The Progress Power (Gas Fired Power Station) Order

5.4 Flood Risk Assessment – GIS Variant

Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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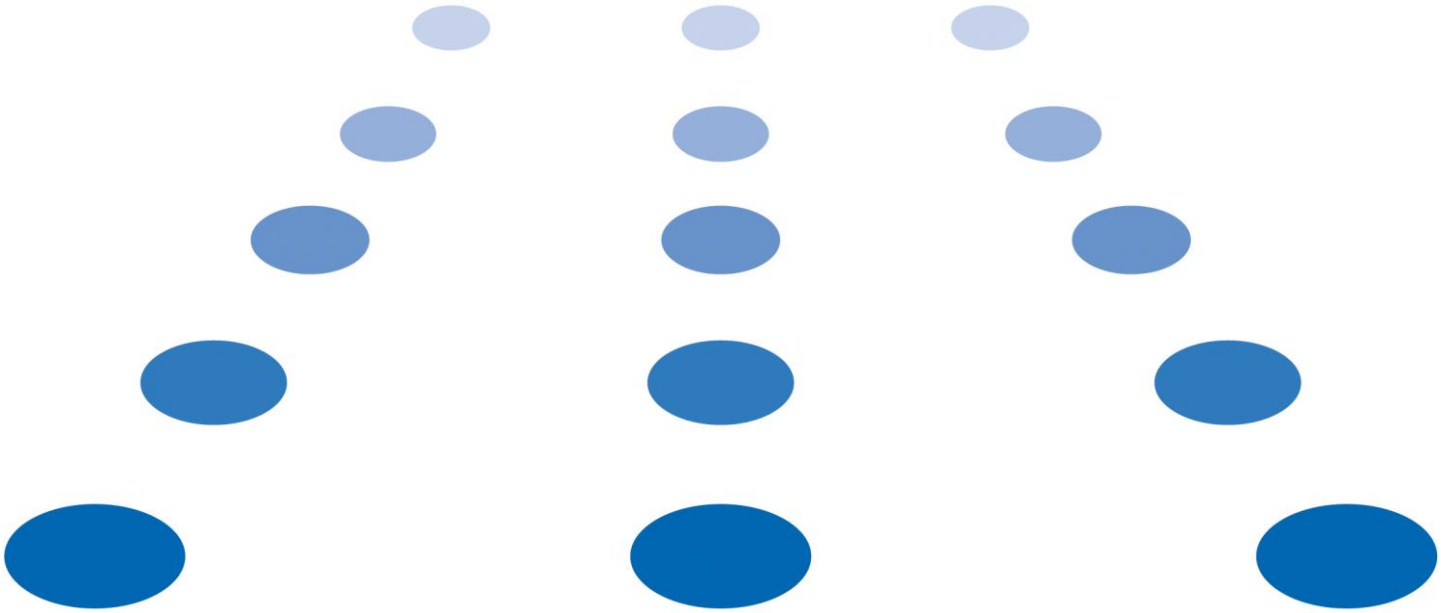

PARSONS BRINCKERHOFF

PROGRESS POWER

December 2014

PROGRESS POWER PROJECT FLOOD RISK ASSESSMENT

GIS VARIANT SUBSTATION

Progress Power Limited

3512438B

Final

Progress Power Project Flood Risk Assessment

3512438B

Prepared for
Progress Power Limited
49 York Place
Edinburgh
EH1 3JD

Prepared by
Parsons Brinckerhoff
Queen Victoria House
Redland Hill
Bristol BS6 6US
0117 9339300 www.pbworld.com

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Prepared by	Nathan Sherwood	**Checked by** *(technical)*	Joanna Goodwin
Approved by	Joanna Goodwin	**Checked by** *(quality assurance)*	A Gregory

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1.0	December 2014	-	First issue
2.0	January 2014	All	Inclusion of Substation, Sealing End Compound, Above Ground installation and Access Tracks
3.0	February 2014	All	Amendments for consistency between ES and FRA. Re-calculation of site areas, greenfield runoff rates and storage volumes.
4.0	November 2014	All	Drawings and figures updated to reflect change in Order Limit for a GIS substation

CONTENTS

EXECUTIVE SUMMARY

Background	Parsons Brinckerhoff Ltd was appointed by Progress Power Limited to prepare a site specific Flood Risk Assessment (FRA) to support the Project at the former Eye Airfield located in Eye, Mid Suffolk. The FRA was conducted in accordance with the NPPF and EN-1 and provides a predominantly qualitative assessment of flood risk to the development proposals and the people and property elsewhere as a result of the planned development. The Project comprises a new gas fuelled Power Generation Plant and supporting Electrical Connection and Gas Connection. The Power Generation Plant will be sited on the former Eye Airfield with existing development to the west, north and east of the Power Generation Plant. The Above Ground Installation will be sited in the south of the airfield adjacent to Castleton Road. The proposed Substation and Sealing End Compound will be sited approximately 1 km to the west of the Power Generation Plant Site.
Existing flood risk	The existing Project Site is not considered to be at significant risk from any source of flooding, namely fluvial, tidal, groundwater, overland flow and artificial sources. The greatest risk of flooding to adjacent areas is to land located to the north of the Power Generation Plant Site within the former Eye Airfield Industrial Estate. This risk is most likely associated with surface water runoff as a result of blocked surface water drains within the former airfield, blockages within an existing culverted watercourse and lack of capacity in the culverted watercourse. Climate change, in particular increased rainfall intensity, could exacerbate flooding from these sources.
Post development flood risk and surface water management proposals	If unmitigated, the construction of the Project could increase flood risk within the former Eye Airfield Industrial Estate and to downstream receptors, including those at existing risk of fluvial flooding from the River Dove, associated with an increase in surface water runoff from increased impermeable area. The Project may also increase flood risk within the town of Eye to the south-east if water is not intercepted by a drainage system and is instead allowed to runoff naturally. Surface water management for the Project will be designed to ensure no increase in surface water runoff for all storms up to the 1 in 100 year return period storm. Surface water discharge will be limited to the existing greenfield runoff rates to ensure no increased risk to people or property elsewhere and allowing for the potential effects of climate change over the lifetime of the

	development. The drainage of the Project Site will need to be confirmed during the detailed design of the proposed drainage system, ensuring that SUDS principles are applied to the conveyance, attenuation and discharge of surface water runoff. The feasibility of infiltration will be investigated further during the detailed design of the Project, although ground conditions suggest that ground permeability is low. If deemed suitable, infiltration of surface water runoff will be maximised through the use of combined infiltration and attenuation systems, although some discharge from the Power Generation Plant Site is still considered likely. An open detention pond will be used to store surface water from the Power Generation Plant Site during periods of intense rainfall. If necessary, surface water will be discharged at an attenuated rate to the existing drainage connection located to the north of the site adjacent to the Eye Power Station. Surface water runoff from the Gas Connection and Electrical Connection will be managed via infiltration into the ground. If infiltration does not prove to be a viable option due to ground permeability, it is proposed that surface water runoff will be discharged to a local drainage ditch at an attenuated rate. Through implementation of a robust surface water drainage strategy, the development is not predicted to cause an increase to flood risk within the site or to people and property elsewhere.

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Objectives

1.1.1 Parsons Brinckerhoff Ltd was appointed by Progress Power Limited to prepare a site specific Flood Risk Assessment (FRA) to support the Project at the former Eye Airfield located in Eye, Mid Suffolk.

1.1.2 Review of indicative flood maps available from the Environment Agency (EA) website indicates that the Project Site is located within the low risk Flood Zone 1. The EA standing advice on flood risