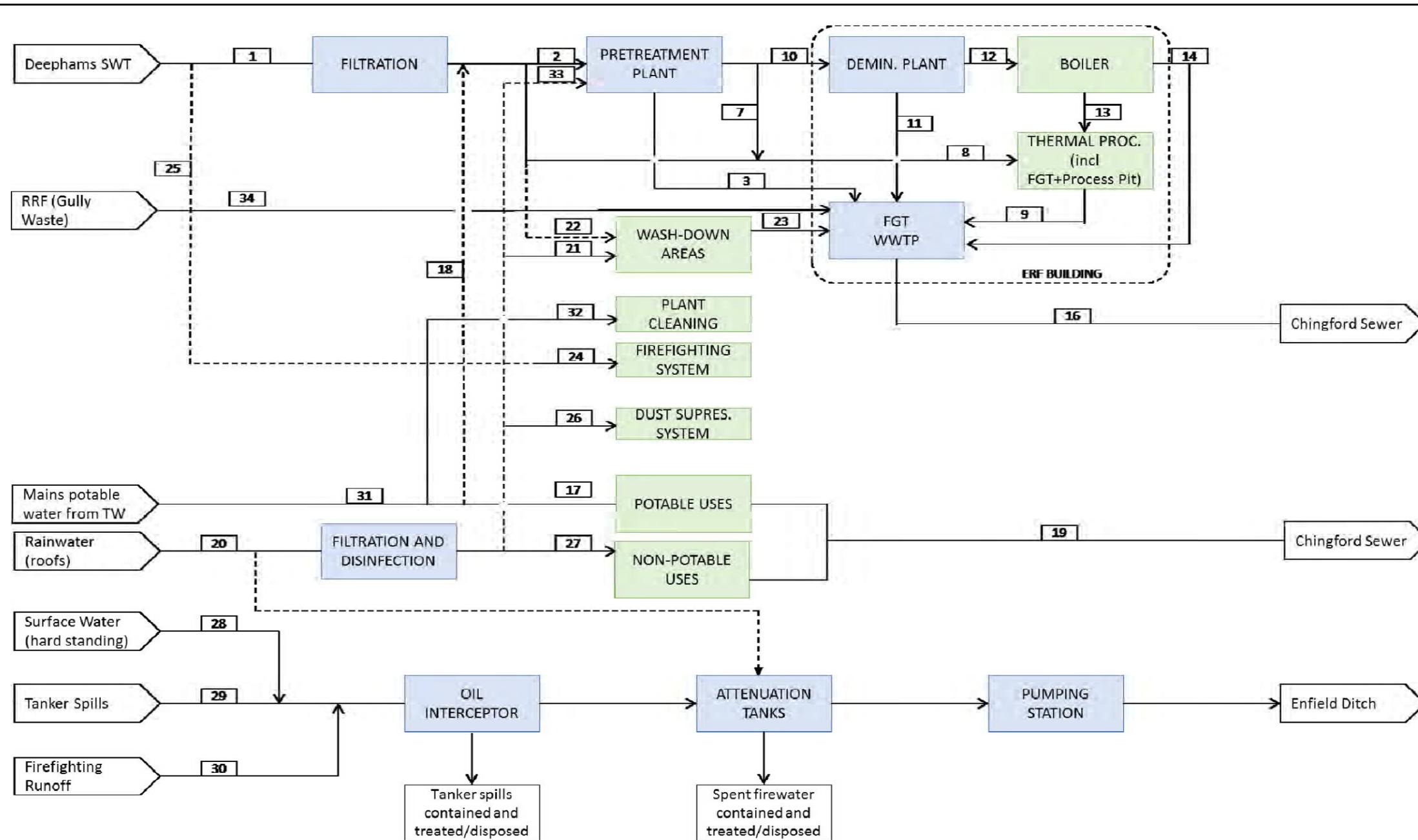
 NLWA
 18 BEROL HOUSE
 25 ASHLEY ROAD
 TOTTENHAM HALE
 N17 9LJ
 TEL: (0208) 4895730
 DCO APPLICATION REF:
 DOC REF No:


 17 ANGEL GATE, CITY ROAD, LONDON, EC1V 2SH.
 TEL: (0207) 8431400 FAX: (0207) 8431410

DRAWING No.
35180/LON/PRD/001/G

DESCRIPTION	DEMINERALISATION PLANT							
	FRESH WATER	COOLING WATER PURGE	DEMINERALISATION PLANT	TRADE EFFLUENT	SLUDGE	SOLIDS	POTABLE WATER	EFFLUENT TO WWTP
REF.	A	B	C	D	E	F	G	H
FLOWS (m ³ /h)	130	40	10	70-80	60Tn/W	15Tn/W	13-15	60-65

Appendix B: Water balance for future Edmonton EcoPark



REVISIONS					
Rev	Date	Engineer	Drawn	Checked	Approved
A					
First Issue for comment					
B					
C					
D					
E					
F					
G					
Note 1: Dashed lines show back-up or emergency lines.					
Note 2: Stream 16 can be up to 60m ³ /h. WWTP will be designed to 60m ³ /h					
Note 3: Stream 33 (Rainwater) can be used in thermal processes if necessary					
Notes					
Block Flow Diagram of Water Management in NLHPP Edmonton EcoPark					

Line No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34			
Description	Filtrat. In	Pre treat in	Pre treat out	Blend Cool Towers	Cool Towers In	Cool Towers Purge	Blend Therm Proc	Therm Proc In	Therm Proc Eff.	Demin In	Demin conc Out	Boiler In	Steam	Boiler blow-down	To Sewer #1	To Sewer #2	PW	PW Emerg	To Sewer #3	RW (roofs)	Wash In	Wash Emerg	Wash Out	Fire Syst In	Fire Syst Emerg	Dust Syst In	Non-Potable Use	Surf Water (hard)	Tanker Spills	Fire Syst Runoff	PW in	Plant cleaning in	Thermal proc IN from	Gully waste			
Flow (m ³ /h)	130	130	0	N/A	N/A	N/A	110	110	40	20	5.0	15	N.A.	1.5	N/A	47.23	1.1	N.A.	1.1	0.74	0.5	N.A.	0.5	0	N.A.	0.2	0.04	tbc	~20m ³	~1500m ³	11.1	10	Note 3	0.23			
Cl ⁻ (mg/l)	150	150	1350	17	54	256	17	24		17	150	2		2	252	<1000				2.3	2.3	150		2.3	150	2.3	2.3										
Na (mg/l)	100	100	900	11	36	170	11	16		11	100	1		1	168					1.4	1.4	100		1.4	100	1.4	1.4										
Conductivity (µS/cm)	1037	1037	9333	115	372	1767	115	169		115	1037	13		13	1741					26	26	1037	500-11000	26	1037	26	26										
Hardness (mg CaCO ₃ /l)	331	331	2979	37	119	564	37	54		37	331	4		4	556								331		331												
TDS (mg/l)	832	832	7488	92	298	1417	92	136		92	832	10		10	1397	<3000							832	900-2500		832											
TSS (mg/l)	5	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1		<1		<400			45			<1		<1	5	<1	<1										
Alkalinity (mg CaCO ₃ /l)																			300																		
SO ₄ ²⁻ (mg/l)																<1000				0.9	0.9			0.9		0.9	0.9										
Fe (ppm)																<50																					
COD (mg/l)																<600			600																		
BOD (mg/l)																<400			250																		
Ammonia (mg/l)																				36	0.8	0.8			0.8		0.8	0.8									
Nitrate (mg/l)																					0.7	0.7			0.7		0.7	0.7									
pH	8																			7	5	5			7-9	5	8	5	5								

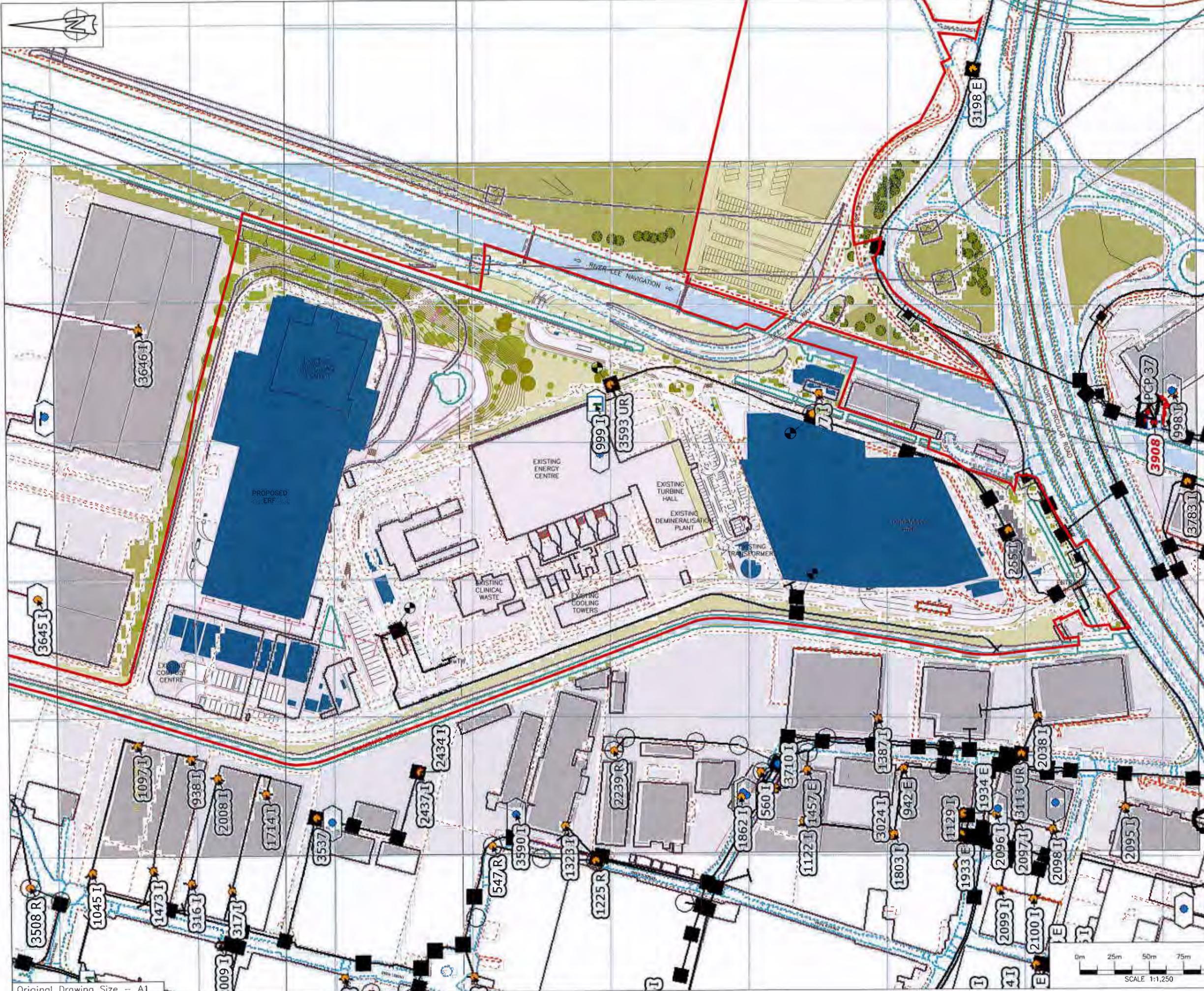
Edmonton

CLIENT :

Floor 4
60 London Wall
London
EC2M 5TQ

Project No.	Document Ref.
35180	BFD-003

Appendix C: Supported drawings



DESCRIPTION					
REV	DATE		DRAWN	CHECKED	APP'D
A	06/08/2014	FIRST ISSUE	AC	EDA	JA
REVISIONS					
REV	DATE		DRAWN	CHECKED	APP'D
B	05/10/2014		AC		
C	19/08/2015	SITE BOUNDARY AMENDED AND AFFECTED BY APPARATUS NOTED	MJB	AD	JA

NOTES:
 1. SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKER'S INFORMATION, COPIES OF THE ORIGINAL DRAWINGS ARE AVAILABLE.

- LEGEND:
- PROPOSED ERF & RRF
 - SITE BOUNDARY
 - PROPOSED ROUTE FOR BT CABLES
 - AFFECTED BY APPARATUS

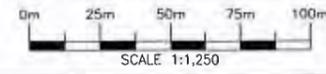
SCALES: 1:1250
 PROJECT TITLE:
 EDMONTON UTILITIES STRATEGY
 DRAWING TITLE:
 PROPOSED AND EXISTING SITE SERVICES TELECOM CABLES

CLIENT:

 NLWA
 18 BEROL HOUSE
 25 ASHLEY ROAD
 TOTTENHAM HALL
 N17 9LJ
 TEL: (0208) 4895730

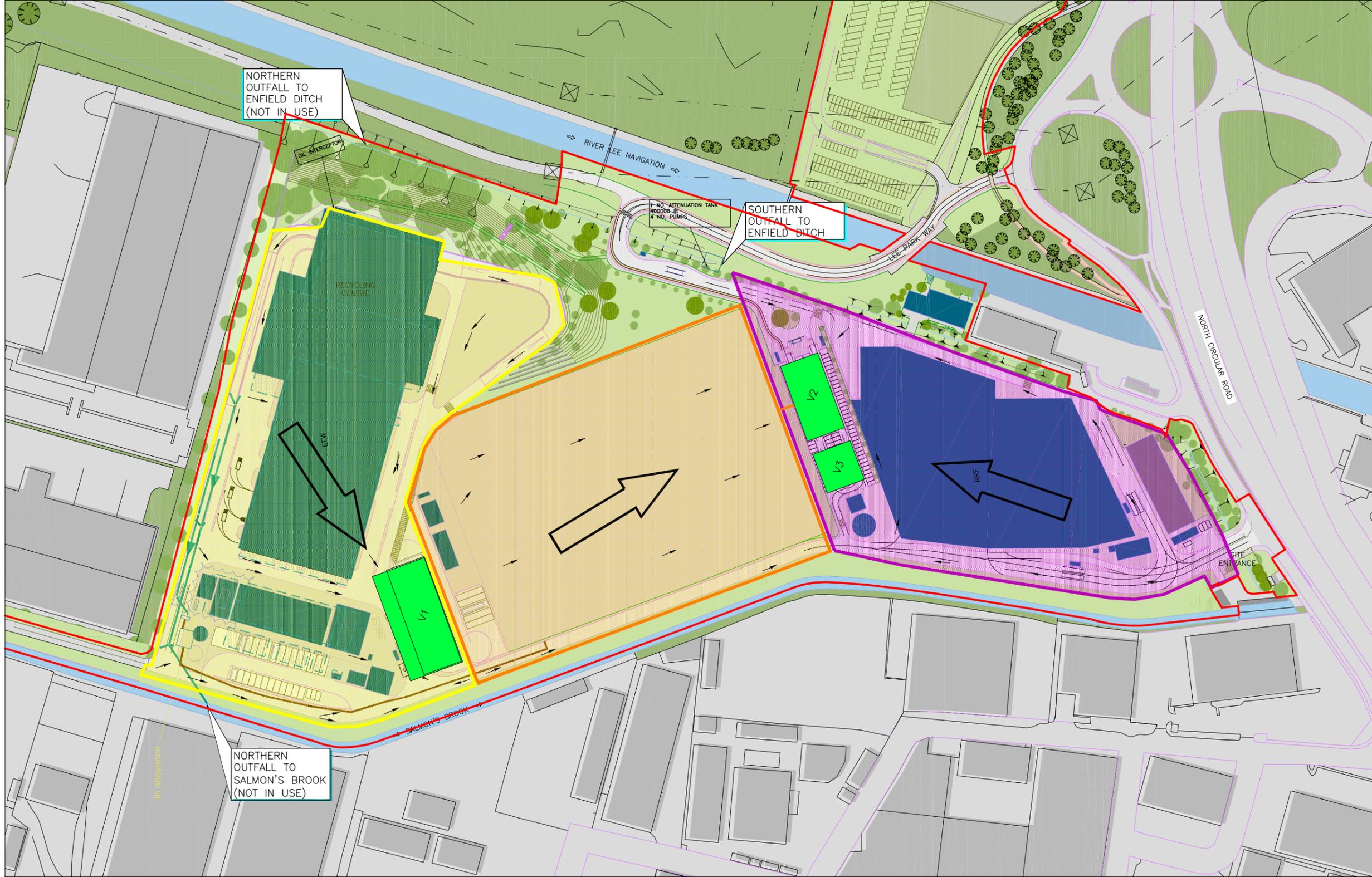
DCO APPLICATION REF:
 [DCO REF No.]


 17 ANGEL GATE, CITY ROAD, LONDON, EC1V 2SH.
 TEL: (0207) 8431400 FAX: (0207) 8431410
 DRAWING No.
 35180/LON/SKT/006/C





DESCRIPTION					
REV A	DATE 27/01/2015	FIRST ISSUE	DWN AC	CHK EGA	APP JA
REVISIONS					
REV B	DATE 13/02/2015	ADDITION OF SUB-CATCHMENT AREAS AND FLOW DIRECTIONS. RE-LOCATION OF PROPOSED ATTENUATION TANKS	DWN MS	CHK EG	APP JA
C	05/03/2015	UPDATED BACKGROUND AND LOGO	MS	EG	JA
D	19/08/2015	SITE BOUNDARY AMENDED	MJB	AD	JA



NOTES:
 1. SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKER'S INFORMATION. COPIES OF THE ORIGINAL DRAWINGS ARE AVAILABLE.

LEGEND:

	PROPOSED AREAS
	SITE BOUNDARY
PROPOSED DRAINAGE SUB-CATCHMENTS	
	ERF SUB-CATCHMENT
	EFW SUB-CATCHMENT
	RRF SUB-CATCHMENT
	FLOW DIRECTION

SCALES: 1:1250

PROJECT TITLE:
 EDMONTON UTILITIES STRATEGY

DRAWING TITLE:
 SPILL CONTROL STRATEGY

CLIENT:
 NLWA
 1B BEROL HOUSE
 25 ASHLEY ROAD
 TOTTENHAM HALE
 N17 9LJ
 TEL: (0208) 4895730

DCO APPLICATION REF:
 DOC REF No:



17 ANGEL GATE, CITY ROAD, LONDON, EC1V 2SH.
 TEL: (0207) 8431400 FAX: (0207) 8431410

DRAWING No.
 35180/LON/CVD/010/D

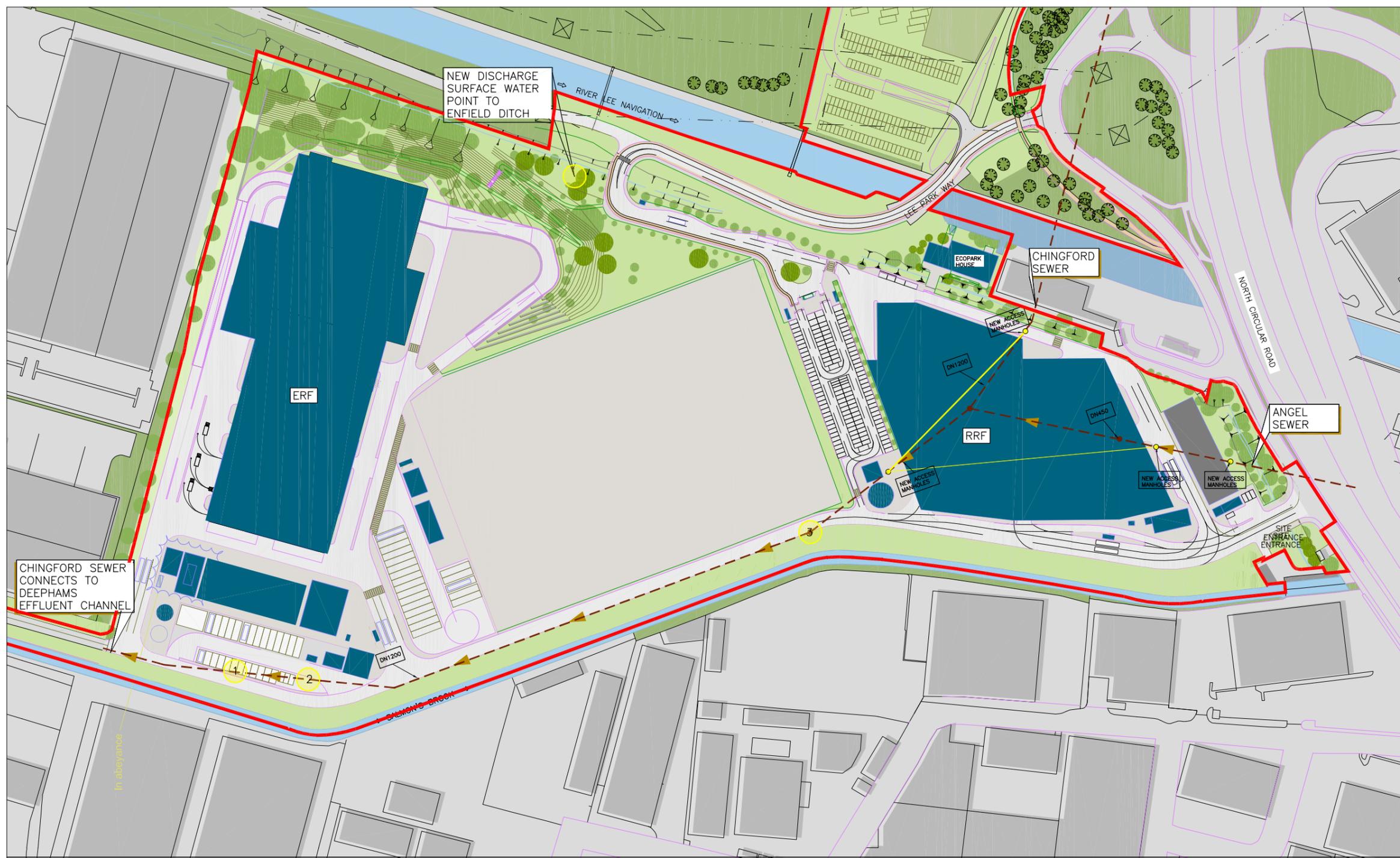


DESCRIPTION					
REV A	DATE		DWN	CHK	APP
	27/01/2015	FIRST ISSUE	AC	EGA	JA
REVISIONS					
REV B	DATE		DWN	CHK	APP
	10/03/2015	ADDITION OF SEWER DIVERSION	MS	EG	JA
C	31/03/2015	UPDATED BACKGROUND	MS	EG	JA
D	13/04/2015	AMENDED LEGEND	MS	EG	JA
E	24/06/2015	MINOR AMENDMENTS TO DRAWING	MS	EG	JA
F	19/08/2015	SITE BOUNDARY AMENDED	MJB	AD	JA

- NOTES:
- SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKER'S INFORMATION. COPIES OF THE ORIGINAL DRAWINGS ARE AVAILABLE.
 - LAYOUT OF NEW UTILITIES ARE INDICATIVE AND SUBJECT TO DETAILED DESIGN.

LEGEND:

	PROPOSED BUILDINGS
	SITE BOUNDARY
	EXISTING FOUL SYSTEM (OWNED BY THAMES WATER)
	PROPOSED SEWER DIVERSION
	PROPOSED MAHOLES
	TREATED EFFLUENT
	COOLING TOWERS PURGE
	DOMESTIC FOUL



SCALES: 1:1250

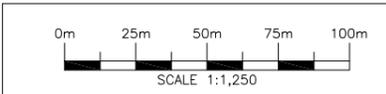
PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT

DRAWING TITLE:
PROPOSED FOUL CONNECTIONS SHOWING PROPOSED SEWER DIVERSION IN EDMONTON ECOPARK

CLIENT:
 NLWA
 1B BEROL HOUSE
 25 ASHLEY ROAD
 TOTTENHAM HALE
 N17 9LJ
 TEL: (0208) 4895730

DCO APPLICATION REF:
DOC REF No:

60 LONDON WALL,
LONDON
EC2M 5TQ
TEL: (0203) 2151700
FAX: (0203) 2151701



DRAWING No.
35180/LON/CVD/012/F

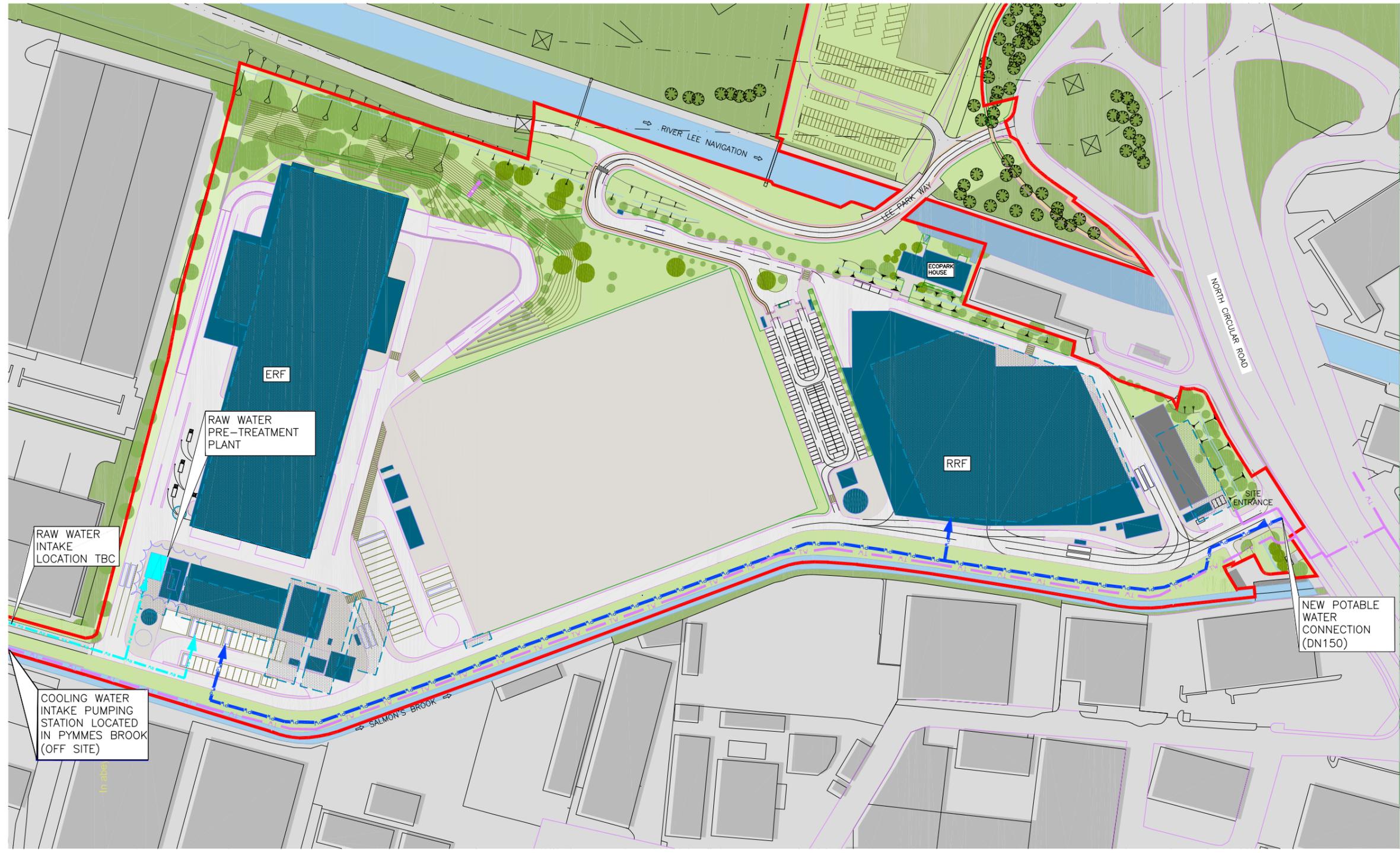


DESCRIPTION					
REV A	DATE 05/02/2015	FIRST ISSUE	DWN MS	CHK EGA	APP JA
REVISIONS					
REV B	DATE 31/03/2015	UPDATED BACKGROUND	DWN MS	CHK EG	APP JA
C	05/05/2015	ADDITION OF POTABLE WATER MAIN	MS	EG	JA
D	19/08/2015	SITE BOUNDARY AMENDED AND MINOR AMENDMENTS	MJB	AD	JA

- NOTES:
- SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKER'S INFORMATION. COPIES OF THE ORIGINAL DRAWINGS ARE AVAILABLE.
 - NEW RAW WATER MAIN WILL BE OWNED BY LWL.
 - NEW POTABLE WATER MAIN WILL BE OWNED BY LWL.
 - POTABLE WATER MAIN IS OWNED BY THAMES WATER.
 - LAYOUT OF NEW UTILITIES ARE INDICATIVE AND SUBJECT TO DETAILED DESIGN.

LEGEND:

	PROPOSED BUILDINGS
	SITE BOUNDARY
	POTABLE WATER MAIN (OWNED BY THAMES WATER)
	RAW WATER MAIN (WILL BE OWNED BY NLWA).
	POTABLE WATER MAIN (WILL BE OWNED BY NLWA).



SCALES: 1:1250

PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT

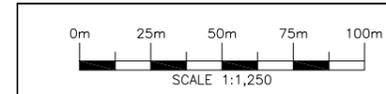
DRAWING TITLE:
PROPOSED RAW WATER INTAKE, POTABLE WATER AND PRE-TREATMENT PLANT IN EDMONTON ECOPARK

CLIENT:

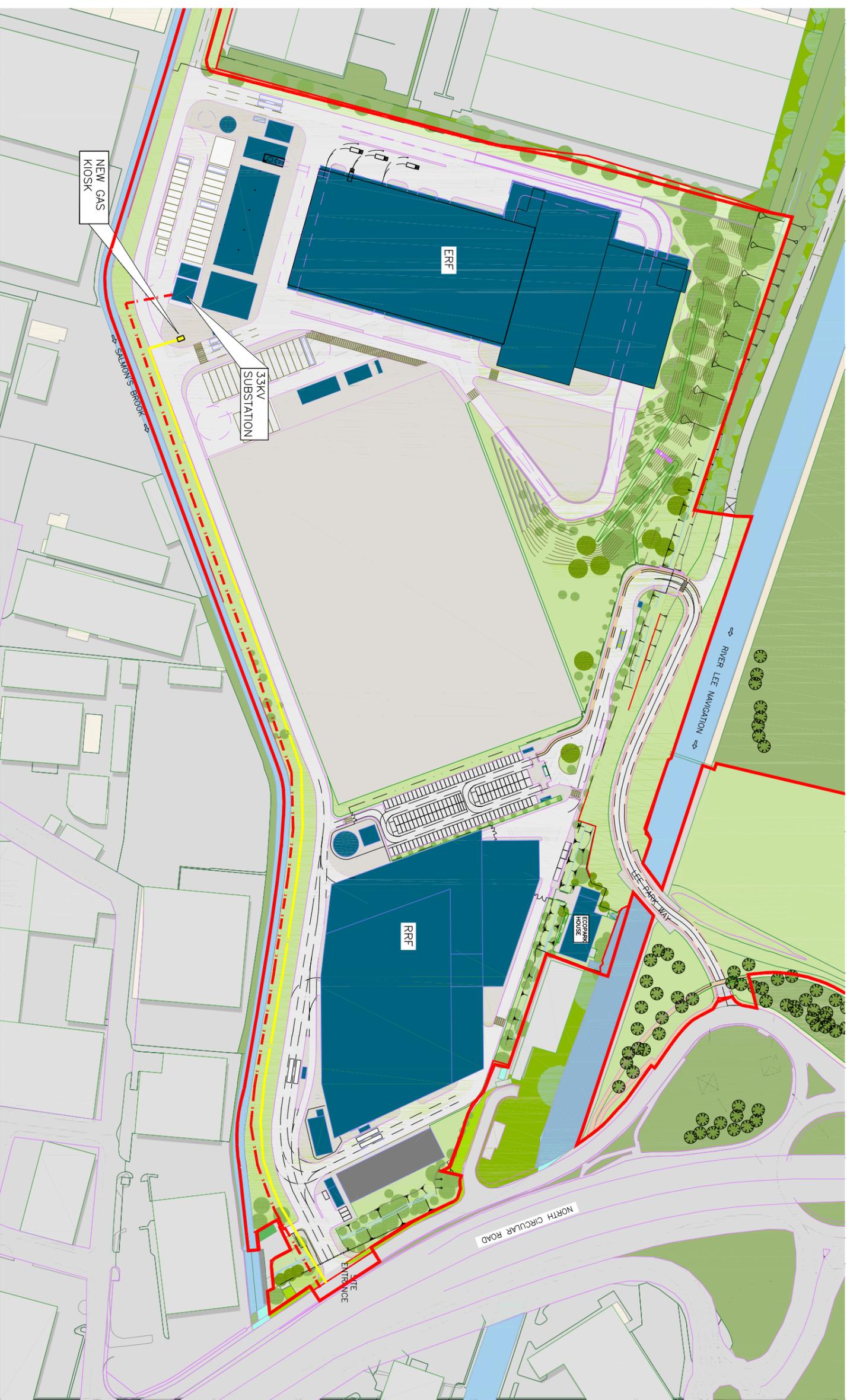
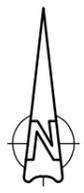
 NLWA
 1B BEROL HOUSE
 25 ASHLEY ROAD
 TOTTENHAM HALE
 N17 9LJ
 TEL: (0208) 4895730

DCO APPLICATION REF:
 DOC REF No: _____

60 LONDON WALL,
 LONDON
 EC2M 5TQ
 TEL: (0203) 2151700
 FAX: (0203) 2151701



DRAWING No.
35180/LON/CVD/013/D



DESCRIPTION

REV	DATE	CHK	APP
A	09/02/2015	MS ECA	JA

REVISIONS			
REV	DATE	CHK	APP
B	17/03/2015	MS EG	JA
C	15/04/2015	MS EG	JA
D	24/06/2015	MS EG	JA
E	19/09/2015	MS AD	JA

NOTES:

- SERVICES INFORMATION SHOWN HAS BEEN INTERPRETED FROM SERVICE UNDERTAKERS' DRAWINGS. COPIES OF THE ORIGINAL DRAWINGS ARE AVAILABLE.
- NEW MAIN POWER CABLES WILL BE OWNED BY UKPN (X2).
- NEW GAS MAIN PIPE WILL BE OWNED BY NATIONAL GRID.
- LAYOUT OF UTILITIES ARE INDICATIVE AND SUBJECT TO DETAILED DESIGN.

LEGEND:

- PROPOSED BUILDINGS
- SITE BOUNDARY
- CABLE ROUTE
- NEW MAIN GAS PIPE (WILL BE OWNED BY NATIONAL GRID).

SCALES: 1:1250

PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT

DRAWING TITLE:
PROPOSED GAS PIPE, KIOSK AND POWER CABLE IN EDMONTON ECOPARK

CLIENT:

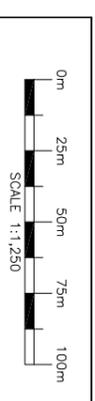


DOC REF No: _____
DOC APPLICATION REF: _____

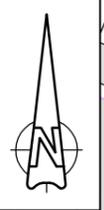
60, LONDON WALL,
LONDON
EC2M 3TU
TEL: (0203) 2151700
FAX: (0203) 2151701



DRAWING No. 35180/LON/CVD/014/E



Appendix D: Land to the east and north of the Edmonton EcoPark



DESCRIPTION					
REV	DATE		DWN	CHK	APP
A	27/04/2015	FIRST ISSUE	SAS	EG	
REVISIONS					
REV	DATE		DWN	CHK	APP
B	02.07.2015		MJB	EG	JA
C	20.08.2015		MJB	AD	JA

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. ALL LEVELS ARE IN METRES ABOVE ORDANCE DATUM UNLESS STATED OTHERWISE.
3. GRID COORDINATES RELATE TO ORDANCE SURVEY NATIONAL GRID.

LEGEND:

	SURFACE WATER SEWER-OWNED BY THAMES WATER
	WATER MAIN-OWNED BY THAMES WATER
	COMBINED SEWER-CHINGFORD SEWER OWNED BY THAMES WATER
	VODAFONE CABLE
	BT CABLE
	GAS MAIN-OWNED BY NATIONAL GRID
	ELECTRIC CABLE-OWNED BY UKPN
	DATA CABLE (OWNED BY VIRGIN)
	PROPOSED RAW WATER PIPE
	EXISTING DRAINAGE PIPE
	DATA CABLE TRENCH INCLUDING VODAFONE, ZAYNO AND VIRGIN

SCALES: 1:1000

PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT

DRAWING TITLE:
PROPOSED UTILITIES IN LAND TO THE NORTH OF EDMONTON ECOPARK

CLIENT:
 NLWA
 1B BEROL HOUSE
 25 ASHLEY ROAD
 TOTTENHAM HALE
 N17 9LJ
 TEL: (0208) 4895730
 DCO APPLICATION REF:

PARTNERSHIP HOUSE,
 REGENT FARM ROAD,
 GOSFORTH,
 NEWCASTLE UPON TYNE
 NE3 3AF
 TEL: (0191) 2726100
 FAX: (0191) 2726515



DRAWING No. 35180/GOS/CVD/001 REV. C

ZONE- A
 FOR MORE DETAILS REFER
 TO DRAWING NO.
 31580/GOS/CVD/007

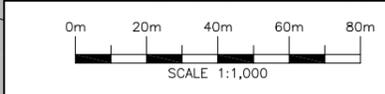
OUTFALL OF
 DEEPHAMS STW

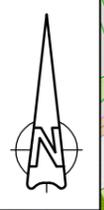
NEW PUMPING
 STATION

PROPOSED RAW
 WATER PIPE

ZONE- B
 FOR MORE DETAILS REFER
 TO DRAWING NO.
 31580/GOS/CVD/007

In abeyance





DESCRIPTION					
REV	DATE		DWN	CHK	APP
A	27/04/2015	FIRST ISSUE	SAS	EG	
REVISIONS					
REV	DATE		DWN	CHK	APP
B	02.07.2015		MJB	EG	JA
C	15.07.2015		MJB	EG	JA
D	20.08.2015		MJB	AD	JA

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
 2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE.
 3. LOCATIONS OF EXISTING SERVICES ARE INDICATIVE ONLY AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE AND RECORD THE POSITIONS OF ALL SERVICES PRIOR TO EXCAVATION.
 4. GRID COORDINATES RELATE TO ORDNANCE SURVEY NATIONAL GRID.
 5. IF NOT INDICATED OTHERWISE, ELECTRICAL CABLES ARE OWNED BY UKPN.

- LEGEND:
- WATER MAIN—OWNED BY THAMES WATER
 - COMBINED SEWERS—OWNED BY THAMES WATER
 - SLUDGE TRUNK MAIN—OWNED BY THAMES WATER
 - BT CABLE
 - NATIONAL GRID GAS & ELECTRICITY TRANSMISSION
 - EXISTING 275kV OVERHEAD ELECTRIC CABLE
 - ELECTRIC CABLE (SEE NOTES IN DRAWING FOR OWNERSHIP)

SCALES: 1:500

PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT

DRAWING TITLE:
PROPOSED UTILITIES IN THE LAND TO THE EAST OF THE EDMONTON ECOPARK

CLIENT:
 NLWA
1B BEROL HOUSE
25 ASHLEY ROAD
TOTTENHAM HALE
N17 9LJ
TEL: (0208) 4895730
DCO APPLICATION REF:

PARTNERSHIP HOUSE,
REGENT FARM ROAD,
GOSFORTH,
NEWCASTLE UPON TYNE
NE3 3AF
TEL: (0191) 2726100
FAX: (0191) 2726515



DRAWING No. 35180/GOS/CVD/002 REV. D



ZONE- B
FOR MORE DETAILS REFER
TO DRAWING NO.
31580/LON/CVD/006

ZONE- A
FOR MORE DETAILS REFER
TO DRAWING NO.
31580/LON/CVD/006

PROPOSED BT
CONNECTION POINT

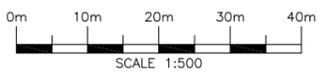
CONNECTION TO TW
POTABLE WATER MAIN

4" WATER MAIN

6" WATER MAIN

84" RAW WATER

355mm WATER MAIN



Original Drawing Size - A1 DO NOT SCALE

DESCRIPTION					
REV	DATE		DWN	CHK	APP
A	27/04/2015	FIRST ISSUE	SAS	EG	
REVISIONS					
REV	DATE		DWN	CHK	APP

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
 2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE.
 3. LOCATIONS OF EXISTING SERVICES ARE INDICATIVE ONLY AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE AND RECORD THE POSITIONS OF ALL SERVICES PRIOR TO EXCAVATION.
 4. GRID COORDINATES RELATE TO ORDNANCE SURVEY NATIONAL GRID.
 5. IF NOT INDICATED OTHERWISE, ELECTRICAL CABLES ARE OWNED BY UKPN.

- LEGEND:
- WATER MAIN—OWNED BY THAMES WATER
 - COMBINED SEWERS—OWNED BY THAMES WATER
 - SLUDGE TRUNK MAIN—OWNED BY THAMES WATER
 - BT CABLE
 - NATIONAL GRID GAS & ELECTRICITY TRANSMISSION
 - EXISTING 275kV OVERHEAD ELECTRIC CABLE
 - ELECTRIC CABLE (SEE NOTES IN DRAWING FOR OWNERSHIP)

SCALES: 1:500

PROJECT TITLE:
NORTH LONDON HEAT AND POWER PROJECT

DRAWING TITLE:
PROPOSED UTILITIES IN THE LAND TO THE EAST OF THE EDMONTON ECOPARK

CLIENT:

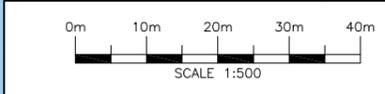
 NLWA
 1B BEROL HOUSE
 25 ASHLEY ROAD
 TOTTENHAM HALE
 N17 9LJ
 TEL: (0208) 4895730
 DCO APPLICATION REF:

PARTNERSHIP HOUSE,
 REGENT FARM ROAD,
 GOSFORTH,
 NEWCASTLE UPON TYNE
 NE3 3AF
 TEL: (0191) 2726100
 FAX: (0191) 2726515

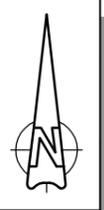


DRAWING No.
35180/GOS/CVD/006

REV.
A



Original Drawing Size - A1 DO NOT SCALE



DESCRIPTION					
REV	DATE		DWN	CHK	APP
A	27/04/2015	FIRST ISSUE	SAS	EG	
REVISIONS					
REV	DATE		DWN	CHK	APP
B	02/07/2015		MJB	EG	JA
C	20/08/2015		MJB	AD	JA

NOTES:
 1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
 2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE.
 3. GRID COORDINATES RELATE TO ORDNANCE SURVEY NATIONAL GRID.

LEGEND:

	SURFACE WATER SEWER—OWNED BY THAMES WATER
	WATER MAIN—OWNED BY THAMES WATER
	COMBINED SEWER—CHINGFORD SEWER OWNED BY THAMES WATER
	VODAFONE CABLE
	BT CABLE
	GAS MAIN—OWNED BY NATIONAL GRID
	ELECTRIC CABLE—OWNED BY UKPN
	DATA CABLE (OWNED BY VIRGIN)
	PROPOSED RAW WATER PIPE
	EXISTING DRAINAGE PIPE
	DATA CABLE TRENCH INCLUDING VODAFONE, ZAYNO AND VIRGIN

SCALES: 1:1000

PROJECT TITLE:
 NORTH LONDON HEAT AND POWER PROJECT

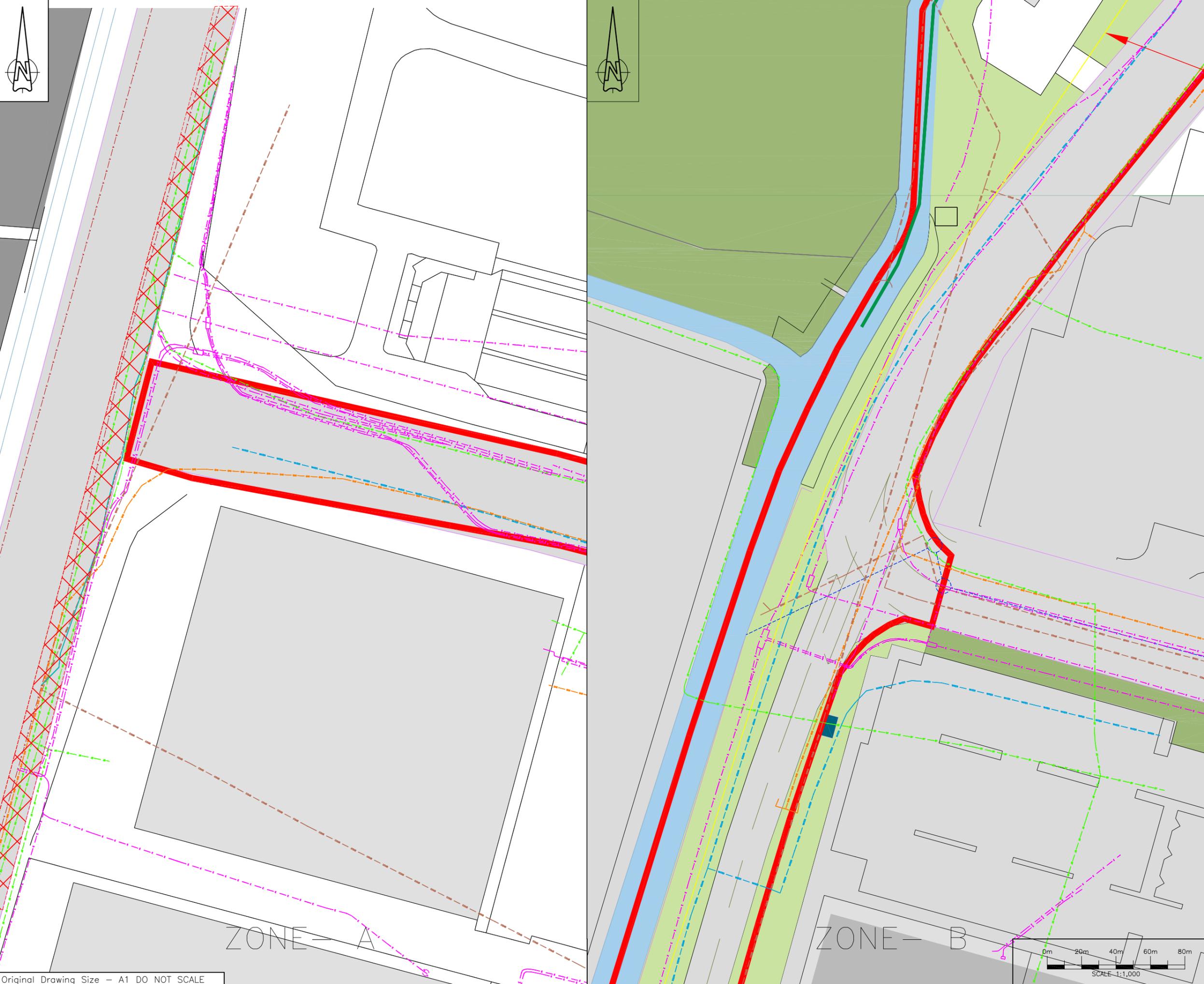
DRAWING TITLE:
 PROPOSED UTILITIES IN LAND TO THE NORTH OF EDMONTON ECOPARK

CLIENT:
 NLWA
 1B BEROL HOUSE
 25 ASHLEY ROAD
 TOTTENHAM HALE
 N17 9LJ
 TEL: (0208) 4895730
 DCO APPLICATION REF:

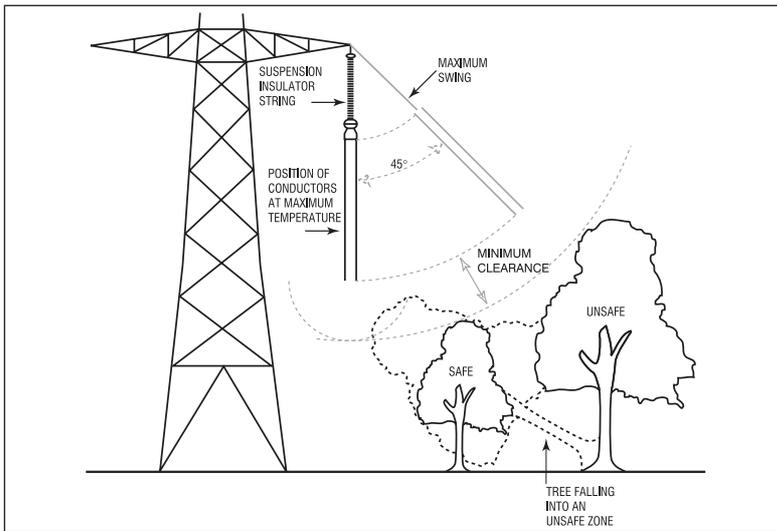
PARTNERSHIP HOUSE,
 REGENT FARM ROAD,
 GOSFORTH,
 NEWCASTLE UPON TYNE
 NE3 3AF
 TEL: (0191) 2726100
 FAX: (0191) 2726515



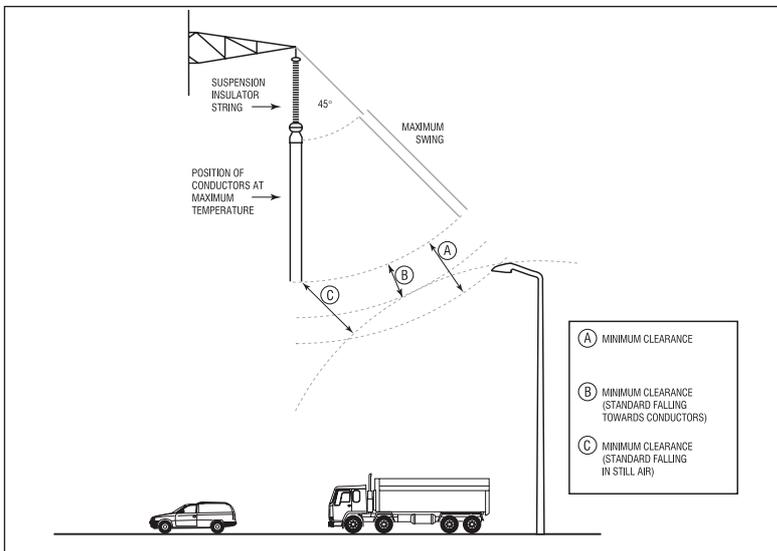
DRAWING No. 35180/GOS/CVD/007 REV. C



Original Drawing Size — A1 DO NOT SCALE



Clearance to trees.
(Ref. Item 8 table 1).



Clearance to lighting standards.
(Ref. Item 11 table 1).

Item	Description of Clearance	Minimum Clearance (metres) at 400,000 volts	Minimum Clearance (metres) at 275,000 volts
1	To ground	7.6	7.0
2	To normal road surface	8.1	7.4
3	To road surface designated "6.1 metres high load" routes	9.2	8.5
4	To motorway or other road surface where "Skycradle" can be used	10.5	9.8
5	To motorway or road surface where scaffolding is to be used on:		
	(i) Normal 3 lane motorways	16.3	15.6
	(ii) Elevated 2 lane motorways	13.3	12.6
6	To any object on which a person may stand including ladders, access platform, etc	5.3	4.6
7	To any object to which access is not required AND on which a person cannot stand or lean a ladder	3.1	2.4
8	To trees under or adjacent to line and:		
	(i) Unable to support ladder/climber	3.1	2.4
	(ii) Capable of supporting ladder/climber	5.3	4.6
	(iii) Trees falling towards line with line conductors hanging vertically only	3.1	2.4
9	To trees in orchards and hop gardens	5.3	4.6
10	To irrigators, slurry guns and high pressure hoses	30.0	30.0
11	To street lighting standards with:		
	(i) Standard in normal upright position	4.0	3.3
	(ii) Standard falling towards line with line conductors hanging vertically only	4.0	3.3
	(iii) Standard falling towards line	1.9	1.4

Table 1: Overhead line conductor clearances.



ENERGY
NETWORKS
ASSOCIATION

Technical Specification 43-8

Issue 3, 2004

OVERHEAD LINE CLEARANCES

With Amendment 1, 2004

Energy Networks Association
Engineering Directorate

© 2004 *Energy Networks Association*

All rights reserved. No part of this publication may be reproduced, stored in a retrieval or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written consent of Energy Networks Association. Specific enquiries concerning this document should be addressed to:

Engineering Directorate
Energy Networks Association
18 Stanhope Place
Marble Arch
London
W2 2HH

This document has been prepared for use by members of the Energy Networks Association to take account of the conditions which apply to them. Advice should be taken from an appropriately qualified engineer on the suitability of this document for any other purpose.

© 2004 Energy Networks Association

Amendment 1 to ENATS 43-8 Issue 3, 2004 Overhead Line Clearances

The following amendment has been made to correct an editorial error within the document.

In clause 11.3.2 on page 19; replace paragraph 2:

"A horizontal physical barrier shall be erected to form a roof between the area of work and the overhead line such that the safe clearance limit cannot be infringed. The distances in Table 11.2, Item 11.2.1 shall be treated as a minimum necessary clearance and shall be used to calculate the height of the underside of the physical barrier."

with:

"A horizontal physical barrier should be erected to form a roof between the area of work and the overhead line such that the safe clearance limit cannot be infringed. The distances in Table 11.2, Item 11.2.1 shall be treated as a minimum necessary clearance and shall be used to calculate the height of the underside of the physical barrier."

CONTENTS

	Page
Forward	3
1 - Scope	3
2 - References	4
3 - Definitions	6
4 - Derivation of Clearances	8
5 - Application of Clearances	9
6 - Clearances to Ground, Roads and Objects	10
7 - Clearances where Power Lines Cross or are in Close Proximity	15
8 - Railway Crossings	16
9 - Waterway Crossings.....	16
10 - Telecommunication Lines	17
11 - Work in Proximity to Overhead Lines.....	17

TABLES

Table 6.1 - Clearances to Ground and Roads	10
Table 6.2 - Clearances to Objects	11
Table 6.3 - Ground Clearance.....	13
Table 6.4 - Clearance to Buildings and Structures.....	14
Table 7.1 - Minimum Clearances where Power Lines Cross or are in Close Proximity	15
Table 8.1 - Principal Vertical Clearances to Railways and Associated Structures.....	16
Table 11.1 - Horizontal Distances to Safety Barriers	18
Table 11.2 - Vertical Passing Clearances.....	18

ILLUSTRATIONS

Fig. 1 - Clearances to Objects (on which a person can stand)	20
Fig. 2(a) - Clearances to Trees.....	21
Fig. 2(b) - Clearances to Trees in Orchards and Hop Gardens.....	21
Fig. 3 - HV Conductor Clearances to Lighting Columns	22
Fig. 4 - LV Conductor Clearances from Lighting Columns.....	23
Fig. 5 - Clearance between Structures and Effectively Insulated Conductors Installed on Poles.....	24

APPENDIX

A - Clearances to Objects – Philosophy	25
--	----

SPECIFICATION FOR OVERHEAD LINE CLEARANCES

FOREWORD

This Specification represents the current practice of Energy Networks Association Member Companies (ENAMC), in the UK, for clearances for overhead lines and includes the statutory ground clearance requirements of The Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR).

Overhead line clearances for new overhead lines operating at 45 kV and above shall be compliant with BS EN 50341 and BS EN 50341-3-9.

Overhead line clearances for new overhead lines operating below 45 kV shall be compliant with prEN 50423-1, prEN 50423-2 and prEN 50423-3.

For overhead lines which are designed using probabilistic thermal rating concepts which allows a defined conductor temperature exceedance then the 'specified maximum conductor temperature' shall be replaced by the 'maximum likely conductor temperature' in accordance with Regulation 17 (1) of ESQCR 2002. The minimum clearances shall be determined from the relevant tables and voltages contained in this document.

Clearances in this Specification are based on the conductor sag at the defined maximum or likely conductor temperature and are not based on the sag of conductor with ice or snow applied.

The requirements for air clearances have been contained previously in a number of documents. This Specification presents comprehensive schedules of clearances for all lines at all voltages.

This Specification on overhead lines clearances supersedes the following documents:

- (i) Engineering Recommendation L11/4.
- (ii) Engineering Recommendation L40/1.
- (iii) Engineering Recommendation G35.
- (iv) The clearances given in ENA TS 43-12.
- (v) Issue 2 of this Specification.

1 SCOPE

This Specification specifies the minimum clearances between ENAMC overhead lines at all nominal system voltages and objects, ground, railway property and other ENAMC overhead lines. The Specification also refers to National Agreements between ENAMC and other Authorities.

Clearances specified refer to bare, lightly and effectively insulated line conductors and have been determined to provide safety to the general public and protection against flashover of the line. These clearances are based on normal use of any land, buildings or structures crossed by the line, unusual situations can only be determined by local assessment and may require an increase in the clearances specified or other measures to be taken for example as described in ENA TS 43-90. **All clearances shall therefore be determined by the appropriate ENAMC, considering the circumstances in which the line is used and having regard to the use of the surrounding land.** This Specification has been produced primarily for use by such personnel, who may find Appendix A useful.

This Specification may be of use to the general public, and to bodies outside the ENAMC as a general guidance document, but in all cases where definitive clearances are required contact **shall** be made with the owner of the overhead line. This is particularly important where a change in land use is envisaged. An appropriate member of that company's staff will then determine the clearance to be adopted for that particular situation, along with any precautions deemed necessary.

Where effectively insulated conductors are used, ground clearances over roads accessible to vehicular traffic shall be maintained as stated in Regulation 17 (2) (a) of ESQCR 2002.

Clearances over other ground or in proximity to objects may be reduced provided the effectively insulated conductor is not placed in a position where it is likely to be damaged or where persons going about normal everyday activities could come into contact with it.

Where other considerations, e.g. induced voltages would dictate the use of metallic screens or enhanced clearances, the owner of the overhead line will specify the requirements. This Specification for overhead line clearances need not be applied retrospectively to existing lines subject to the requirements of Regulation 2 (8), ESQCR 2002 with regard to "material alteration".

2 REFERENCES

This Specification makes reference to, or should be read in conjunction with, the following Documents:

Statutory Instrument 2002 No. 2665, The Electricity Safety, Quality and Continuity Regulations 2002

BS EN 50341-1 1999, 'Overhead electrical lines exceeding AC 45 kV – General Requirements'

BS EN 50341-3-9 1999, 'Overhead electrical lines exceeding AC 45 kV - UK National Normative Annexe'

prEN 50423-1, 'Overhead electrical lines exceeding AC 1 kV up to and including AC 45 kV - Part 1: General requirements - Common specifications'

prEN 50423-2, 'Overhead electrical lines exceeding AC 1 kV up to and including AC 45 kV - Part 2: Index of National Normative Aspects'

prEN 50423-3, 'Overhead electrical lines exceeding AC 1 kV up to and including AC 45 kV - Part 3: Set of National Normative Aspects'

BS 7354:1990, 'Code of Practice for the design of high-voltage open-terminal substations'.

HSE guidance note GS6 (rev) 'Avoidance of Danger from Overhead Lines' ISBN 0 11 885 6685.

SMCC 004, "Notes of Guidance on Safe Working of Third Parties in Close Proximity to Live Overhead Conductors"

ENA TS 43-02, 'Design of Steel Tower Overhead Transmission Lines at 132 kV and Higher Voltages', Clause 12 only.

ENA TS 43-12, 'Insulated aerial bundled conductors erection requirements for LV overhead distribution systems.'

ENA TS 43-90 'Anti climbing devices and safety signs for HV lines up to and including 400 kV'.

ENA TS 43-122 XLPE Covered-Conductors For Overhead Lines (Having Rated Voltages U_0/U Greater Than 0.6/1 kV Up To and Including 19/33 kV)

Engineering Recommendation G39/1, 'Model Code of Practice Covering Electrical Safety in the Planning, Installation, Commissioning and Maintenance of Public Lighting and Other Street Furniture'.

Engineering Recommendation G45/1, 'Notes of Guidance for Electricity Boards on the Use of Irrigators, Slurry Guns and High Pressure Hoses in the Vicinity of Overhead'

Engineering Recommendation G55/1, 'Safe Tree Working in Proximity to Overhead Electric Lines.'

Engineering Recommendation EB/BT.2 'Conditions for BT and Public Suppliers' Joint Use of Poles'.

Engineering Recommendation P0.1, Post Office Memorandum A80 (e), 'Protection of Post Office Lines from Contact with Low or Medium Voltage Power Lines'.

Engineering Recommendation P0.2, Post Office Memorandum A23l (b), 'Protection of Post Office Lines from High Voltage Power Lines'.

Note: P.0.1 and P.0.2 are to be replaced by P.0.5 when this is issued (early 2004).

Engineering Recommendation P0.3, 'Technical Conditions Applicable under Master Wayleave Agreements between the Post Office and the Electricity Supply Industry for Wayleaves on Post Office Telecommunications Property'.

Railway Master Wayleave Agreement.

3 DEFINITIONS

For the purpose of this Specification, the following definitions apply:

Application Factor

The distance (dependent upon working situation) which is added to the safety distance to determine working and access clearance.

Basic Electrical Clearances

Clearance to earth ascribed to air insulation for each nominal system voltage. Basic electrical clearances do not include any additions for constructional tolerances, wind effects, etc.

Cable

A conductor, or assembly of conductors, which are effectively insulated and incorporates an earthed metallic screen.

Controlled Zone

The inside of an enclosure efficiently protected by fencing not less than 2.4 m (8 ft.) in height or other means necessary to meet the requirements of ESQCR 2002 Regulation 11 (b).

Covered Conductor (CC)

A design of conductor that can be lightly or effectively insulated and may be manufactured in accordance with ENA TS 43-122.

Note: In the Guidance Notes to the ESQC Regulations CC is referred to as BLX, which is a trade name used in Scandinavia.

Creep

The non-elastic stretch of a conductor. This consists of two parts - bedding down of the strands and the long-term stretch of conductor material.

Effectively Insulated Conductor

A line conductor which is insulated for continuous phase to phase or phase to earth contact and is protected, so far as is reasonably practicable, against mechanical damage or interference having regard to its accessibility.

Note: The implication here is that insulated conductors (such as low voltage aerial bundled conductors but not high voltage CC conductors) may be placed such that they are ordinarily accessible, providing they are safe in the particular circumstances.

Jumper Connection

A connection at a support from a phase conductor to another conductor or to a terminal on transformers, switchgear, fusegear, line taps, etc. at support.

Lightly Insulated Conductor

A line conductor which is insulated against momentary phase to phase or phase to earth contact and is considered as a bare conductor for clearance purposes.

Note: This level of insulation may not be designed to support the full phase to earth or phase-to-phase voltage (as appropriate). For example the covering on some types of HV or EHV CC overhead line conductors could be described as *lightly insulated*. Other types of CC exist that can be effectively insulated.

Line Conductor

A conductor used, or to be used, for conveying a supply of electricity. A line conductor is deemed to include a through jumper.

Normal Use of Land

The type of work or activity which is likely to occur on or over a particular piece of land or water.

Object

Any building, wall, fence, structure, stationary vehicle, tree, vegetation or similar with an elevation above ground level.

Overhead Line

Apparatus in the open air and above ground level coming within the scope of ESQCR 2002.

Safety Distance

Distance from nearest exposed conductor or from an insulator supporting a conductor is maintained to avoid danger.

Specified Maximum Temperature

The likely maximum temperature of the conductor resulting from a combination of climatic conditions and the rated electrical load under normal operating conditions.

System Voltage

The nominal RMS phase-to-phase voltage of a three-phase AC system.

Wire

A wire which is not designed to convey electricity but which is attached to a support carrying line conductors, e.g. flying stay wire.

4 DERIVATION OF CLEARANCES

In general, the clearances specified in this Specification have been derived from the summation of the following:

- (i) Basic electrical clearance as specified in BS EN 50341-1, increased by 10 % and rounded up, or where past practice has employed greater clearances, these have been retained.
- (ii) An appropriate physical distance to allow for the normal use of the ground or object to which clearance is required. This is termed the **Application Factor**.

It has not been possible to specify all the clearances by the above method since some shall comply with Statutory Requirements. In addition, certain clearances, e.g. to railways, are the subject of agreement with the appropriate companies.

In some cases, the clearance derived by the summation of (i) and (ii) is greater than the statutory clearance and in these cases, it is this greater clearance which is quoted in this Specification.

Throughout this Specification statutory clearances are highlighted by being *printed in italic type*.

Note: Appendix A, "Clearance to Objects – Philosophy" clarifies the process used to determine the clearances. Where overhead lines are refurbished, or constructed, so that the basic impulse level (BIL) exceeds those used in determining the clearances, then the clearances will have to be re-assessed. This is particularly pertinent in cases where a line is insulated for a higher voltage than that at which it is operated.

5 APPLICATION OF CLEARANCES

The following factors require to be taken into consideration when providing clearances to overhead lines:

- (i) Allowance shall be made for the effects of creep in conductors, as the specified clearance shall be maintained for the life of the conductor.
- (ii) In some cases, lines are operated at a lower voltage than that for which they are designed. It is important when specifying clearances to fixed objects that the clearances appropriate to the intended nominal operating voltage of the line be adopted.
- (iii) When an overhead line is being erected in proximity to existing objects, the clearances shall allow for future maintenance of the object.
- (iv) When work is to be carried out, or objects are to be erected in proximity to an existing overhead line, the clearance may require to be increased substantially to allow for the operation and movement of site traffic. Detailed guidance on safe working methods are given in HSE guidance note GS6. If utilised, the clearances provided in Section 11 will allow the site operator to comply with GS6.

6 CLEARANCES TO GROUND, ROADS AND OBJECTS

6.1 Clearances to Ground and Roads

The clearances specified in Table 6.1 shall not be infringed at the specified maximum conductor temperature with the conductor (including its suspension insulators if fitted) hanging vertically in still air or deflected at any angle up to 45° from the vertical.

Table 6.1 - Clearances to Ground and Roads

Item	Description of Clearance	Nominal System Voltage (kV)				
		Minimum Clearance (m)				
		≤ 33	66	132	275	400
6.1.1	Line conductor at any point not over road. (Note 1)	5.2	6.0	6.7	7.0	7.6
6.1.2	Line conductor to road surface other than as specified in 6.1.3, 6.1.4, and 6.1.5. (Note 2)	5.8	6.0	6.7	7.4	8.1
6.1.3	Line conductor to road surface of designated '6.1m high load' routes. (Note 3)	6.9	7.1	7.5	8.5	9.2
6.1.4	Line conductor to motorway or other road surface where 'Skycradle' can be used. (Note 4 & 6)	8.2	8.4	8.8	9.8	10.5
6.1.5	Line conductor to motorway road surface where scaffolding is to be used on:					
	(i) Normal 3 lane motorways. (ii) Elevated 2 lane motorways (Note 5 & 6)	14.0 11.0	14.2 11.2	14.6 11.6	15.6 12.6	16.3 13.3
6.1.6	Bare live metalwork, e.g. transformer terminals, jumper connections, etc. (Note 7)	4.3	4.3	Controlled Zone Safety Rules Apply		

Notes:

1. The specified ground clearance for effectively insulated conductors at locations, which are not over roads accessible to vehicular traffic, are included in Section 6.3. Such conductors shall be positioned so that they are not likely to be damaged or cause injury.
2. The height of any wire or cable (other than a line conductor) which is attached to a support carrying a line conductor is 5.8 m above any roadway irrespective of the line voltage. The clearances specified allow for the safe passage below the

- line of a vehicle of maximum height 5 m. These clearances are based on a vehicle height not exceeding 5 m (except for the 6.1 m high load routes).
3. 'High load' routes are roads designated by the Department for Transport, for which the higher load clearance of 6.1 m shall be maintained.
 4. These clearances apply to situations where it is possible to use a Skycradle for conductor erection and maintenance. These clearances allow for the positioning of the Skycradle under a live circuit. Where the circuit under which the Skycradle is to be positioned and any adjacent circuit can be made dead during the slewing of the Skycradle, then these clearances can be reduced to 7.6 m for all voltages.
 5. In situations where the Skycradle cannot be used to erect or maintain lines, which cross a motorway, these clearances should be adopted. They allow for the erection of scaffolding / guard netting with the overhead circuits live.
 6. Should the use of Skycradles or the erection of temporary scaffolding in proximity to overhead lines be considered then appropriate guidance shall be sought relating to acceptable working methods and appropriate preparation prior to any work commencing.
 7. These clearances apply to supports of overhead lines that in addition support transformers, isolators, cable sealing ends, etc. These clearances do not apply to pole mounted, LV fuses as long as they are effectively insulated and the fuse carriers are in place. These clearances are not required for effectively insulated jumper connections but shall be maintained from any bare jumpers and terminals.

6.2 Clearances to Objects

The clearances specified in Table 6.2 shall not be infringed at the specified maximum conductor temperature with the conductor (including its suspension insulators if fitted) hanging vertically in still air or deflected at any angle up to 45° from the vertical towards the object unless otherwise specified. The clearances apply in any direction.

Table 6.2 - Clearances to Objects

Item	Description of Clearance	Nominal System Voltage (kV)				
		Minimum Clearance (m)				
		≤ 33	66	132	275	400
6.2.1	Line conductor to any object which is normally accessible (including permanently mounted ladders and access platforms) or to any surface of a building. (Note 1 and Fig. 1)	3.0	3.2	3.6	4.6	5.3
6.2.2	Line conductor to any object to which access is not required AND on which a person cannot stand or lean a ladder. (Note 2)	0.8	1.0	1.4	2.4	3.1

Item	Description of Clearance	Nominal System Voltage (kV)				
		Minimum Clearance (m)				
		≤ 33	66	132	275	400
6.2.3	Line conductors to that part of a tree under / adjacent to line and:					
	(i) Unable to support ladder / climber.	0.8	1.0	1.4	2.4	3.1
	(ii) Capable of supporting ladder / climber.	3.0	3.2	3.6	4.6	5.3
	(iii) Trees falling towards line with conductors hanging vertically only. (Note 3 and Fig. 2(a))	0.8	1.0	1.4	2.4	3.1
6.2.4	Line conductors to trees in Orchards and Hop Gardens. (Note 4 and Fig.2(b))	3.0	3.2	3.6	4.6	5.3
6.2.5	Line conductors to irrigators, slurry guns and high pressure hoses (Note 5)	30.0	30.0	30.0	30.0	30.0
6.2.6	Line conductor to street lighting standards with:					
	(i) Standard in normal upright position.	1.7	1.9	2.3	3.3	4.0
	(ii) Standard falling towards line with conductor hanging vertically only.	1.7	1.9	2.3	3.3	4.0
	(iii) Standard falling towards line. (Note 6, Fig. 3 and 4)	0.4	0.7	0.8	1.4	1.9

Notes:

1. These are the minimum clearances that shall be maintained between an overhead line conductor and a normally accessible structure or surface of a building (walls, roof, windows etc.). They permit a person to stand on or against these structures but only allow for free movement of short hand held objects. Detailed guidance on the avoidance of danger from electric lines on construction sites is contained in HSE guidance note GS6.
2. Account should be taken of the possible movement of the object, e.g. flagpole in the wind. These clearances also apply to moving objects to which access is precluded during passage below the line. The height or position of the object should take into account any possible undulating or rocking movement of the object, e.g. a mobile crane jib travelling over uneven ground. Detailed guidance on the avoidance of danger from electric lines on construction sites is contained in HSE Guidance note GS6
3. Clearances quoted in 6.2.3 (i) and (ii) are minimum acceptable clearances but in practice, larger clearances will be necessary to take account of growth rates of trees and of the swaying of trees / branches in the wind. Clearances quoted in 6.2.3 (iii) are recommended in order to protect lines from falling trees but due to wayleave considerations will not always be attainable. Detailed guidance on the avoidance of danger from electric lines in forests is contained in Engineering Recommendation G55/1.

4. These clearances shall be obtained vertically when any part of a tree is within 7.5 m horizontally of a line. For hop gardens, the clearances apply to the strain wires forming the mesh supporting system.
5. The clearance quoted is for general guidance only. Detailed guidance on the use of irrigators, slurry guns and high-pressure hoses in the vicinity of overhead lines is contained in Engineering Recommendation G45/1.
6. The clearances quoted in 6.2.6 (i) assume that maintenance platforms will be positioned such that clearances quoted in Item 6.2.1 are maintained. Where effectively insulated conductors are used, clearances may be reduced to those indicated in Fig. 4. The clearances quoted in 6.2.6(iii) can be neglected if the location of the lighting column is such that impact by a vehicle is improbable.. Engineering Recommendation G39 contains guidance on maintenance of street lighting columns in proximity to overhead lines. Where for maintenance purposes the operative requires to work on the upper part of a lantern, within the clearances specified in 6.2.1, appropriate safety measures shall be taken, which shall be agreed in advance between the distribution or transmission company and the lighting maintenance company or authority. The clearances quoted in 6.2.6 (ii) include additional clearance to allow for the erection of street lighting columns.

6.3 Clearance from effectively insulated low voltage lines attached to poles

Effectively insulated conductors for example Aerial Bundled Conductors (ABC) installed in accordance with ENA TS 43-12 shall comply with the clearances in this section. However, clearances between other power lines and above railways, as detailed in sections 7 and 8 and Tables 7.1 and 8.1 below, shall be met.

6.3.1 Ground Clearance

Clearances to roads shall still comply with paragraph 6.1 and Table 6.1 above however clearances in other locations are provided in Table 6.3 below.

Table 6.3 - Ground Clearance

Location	Minimum Clearance (m)
Along the line of hedgerows, fences and boundary walls etc.	4.0
Domestic driveways with an access width of 2.5 m or less which is defined by gateposts, hedges or other fixed features.	4.3
Between buildings where there is no vehicular access.	3.5

6.3.2 Clearances to Buildings and Structures

The clearances in Table 6.4 below do not apply to mains or services attached to buildings. In determining clearances the following conditions should be considered as appropriate, sags at the maximum working temperature of 75°C and an angular deflection of 30° at a working temperature of 30°C. Deflected conditions need not be considered if the span is effectively shielded from wind by the building or structure.

Table 6.4 - Clearance to Buildings and Structures

Location	Minimum Clearance (m)
Vertical clearance to any surface or structure that is accessible without access equipment (see Fig. 5).	3.0
Horizontal distance to any surface of a building or structure which is accessible without access equipment (see Fig. 5).	1.0
Clearance to parts of a building or structure not normally accessible (see Fig. 5). See note 1.	0.5
Clearance to free-standing apparatus such as street lighting columns, traffic signs, British Telecom poles or columns (see Fig. 5).	0.3

Notes:

1. This clearance is to prevent mechanical abrasion of the conductor. When connecting from a pole to a building it is only necessary to ensure that the attachment route avoids risk of abrasion.

6.3.3 Systems Attached to Buildings

For conductors attached to buildings consideration needs to be given as to additional protective measures to prevent danger. Reference should be made to the appropriate construction system for example ENA TS 43-12 for ABC.

7 CLEARANCES WHERE POWER LINES CROSS OR ARE IN CLOSE PROXIMITY

The following minimum clearances shall apply where power lines cross or are in close proximity to one another. In all cases the clearances shall be determined by the ultimate nominal system voltage of the upper or lower line, whichever is greater.

Table 7.1 - Minimum Clearances where Power Lines Cross or are in Close Proximity

Item	Description of Clearance	Nominal System Voltage (kV)						
		Minimum Clearance (m)						
		0.4	11	33	66	132	275	400
7.1.1	Lowest line conductor or earth wire of upper line to highest line conductor of lower line. (Note 1)	1.0	1.8	2.0	2.3	2.7	3.7	4.4
7.1.2	Lowest line conductor or earth wire of upper line to earth wire of lower line where erected. (Note 1)	0.7	1.4	1.6	2.3	2.7	3.7	4.4
7.1.3	Lowest line conductor or earth wire of upper line to any point on a support of the lower line on which a person may stand. (Note 2)	2.7	2.8	3.0	3.2	3.6	4.6	5.3
7.1.4	Support of upper line and any conductor of lower line. (Note 2)	7.5	7.5	7.5	7.5	15.0	15.0	15.0

Notes:

1. One of the following methods of determining clearances shall be adopted.
 - (a) With the upper conductors / earth wire hanging vertically and the lower conductors / earth wire deflected at 45° under the following conditions:
 - (i) Upper conductor at its specified maximum temperature coincident with lower conductor at an assumed temperature of 25°C less than its specified maximum temperature.
 - (ii) Lower conductor at a temperature of -5.6°C (no ice) coincident with upper conductor at an assumed temperature of 20°C.

or alternatively, (b) With the upper conductor / earth wire hanging vertically at its specified maximum temperature and the lower conductor / earth wire deflected at any angle up to 45° at a temperature of -5.6°C (no ice). In localities where there is a high likelihood of conductor icing it may be appropriate to consider the effects of such icing.
2. Clearance shall be obtained with the conductor / earth wire at its specified maximum temperature and deflected by any angle up to 45°.

8 RAILWAY CROSSINGS

Clearances to railways and their associated lines, buildings and yards are covered by the second schedule (General and Engineering) of the Condition Railway Master Wayleave Agreement.

Table 8.1 lists the principal vertical clearances referred to in the above Agreement. For horizontal clearances to railway circuits (excluding traction wires) reference should be made to the Agreement.

Table 8.1 - Principal Vertical Clearances to Railways and Associated Structures

Item	Description of Clearance	Nominal System Voltage (kV)				
		Minimum Clearance* m (ft)				
		≤ 33	66	132	275	400
8.1.1	Ground level.	6.1 (20)	6.1 (20)	6.7 (22)	7.0 (23)	7.6 (25)
8.1.2	Ground level at roads or yards where road mobile cranes are likely to be employed.	10.7 (35)	10.7 (35)	11.2 (37)	11.5 (38)	12.2 (40)
8.1.3	Rail level (see Note 1).	7.3 (24)	7.3 (24)	8.0 (26)	8.2 (27)	8.8 (29)
8.1.4	Buildings, gantries or other structures on which a man might stand and to traction wires (see Note 1).	3.0 (10)	3.0 (10)	3.7 (12)	4.6 (15)	6.1 (20)

* The imperial values take precedence since they are specified in the Agreement.

Notes:

- The clearances specified in 8.1.3 and 8.1.4 do not incorporate any allowances for use of scaffolding or Skycradle across railway tracks / traction wires during erection / maintenance of overhead lines. Clearances of 2.75 m (9 feet) and 4.9 m (16 feet) are required between scaffold net or Skycradle boom and traction wires and rail respectively.

9 WATERWAY CROSSINGS

Clearances to waterways are not subject to a single national Agreement but are dealt with by agreement with the appropriate Authority.

10 TELECOMMUNICATION LINES

Vertical and lateral clearances to telecommunication lines are specified in Engineering Recommendations PO.1 (1975), PO.2 (1975), PO.3 (1976), for voltages up to and including 33 kV.

Note: PO 1 and PO2 are to be replaced by PO5 in early 2004.

Engineering Recommendation EB/BT.2 'Conditions for BT and Public Suppliers' Joint Use of Poles' specifies the clearance requirements for apparatus when poles are jointly used.

11 WORK IN PROXIMITY TO OVERHEAD LINES.

This section deals with the use of plant or vehicles in proximity to overhead lines. Where work is undertaken using ladders, scaffold, mobile platforms etc. then the clearances provided in Tables 6.1 and 6.2 shall be used unless other risk mitigation can be employed such as temporary shrouding of the overhead conductor.

Whenever work is to be carried out in proximity to overhead lines consideration shall always be given to the possibility of making the line dead, or diverting it around the area affected.

The Health and Safety Executive provide guidance for the avoidance of danger from overhead lines in their Guidance Note GS6. The ENAMC shall be prepared to provide, preferably in writing, safety clearances and advice on safe working methods to those working in proximity to overhead lines. Where work can only be carried out safely with the line dead, this shall be the subject of precise written agreement between the ENAMC and the site operators.

11.1 Horizontal Clearances – on sites where there will be no work or passage of plant under lines.

HSE Guidance Note GS6 recommends that the ENAMC should be contacted for advice for any work within 15 m of a line erected on steel towers and 9 m of a line erected on wood poles.

Table 11.1 details typical minimum values for horizontal separation of the lines and safety barriers.

Table 11.1 - Horizontal Distances to Safety Barriers

Voltage / Type	≤33 kV Wood Pole	66 kV Wood Pole	132 kV Wood Pole	132 kV Tower	275 kV Tower	400 kV Tower
Minimum horizontal distances to safety barriers.	6.0 m	6.0 m	6.0 m	9.0 m	12.0 m	14.0 m

Note: Site conditions will dictate whether this clearance is adequate and consideration shall be given to line parameters e.g. span length, maximum sag etc. when calculating an actual clearance.

11.2 Vertical Passing Clearances – on sites where vehicles will pass under the lines.

Table 11.2 details these passing clearances and Appendix 2 provides their derivation.

The clearances given in Table 11.2, Item 11.2.1 are for vehicles with fixed height loads travelling on unmetalled roads.

Where the load carried by vehicles is variable then the vertical passing clearance shall be increased. These clearances are given in Table 11.2, Item 11.2.2.

Table 11.2 - Vertical Passing Clearances

Item No.	Nominal System Voltage		≤33 kV	66 kV	132 kV	275 kV	400 kV
11.2.1	Passing Clearance fixed height loads	m	0.8	1.0	1.4	2.4	3.1
11.2.2	Passing Clearance variable height loads	m	2.3	2.5	3.2	4.1	5.0

The above clearances shall be used to determine the maximum distance to the underside of barriers erected to prevent vehicles or plant from infringing these clearances whilst traversing the line. The height to the underside of the barrier shall be the minimum ground clearance of the line less the specified passing clearance in Table 11.2.

11.3 Vertical Clearance – on sites where work will be undertaken beneath the line.

Work beneath the line shall be deemed to be any work carried out within the minimum horizontal distances specified in Table 11.1 or the calculated distance (see note under 11.1) whichever is greater.

HSE Guidance Note GS6 provides recommendations for working under the line and uses two cases. "Work at ground level only (for example pipe laying)" and "Erection of buildings or structures underneath an overhead line". In both cases the clearances are the same and these are shown in Table 11.2 Item 11.2.1.

11.3.1 Work at ground level only.

Where work is carried out at ground level only the passing clearance of fixed height loads is permissible, as HSE Guidance Note GS6 requires that no vehicle or item of plant shall reach beyond the safe clearance limit. Where plant has the capability to reach into the safe clearance limit it shall be fitted with a physical restraint in order to prevent such action.

HSE Guidance Note GS6 requires that all such work shall be "under the direct supervision of a responsible person".

11.3.2 Work on buildings or structures underneath an overhead line

This includes all work under an overhead line and includes new construction, work on existing structures and demolition.

A horizontal physical barrier shall be erected to form a roof between the area of work and the overhead line such that the safe clearance limit cannot be infringed. The distances in Table 11.2, Item 11.2.1 shall be treated as a minimum necessary clearance and shall be used to calculate the height of the underside of the physical barrier.

Where a conductive material is used to form the barrier this shall be earthed.

The line shall be made dead if, during the erection of the physical barrier, safety clearances would be infringed.

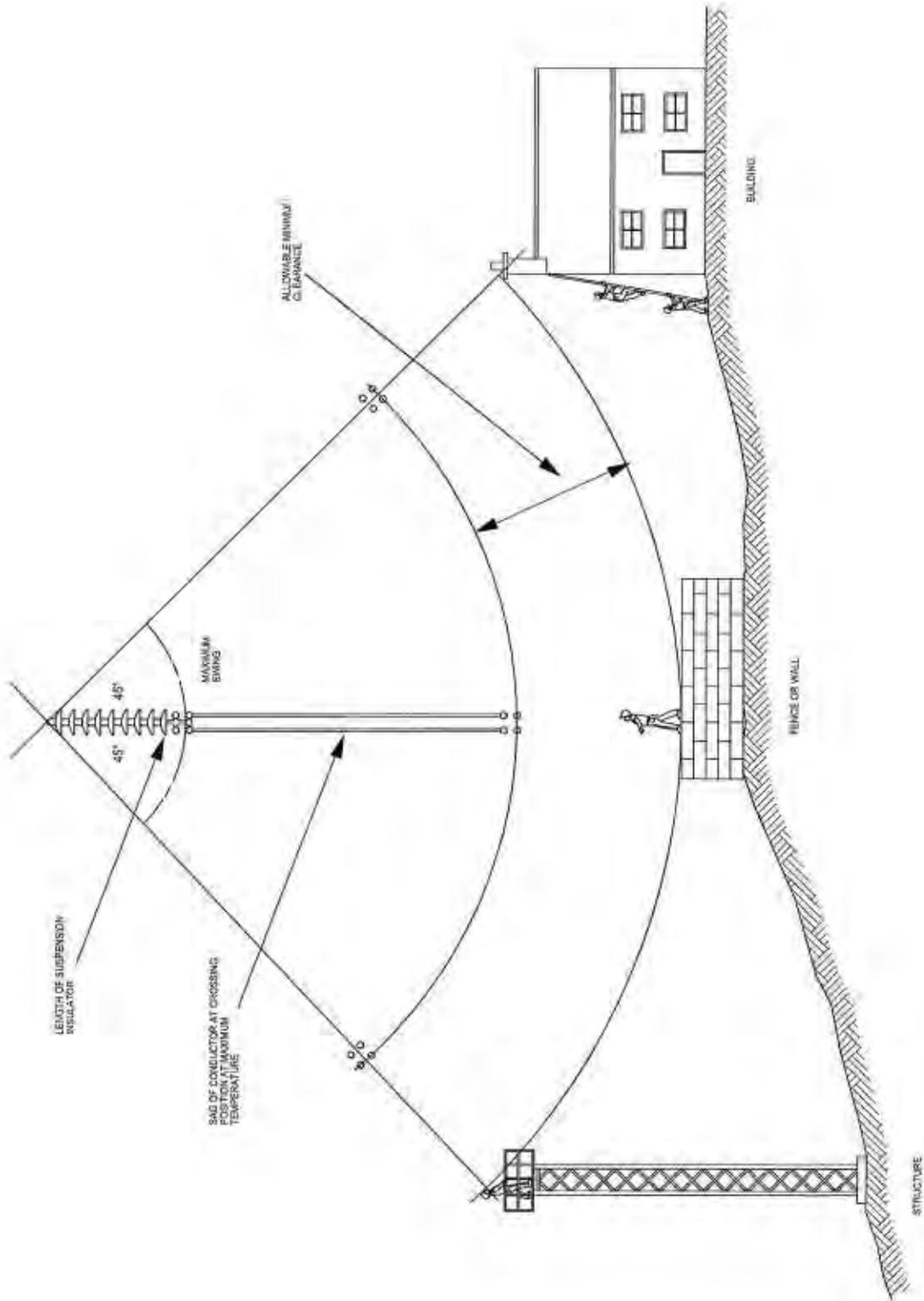


Fig. 1 Clearance to objects (on which a person can stand)

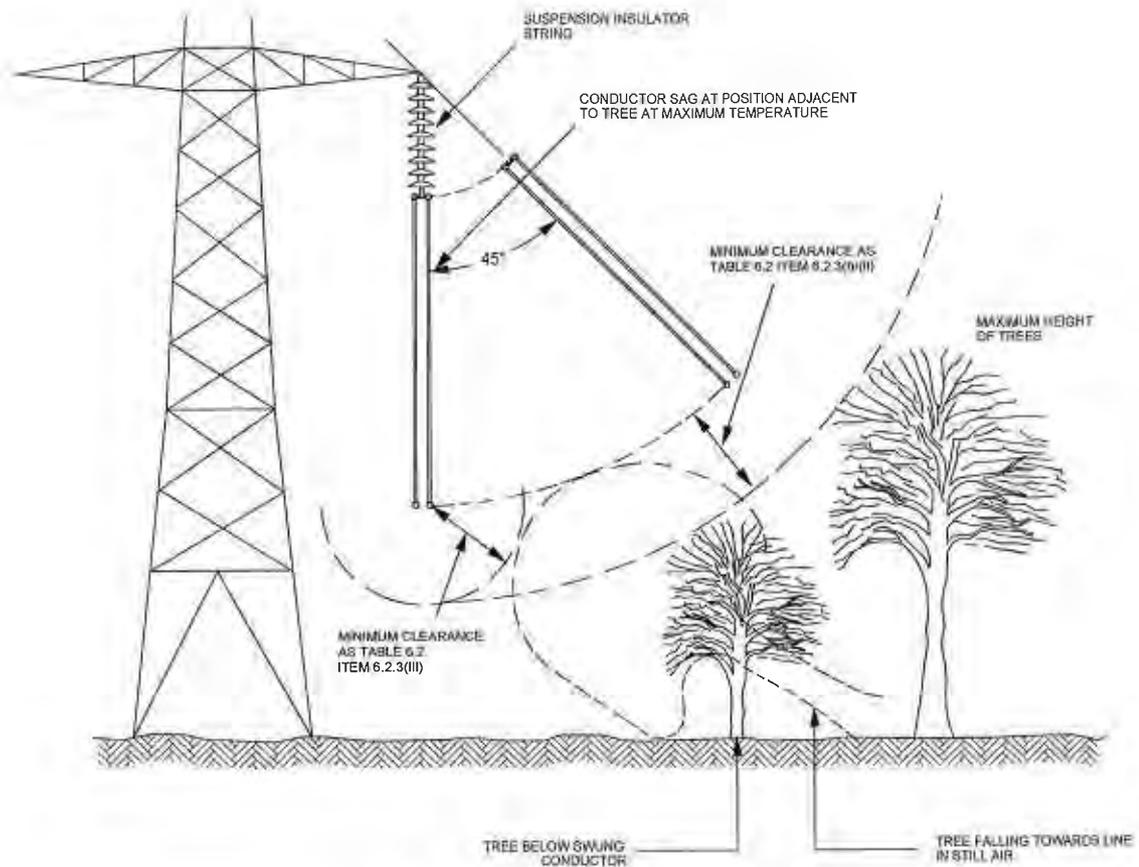
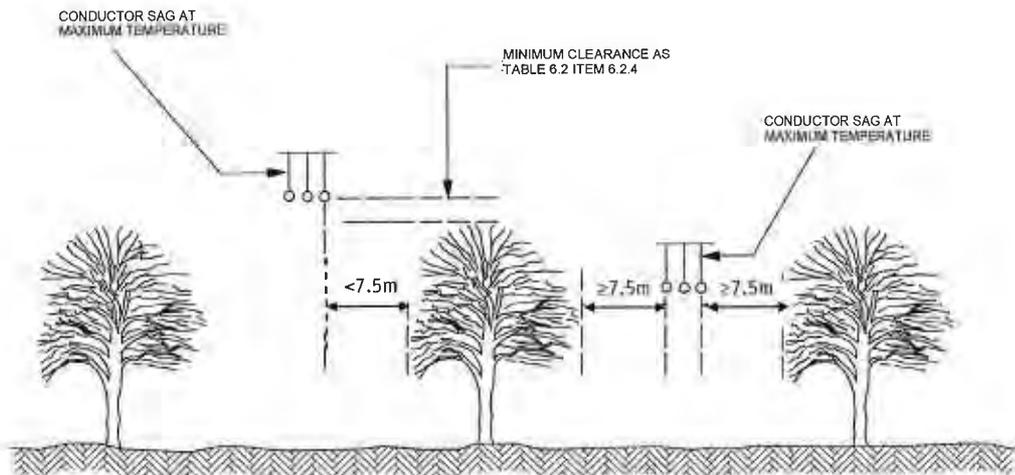


Fig. 2(a) Clearance to trees



Note: The leftmost configuration shows that when a tree is horizontally closer to the line than 7.5m, then vertical clearance, from the treetop, shall be maintained.

Fig. 2(b) Clearance to trees in orchards and hop gardens

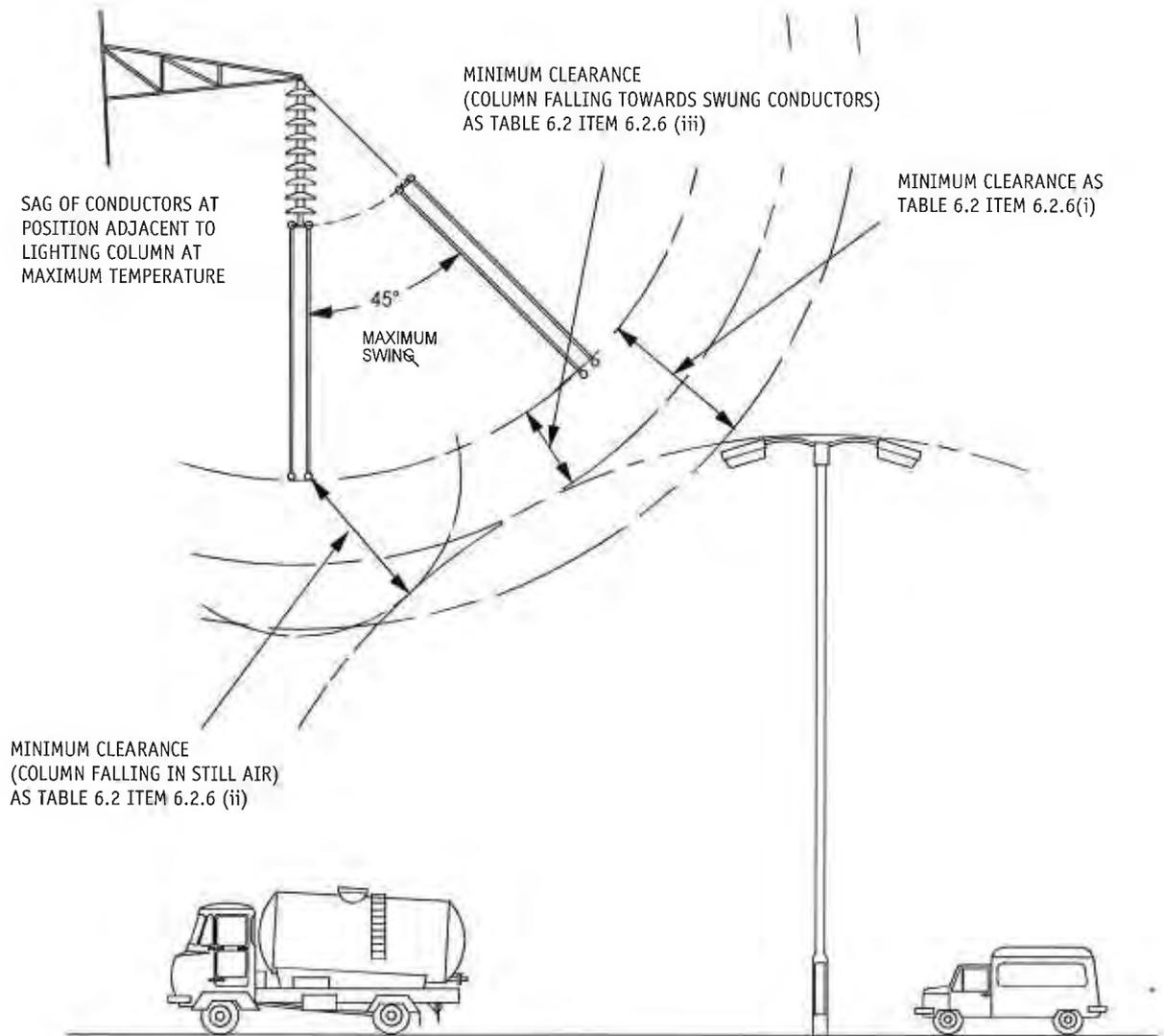
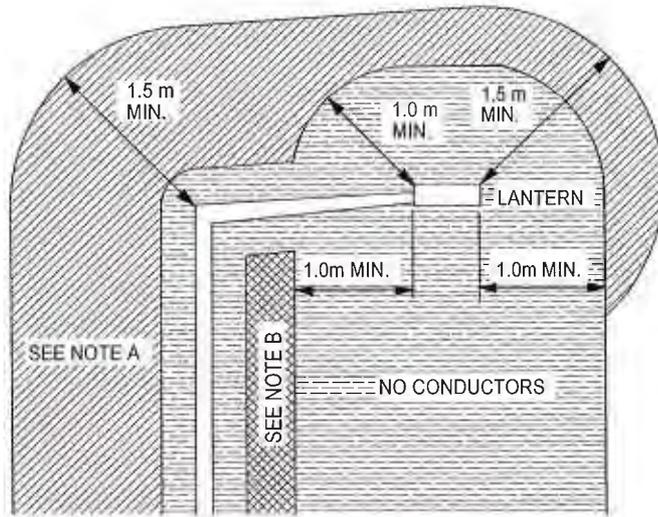
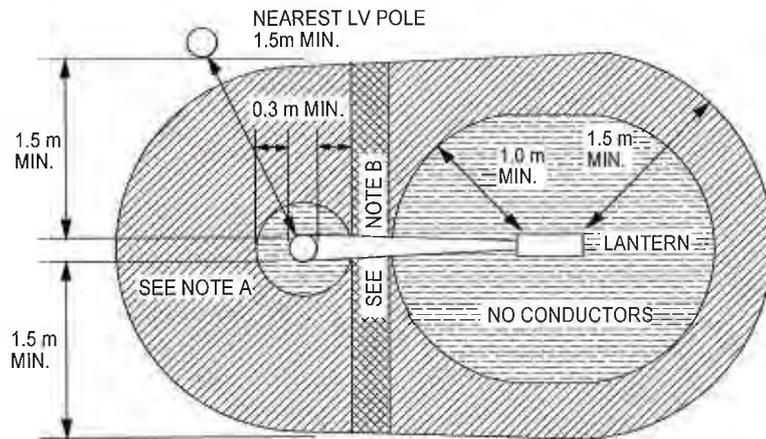


Fig. 3 HV Conductor Clearance to lighting columns



ELEVATION



PLAN



A

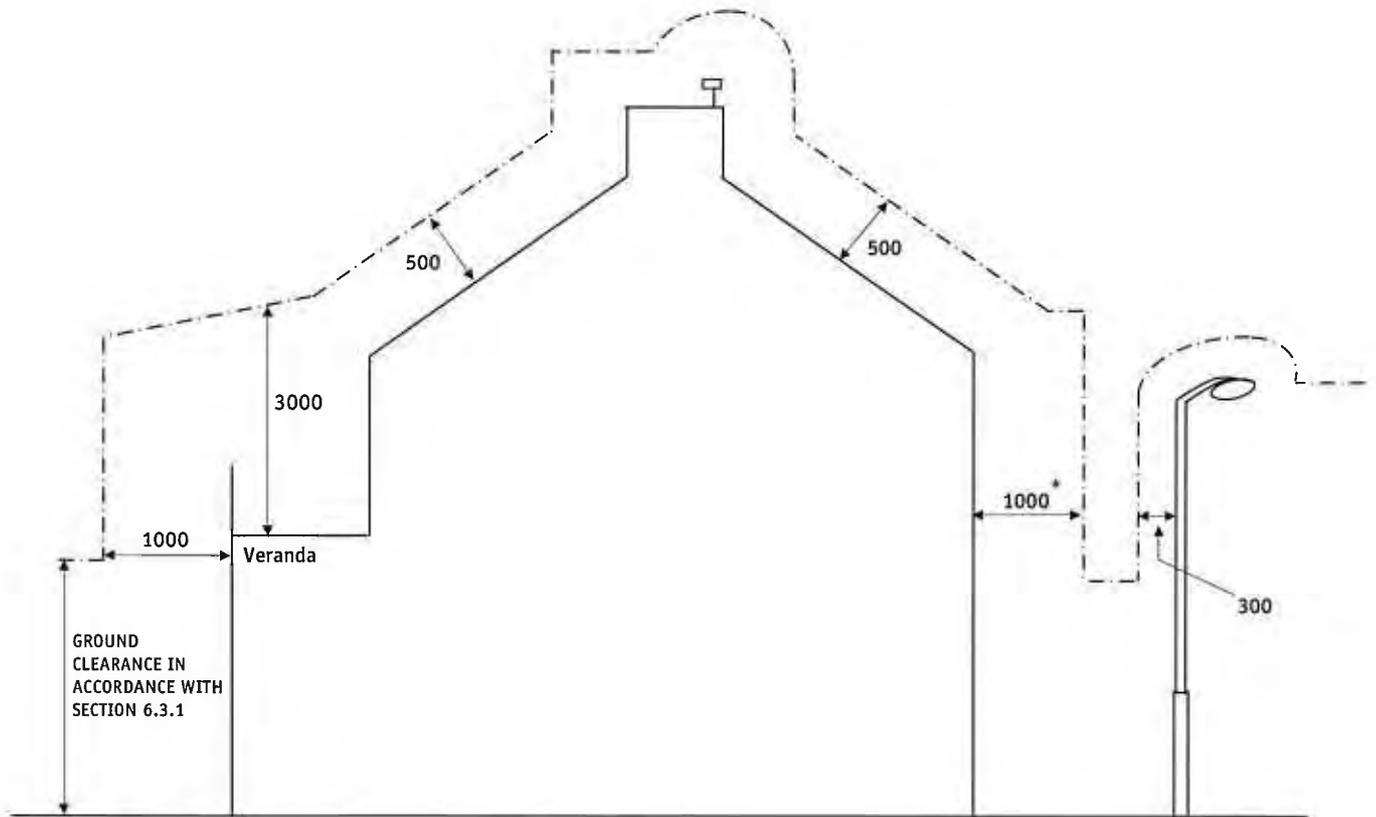
ALL PHASE AND NEUTRAL AND SWITCHWIRE CONDUCTORS IN THIS AREA SHALL BE EFFECTIVELY INSULATED FOR 1.5m FROM THE COLUMN OR LANTERN



B

ALL PHASE AND NEUTRAL AND SWITCHWIRE CONDUCTORS BENEATH THE OVERHANGING ARM OF THE COLUMN SHALL BE INSULATED THROUGHOUT THE SPAN OR EFFECTIVELY INSULATED AS IN 'A' ABOVE BUT WITH SUITABLE CONDUCTOR SPACERS.

Fig. 4 LV Conductor Clearances from lighting columns



----- EFFECTIVELY INSULATED CONDUCTORS SHOULD NOT BE POSITIONED BETWEEN THIS LINE AND THE STRUCTURE

- THIS CLEARANCE MAY BE REDUCED TO 500 mm WHERE THERE IS A BLANK WALL

ALL DIMENSIONS IN mm

Fig. 5 Clearance between structures and effectively insulated conductors installed on poles

APPENDIX A (*Informative*)

CLEARANCES TO OBJECTS - PHILOSOPHY

INTRODUCTION

The clearances to objects specified in 6.2 and Table 6.2 have been computed, in general, using the philosophy set out below.

Clearances to objects shall be maintained such that under no circumstances will the 'safety distance', as quoted in the Distribution Safety Rules, be infringed. This condition shall apply to both fixed objects and to any temporary objects that can be placed on or adjacent to fixed objects, for example a ladder against a building, or a mobile platform adjacent to a street lighting column. Clearances to objects shall be maintained under all likely line conditions, i.e. at maximum and minimum sag and with conductors hanging in still air and deflected due to wind. The two most probable conditions relative to objects are set out below.

These safety distances have been derived from the basic electrical clearance from overhead line to structure or obstacle (D_{el}) in BS EN 50341-1 increased by 10 % in accordance with 5.3.5.3 of that document and rounded up. Where past practice, (which was based on basic electrical clearance as specified in BS 7354 1990, 5.2.3, plus a 300 mm allowance for hand held tools), employed greater clearances, these have been retained, as indicated below.

System Voltage (kV)	Unit	≤33	66	132	275	400
Safety Distance	m	0.8	1.0	1.4	2.4	3.1
For Information						
D_{el}	m	0.6	0.7	1.2	2.1	2.8
$D_{el} + 10\%$	m	0.66	0.77	1.32	2.31	3.08
Rounded up to	m	0.7	0.8	1.4	2.4	3.1

Note: Where overhead lines are refurbished, or constructed, so that the basic impulse level (BIL) exceeds those used in determining the above clearances, then the clearance to obstacles will have to be re-assessed.

A.1 NORMAL CLEARANCE

This is the distance between the conductor at maximum sag hanging vertically or deflected by any angle up to 45° and an object. It is not normal to permit any object to be placed above an electric line. If a person can stand on the object or any temporary object adjacent to it, then the normal clearance shall include an 'application factor' of 2.2 m to allow for the person to move their arm whilst holding a short metallic object. Should it be necessary for a person to move their arm whilst holding a longer object, then this normal clearance may have to be increased by a distance of up to the length of the object.

A.2 PASSING CLEARANCE

This is the minimum distance between the conductor at maximum sag hanging vertically or at an angle of up to 45° towards an object and the object itself when it is moving relative to the line. The passing clearance therefore does not normally require an 'application factor' since it is intended for objects which are moving, and on which no person is standing, relative to the line. This clearance can also be applied to any object when there is no likelihood of any temporary platform being situated adjacent to it.

The Normal and Passing Clearances, which have been derived from the 'safety distances', at the various nominal system voltages are:

Nominal System Voltage	Unit	≤33 kV	66 kV	132 kV	275 kV	400 kV
Normal Clearance	m	3.0	3.2	3.6	4.6	5.3
Passing Clearance	m	0.8	1.0	1.4	2.4	3.1

National Grid Overhead Line Profiles

Profile Description:
This profile is derived from the use of LIDAR data and shows the position and status of the power line at the time of survey. Please note that ground levels may have changed since the survey date.

As the amount of power increases in the lines the conductors heat up and become longer, creating greater sag. A computer model has been applied to show the conductor at the maximum rated temperature. Please note that on an average day the conductors may not be at rated temperature and their height above ground is likely to change.

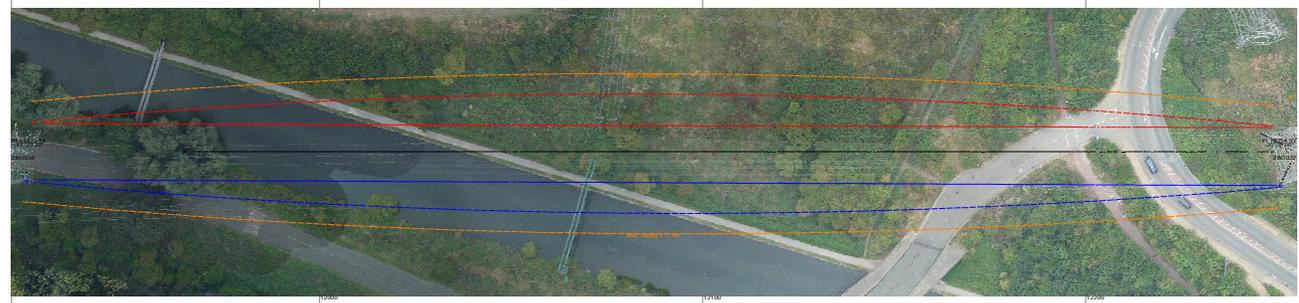
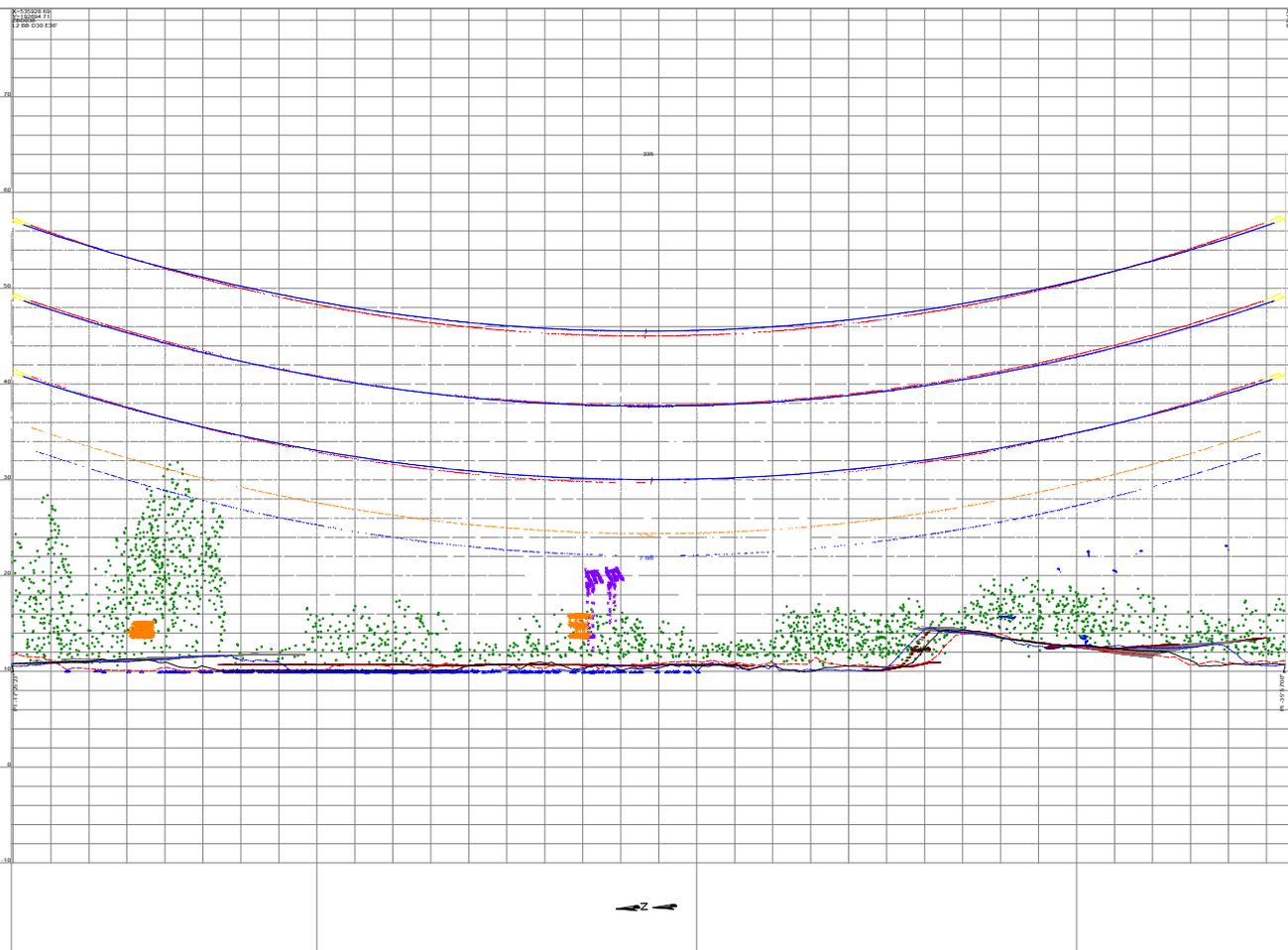
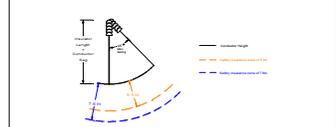
The profile states the lines current voltage. Any construction under the lines should allow for the likely possibility of upgrading of the line from 132kV to 275kV or 275kV to 400kV. Any permanent structures should adhere to the increased clearances.

It remains the responsibility of the third party to ensure the safety clearances are met by their proposed operations by using the bottom conductor attachment points as reference benchmarks.

Drawing Key:
The following clearances are derived from the Energy Networks Association Technical Specification 43-8.

Item	Description of Clearance	Minimum Clearance (meters at 400kV)
1	To Ground	7.6
2	To Normal Road Surface	8.1
3	To road surface of designated 20+ meters high road	9.2
4	To motorway or other road surface where "Motorway" can be used	10.5
5	To motorway road surface where "motorway" to be used on: (a) Normal 2 lane motorways (b) Standard 2 lane motorways	16.3
6	To any overhanging on which a person may stand, including balconies, access platforms, etc.	5.3
7	To any object to which access is not required AND on which a person cannot stand or lean a ladder	3.1
8	To trees within or adjacent to line zone (a) Trees to support the conductors (b) Canopies of supporting infrastructure (c) Trees being felled but with live conductors hanging vertically only	3.1 5.3 5.3
9	To trees in orchards and top gardens	5.3
10	To ingates, entry gates and high clearance fences	36.0
11	To street lighting standards with: (a) Standard of normal height poles (b) Standard of tall towers but with live conductors hanging vertically only (c) Standard of tall towers but with live conductors hanging vertically only	4.0 4.0 1.9

Swing Clearances:
The conductors may swing (blow-out) to a maximum of 45 Degrees during very strong winds, clearances need to be maintained for this situation.



ZBD036 - ZBD037, 275kV, 400mm² ACSIR - Zebra, bundle of 2, Displayed Rated Temp 75 Creep FE
 ZBD036 - ZBD037, 275kV, 400mm² ACSIR - Zebra, bundle of 2, Displayed Rated Temp 75 Creep FE
 ZBD036 - ZBD037, 275kV, 400mm² ACSIR - Zebra, bundle of 2, Displayed Rated Temp 75 Creep FE
 ZBD036 - ZBD037, 275kV, 400mm² ACSIR - Zebra, bundle of 2, Displayed Rated Temp 75 Creep FE
 ZBD036 - ZBD037, 275kV, 400mm² ACSIR - Zebra, bundle of 2, Displayed Rated Temp 75 Creep FE
 ZBD036 - ZBD037, 275kV, 400mm² ACSIR - Zebra, bundle of 2, Displayed Rated Temp 75 Creep FE

Clearance at 400kV Displayed

ISSUE	A		B									
DRAWN	AK	31/01/11	JB	20/04/12								
CHECKED	PM	04/02/11	AS	20/04/12								
APPROVED												
FIRST ISSUE	AS Surveyed		Zebra Parameters Re-validated									

National Grid plc owns the Copyright of this Document. It may not be reproduced or transmitted in any form or for any purpose, without the express written permission of National Grid plc.

National Grid plc		UK Transmission	
Warwick Technology Park, Gattiside Hill, Warwick, CV34 6DA			
Title: Towers ZBD036 to ZBD037		Survey Date: 17/08/10	
Left - B621 & B622		Right - B619 & B620	
Scale: 1:500		Scale: 1:500	
Project Number: zbd001-042_22910_b		Sheet No: 37	
Drawing Number: 28_NG_0228_1		No. of Sheets: 42	
Scale: NGT Project File		Issue: A0	
		CAD	
		ISSUE	
		B	

Appendix E: List of communications with utility providers

Supplier	Date Received	From	To	Subject
Thames Water (Potable Water Supply Site)	15/01/2015	AMEC FW	Water	Application form for potable water
Thames Water (Potable Water Supply Site)	06/02/2015	Thames Water (Developer Services)	AMEC FW	Estimation of Connection and approval
Thames Water (Potable Water Supply Site)	27/02/2015	AMEC FW	Thames Water (Developer Services)	Change of max supply required
Thames Water (Potable Water Supply Site)	04/03/2015	Thames Water (Developer Services)	AMEC FW	Positive answer to change of max supply required (52 m3/h)
Thames Water (Potable Water Supply Site)	23/03/2015	AMEC FW	Thames Water (Developer Services)	Change of max supply required
Thames Water (Potable Water Supply Site)	02/04/2015	Thames Water (Developer Services)	AMEC FW	Positive answer and economic proposal for max supply required (140 m3/h)
Thames Water (Sewer Connection Site)	03/01/2015	AMEC FW	WEB APPLICATION FORM	Application form for connection
Thames Water (Sewer Connection Site)	17/02/2015	Thames Water (Developer Services)	AMEC FW	Information Required
Thames Water (Sewer Connection Site)	02/03/2015	AMEC FW	Thames Water (Developer Services)	Information provided
Thames Water (Sewer Connection Site)	01/05/2015	Thames Water (Developer Services)	AMEC FW	Standby by due to lack of detailed info
Thames Water (Potable Water Supply Laydowns area)	17/07/2015	AMEC FW	Thames Water (Developer Services)	Application for Laydown Area potable water supply
Thames Water (Sewer Connection Laydown Area)	17/07/2015	AMEC FW	Thames Water (Developer Services)	Application for Sewer connection
Thames Water (Potable Water Supply Laydowns area)	22/07/2015	Thames Water (Developer Services)	AMEC FW	Potable connection in Laydown Area visit agreement
Thames Water (Potable Water Supply Laydowns area)	07/08/2015	Site visit to check potable water connections		
Thames Water (Sewer Connection Laydown Area)	17/08/2015	Thames Water (Developer Services)	AMEC FW	Sewer treatment recommendations for Laydown Area
Thames Water (Potable Water Supply Laydowns area)	11/08/2015	Thames Water (Developer Services)	AMEC FW	Quotation and proposed connection with a drawing from Thames Water
Thames Water (Potable Water Supply Laydowns area)	11/08/2015	Thames Water (Developer Services)	AMEC FW	Private Land notice submission documents
Thames Water (Discharge consent)	17/04/2015	AMEC FW	WEB APPLICATION FORM	Application form for discharge (WWT/P)
Thames Water (Discharge consent)	21/04/2015	AMEC FW	WEB APPLICATION FORM	Application form for discharge (cooling Towers)
Thames Water (Discharge consent)	21/04/2015	Thames Water (Developer Services)	AMEC FW	Modification in application form (only one application required)
Thames Water (Discharge consent)	21/04/2015	AMEC FW	WEB APPLICATION FORM	Application form for discharge (cooling Towers)
Thames Water (Discharge consent)	06/05/2015	AMEC FW	Thames Water (Developer Services)	Claim for response
Thames Water (Discharge consent)	02/06/2015	AMEC FW	Thames Water (Developer Services)	Claim for response
Thames Water (Discharge consent)	16/06/2015	AMEC FW	Thames Water (Developer Services)	Claim for response
Thames Water (Discharge consent)	24/06/2015	AMEC FW	Thames Water (Developer Services)	Claim for response
Thames Water (Discharge consent)	25/06/2015	AMEC FW	Thames Water (Developer Services)	Claim for response
Thames Water (Discharge consent)	17/07/2015	Thames Water (Trade Effluent Office)	AMEC FW	Notice of Consent
Thames Water (Discharge consent)	20/07/2015	AMEC FW	Thames Water (Developer Services)	Notice of Consent signed and accepted by NLWA
Thames Water (Discharge consent)	03/08/2015	Thames Water	NLWA	Consent (letter)
Thames Water (Sewer Diversion)	05/03/2015	MEETING READING	MEETING READING	Meeting to agree sewer diversion (AMEC, NLWA, TW (paul berquini))
Thames Water (Sewer Diversion)	11/03/2015	AMEC FW	Thames Water (Developer Services)	Send MOM
Thames Water (Sewer Diversion)	11/03/2015	Thames Water (Developer Services)	AMEC FW	Acceptance of diversion and sanding agreement template
Thames Water (Sludge Main Laydown Area)	17/04/2015	AMEC FW	application form	Inquiry about sludge mains in Laydown Area
Thames Water (Sludge Main Laydown Area)	22/04/2015	Thames Water (Developer Services)	AMEC FW	Additional info required
Thames Water (Sludge Main Laydown Area)	24/04/2015	AMEC FW	Thames Water (Developer Services)	Info about Layout of Laydown area sent
Thames Water (Sludge Main Laydown Area)	29/04/2015	Thames Water (Developer Services)	AMEC FW	Additional info required
Thames Water (Sludge Main Laydown Area)	30/04/2015	AMEC FW	Thames Water (Developer Services)	Info about Layout of Laydown area sent
Thames Water (Sludge Main Laydown Area)	07/05/2015	Thames Water (Developer Services)	AMEC FW	Acceptance of layout of laydown area for sludge main access
Electricity				
	17/08/2015	AMEC FW	UKPN (Generation Eastern Region)	AMEC asking clarifications to assess the grid connection and the start up stage
UK Power Networks	14/08/2015	UKPN (Generation Eastern Region)	AMEC FW	Not availability from UKPN to attend a meeting due to the long delivery time of the grid connection.
UK Power Networks	13/08/2015	AMEC FW	UKPN (Generation Eastern Region)	Meeting requirement for Grid Connection
UK Power Networks	08/07/2015	UKPN (Generation Eastern Region)	AMEC FW	Clarification about feasibility report
UK Power Networks	25/06/2015	UKPN (Generation Eastern Region)	AMEC FW	Clarification about feasibility report
UK Power Networks	23/06/2015	AMEC FW	UKPN (Generation Eastern Region)	Clarification about feasibility report
UK Power Networks	23/06/2015	UKPN (Generation Eastern Region)	AMEC FW	Clarifications will arrive shortly
National Grid plc	15/04/2015	AMEC FW	National Grid (Network Engineering)	Information about Overhead lines in Laydown Area
National Grid plc	23/04/2015	National Grid (Network Engineering)	AMEC FW	Drawings provided
National Grid plc	23/04/2015	AMEC FW	National Grid (Network Engineering)	Request of clearance and security
National Grid plc	28/04/2015	National Grid (Network Engineering)	AMEC FW	Clearance information provided
Gas				
National Grid plc	26/01/2015	AMEC FW	WEB APPLICATION FORM	Application form
National Grid plc	29/01/2015	National Grid (Network Engineering)	AMEC FW	Clarification required for max supply required
National Grid plc	25/02/2015	AMEC FW	National Grid (Network Engineering)	Clarification of max consumption and point of connection required
National Grid plc	10/03/2015	National Grid (Network Engineering)	AMEC FW	Land Inquiry and gas pipes affected
National Grid plc	14/03/2015	National Grid (Network Engineering)	AMEC FW	Land Inquiry and gas pipes affected
Telecommunication				
BT	04/06/2015	AMEC FW	Openreach (Wayleaves)	Inquiry about relocation of apparatus
BT	08/06/2015	Openreach (Wayleaves)	AMEC FW	Contact another department
BT	08/06/2015	AMEC FW	Openreach (Wayleaves)	Inquiry about relocation of apparatus
BT	10/06/2015	Openreach (Network Investment)	AMEC FW	Contact another department
BT	10/06/2015	AMEC FW	Openreach (Networks)	Inquiry about relocation of apparatus
BT	10/06/2015	Openreach (Network Inventory West)	AMEC FW	Contact another department
BT	10/06/2015	AMEC FW	Openreach (Network Investment)	Inquiry about relocation of apparatus
BT	26/06/2015	Openreach (Network Investment)	AMEC FW	BT unable to access big files
BT	09/07/2015	Openreach (Network Investment)	AMEC FW	BT unable to access big files
BT	16/07/2015	Openreach (Network Investment)	AMEC FW	BT unable to access big files
BT	16/07/2015	Openreach (Network Investment)	AMEC FW	Posted the drawings to BT
BT	23/07/2015	Openreach (Network Investment)	AMEC FW	BT awaiting posted drawings
BT	24/07/2015	Openreach (Network Investment)	AMEC FW	BT received posted drawings
BT	05/08/2015	Openreach (Network Investment)	AMEC FW	BT explains various departments to go to, BT spoke with another team member for site survey
BT	06/08/2015	Openreach (Network Investment)	AMEC FW	BT further clarifies additional departments to discuss with, BT gives contact number of supervisor

Appendix F: Consents and agreements in principle



The Water Industry Act 1991

CONSENT

to discharge trade effluent into a public sewer



THAMES WATER UTILITIES LTD.
Water Industry Act 1991
Water Act 2003
Environmental Protection Act 1990
Environment Act 1995
Pollution Prevention and Control Act 1999
CONSENT TO THE DISCHARGE OF TRADE EFFLUENT

WHEREAS

1. North London Waste Authority
Unit 1B Berol House
25 Ashley Road
Tottenham Hale
London
N17 9LJ

is/are the occupier(s)/owner(s) (hereinafter called THE APPLICANT) of the trade premises known as
North London Waste Authority and situate at
London Waste Limited
EcoPark
Advent Way
Edmonton
London
N18 3AG

(hereinafter called THE PREMISES) and by notice dated Twentieth day of July, Two Thousand and Fifteen has/have made application to Thames Water Utilities Ltd. (hereinafter called THE COMPANY) to Consent to the discharge of Trade Effluent by him/her/them from THE PREMISES into the Company's public foul water and/or combined sewers.

2. NOW THEREFORE in exercise of the powers conferred upon it in that behalf as a sewerage undertaker by the Water Industry Act 1991, the Company

HEREBY CONSENTS to the discharge of Trade Effluent from the Premises into the sewer(s)
(as hereinafter defined) subject to the following conditions:

Nature and
composition

1. Multiple Discharge Points - See Appendix 2 for details.



- | | |
|--|---|
| Sewer(s) affected | 2. Multiple Discharge Points - See Appendix 2 for details. And more particularly shown in line(s) on the annexed plan and there on coloured Red.
The point(s) at or through which the trade effluent is to be discharged is(are) shown on the said plan and there on marked blue. |
| Maximum quantity to be discharged | 3. Multiple Discharge Points - See Appendix 2 for details. |
| Maximum rate of discharge | 4. Multiple Discharge Points - See Appendix 2 for details. |
| Matter to be eliminated prior to discharge to the sewer(s) | 5. (a) There shall be eliminated from the Trade Effluent before it is discharged into the sewer(s) any matter, which, either alone or in combination with any matter with which it is likely to come into contact while passing through any sewers, would injure or obstruct any such sewers or cause injury to and/or damage to the health of any person lawfully present in such sewers, pumping stations or sewage treatment works or would makespecially difficult or expensive the treatment or disposal of their contents and in particular but withoutprejudice to the generality of the foregoing words the following matters:-

(i) Petroleum spirit
(ii) Calcium carbide
(iii) Thiourea and thiourea derivatives
(iv) Non biodegradable detergents

(b) The Trade Effluent shall not contain substances listed in Schedule 1 of the Trade Effluents (Prescribed Processes and Substances) Regulations 1989, as amended, at a concentration greater than background concentration as defined in such regulations.

(c) The Trade Effluent shall not contain any of the substances listed in APPENDIX 1 at a concentration expressed in milligrams per litre greater than that stated. |
| | SEE APPENDIX 1 |
| Temperature | 6. No Trade Effluent shall be discharged which has a temperature higher than 43.3 degrees Celsius (110 degrees Fahrenheit). |
| Acidity or alkalinity | 7. No Trade Effluent shall be discharged the pH value of which is less than 6.0 or greater than 11.0. |
| Condensing water | 8. No condensing water shall be discharged. |
| Changes in occupier or process | 9. The Applicant of the Premises shall forthwith give to the Company notice in writing of any changes or proposed changes in the company name, address, occupier, or processes of manufacture or the nature of the raw materials used or of any other circumstances which may alter the nature and composition or the volume of the Trade Effluent or may result in the permanent cessation of the discharge. |



- Commencement of Discharge 10. The commencement date of this Consent will be the date on which the Consent is signed by the Company's Senior Consultant for Wastewater Quality (or any other officer or employee duly authorised by the Company for these purposes). The Applicant must not discharge the Trade Effluent before the commencement date.
- Payment 11. The Applicant of the Premises shall pay to the Company for the Trade Effluent discharged into the sewer
- (a) A sum calculated in accordance with the provisions contained in the Company's Charges Scheme together with
 - (b) The amount of any additional expenses which the Company may from time to time incur with respect to the monitoring, analysis, reception, treatment and disposal of the Trade Effluent.
 - (c) Where samples taken by Thames Water establish that the consumer is in breach of an Agreement or a Consent, the consumer shall be liable to pay the sampling and analysis charge for each sample that was necessary to take in order to establish such a breach, which shall be the charge shown in the Trade Effluent Charges Schedule.
- All sums payable to the Company under this condition shall become due and payable on demand.
- Entry and samples 12. The Applicant of the Premises shall permit duly authorised representatives of the Company to inspect, examine and test at all reasonable times any works and apparatus installed in connection with the Trade Effluent and to take samples of the Trade Effluent.
- Inspection 13. An inspection chamber or manhole shall be provided and maintained by the Applicant of the Premises in a suitable position defined in connection with each pipe through which the Trade Effluent being discharged and such inspection chamber or manhole shall be so constructed and maintained by the Applicant as to enable duly authorised representatives of the Company to take samples at any time of the matter passing into the sewer(s) from the Premises.
- Measurement and determination of discharge 14. (a) A notch gauge and continuous recorder or some other apparatus suitable and adequate for measuring and automatically recording the volume, nature, composition and rate of discharge of the Trade Effluent being discharged into the sewer(s) shall, if required by the Company be provided and maintained by the Applicant of the Premises to the satisfaction of the Company in connection with every pipe through which the Trade Effluent is being discharged.
- (b) It is a requirement of this Consent that if a trade effluent meter(s) is/are installed it/they will be calibrated at least annually or more frequently if specified by the company and certificated by a suitably qualified person and/or company approved by the company.



Records

15. (a) Records in such a form as the Company may require shall be kept of the volume, rate of discharge, nature and composition of the Trade Effluent discharged into the sewer(s) and shall be available at all reasonable times for inspection by duly authorised representatives of the Company and copies of such records shall be sent to the Company on demand.

(b) If the notch gauge and continuous recorder or other apparatus aforesaid ceases to register or measure correctly then, unless otherwise agreed, the quantity of the Trade Effluent discharged into the sewer(s) during the period from the date on which the records of the volume of the Trade Effluent discharged into the sewer(s) were last accepted by the Company as being correct up to the date when the notch gauge and continuous recorder or other apparatus aforesaid again registers correctly shall, for the purpose of any payment to be made to the Company, be based on the average daily volume of the Trade Effluent discharged during the period of one month preceding the date on which the said records were last accepted as aforesaid or during the month immediately after the notch gauge and continuous recorder or other apparatus aforesaid has been corrected, whichever is the higher.

(c) The foregoing provisions of this condition shall be of no effect so long as there is available to the satisfaction of the Company some other method approved by the Company of sampling the Trade Effluent or of determining, measuring and recording the volume and rate of discharge and the nature and composition of the Trade Effluent discharged.

Vacation of Site

16. The Applicant(s) must notify the Company in writing at least 21 days in advance of the following events:

- (a) Vacation of the Premises by the Applicant for any reason, whether permanent or temporary;
- (b) Change of ownership or occupation of the Premises;
- (c) The Applicants entry into liquidation whether voluntarily or compulsorily or bankruptcy, if an individual;
- (d) The presentation of a petition for the appointment of an administrator or a receiver or manager in respect of the Applicants undertakings;
- (e) Cessation of discharge of Trade Effluent from the Premises.

Signed:

T. McHattie

Tony McHattie
Trade Effluent Manager
Duly authorised to sign on behalf of the company

Dated

29th day of *July* 2015



NOTES:

- a) All communications should be sent to the following address:
Senior Consultant - Wastewater Quality
Thames Water Utilities Ltd
Crossness Sewage Treatment Works
Belvedere Road
Abbey Wood
London
SE2 9AQ
- b) Your attention is drawn to the right of appeal to the Director General of Water Services conferred by Section 122 of the Water Industry Act 1991 if you are aggrieved by any condition attached to this Consent.
- c) A fixed charge for all sewerage services plus a domestic sewerage charge is payable in addition to charges for Trade Effluent flows.
- d) A copy of Thames Water Utilities Ltd Charges Scheme is obtainable from the Thames Water Customer Centre.
- e) If you discharge Trade Effluent in contravention of a condition of this Consent you will be guilty of a criminal offence and may be subject to prosecution.



APPENDIX 1 - SUBSTANCES

The Trade Effluent shall not contain any of the substances listed below at a concentration expressed in milligrams per litre greater than that stated:

Determinand Name	Consented Limit
Chloride	10000.0
Sulphate	1800.0
Settleable Solids	400.0
Suspended Solids	400.0
Chemical Oxygen Demand	250.0
Rapidly Settleable Solids	50.0
Ammoniacal Nitrogen	35.0
Saponifiable Material	20.0
Total Phosphorus	13.0
Available Chlorine	10.0
Unsaponifiable Material	10.0
Sulphur Dioxide	5.0
Phenol	2.0
Cyanide	1.0
Sulphide	1.0
Chromium	0.500
Copper	0.500
Lead	0.500
Nickel	0.500
Silver	0.500
Tin	0.500
Zinc	0.500
Dissolved Methane	0.140
Antimony	0.100
Arsenic	0.100
Cobalt	0.100
Molybdenum	0.100
Selenium	0.100
Vanadium	0.100
Cadmium	0.020
Thallium	0.010
Mercury	0.001

THERE ARE NO FURTHER LIMITS IN THIS APPENDIX



APPENDIX 2 - DISCHARGE POINTS

Multiple Discharge Point Details:

Discharge Point ref.	TE Nature	Sewer	Consented Volume (m ³ /day)	Consented Rate (m ³ /hour)	Consented Flow (l/s)
1	demineralised water treatment plant, boiler blowdown, wash down from flue gas scrubbing processes.	Chingford (TWUL Main Sewer)	1440.000	60.000	16.700
2	cooling tower wastewater purge	Chingford (TWUL Main Sewer)	3600.000	150.000	41.670

THERE ARE NO MORE DISCHARGE POINTS



APPENDIX 4 - ADDITIONAL CLAUSES

The Trade Effluent shall not contain any of the substances listed below at a concentration expressed in milligrams per litre greater than that stated:

Determinand Name	Consented Limit
------------------	-----------------

Dieldrin	0.00005
----------	---------

Gamma Hexachlorocyclohexane	0.0001
-----------------------------	--------

Polychlorinated Biphenyls	0.00005
---------------------------	---------

Trifluralin	0.00005
-------------	---------

Hexachlorobenzene	0.0003
-------------------	--------

Hexachlorobutadiene	0.00005
---------------------	---------

Trichlorobenzene	0.00005
------------------	---------

Dichlorvos	0.00005
------------	---------

Fenitrothion	0.00005
--------------	---------

Simazine	0.0003
----------	--------

Atrazine	0.0003
----------	--------

Pentachlorophenol and its compounds	0.0003
-------------------------------------	--------

Triorgantin Compounds	0.0001
-----------------------	--------

Dioxins and Furans	0.00000005
--------------------	------------

THERE ARE NO FURTHER LIMITS IN THIS APPENDIX





Euston Ling
North London Waste Authority
London Waste Limited
EcoPark
Advent Way
Edmonton
London
N18 3AG

Your Ref:
Our Ref: Ops/WwQ/ TDEE0BN1

30 July 2015

Dear Sir

Water Industry Act 1991

Name: North London Waste Authority
Re: London Waste Limited, EcoPark, Advent Way, Edmonton, London, N18 3AG

I enclose the signed copy of your Consent dealing with the discharge of Trade Effluent from the above mentioned premises.

Yours faithfully

A handwritten signature in black ink, appearing to read "DMose", written in a cursive style.

Debbie Mose
Trade Effluent Office Manager

Thames Water Utilities Limited
Crossness STW
Abbey Wood
London
SE2 9AQ

T 020 3577 9200

I www.thameswater.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road,
Reading, RG1 8DB



Series 05 Technical Documents

**NORTH LONDON WASTE
AUTHORITY**

1b Berol House, 25 Ashley Road
Tottenham Hale
N17 9LJ

Telephone: 020 8489 5730

Fax: 020 8365 0254

Email: project@northlondonheatandpower.london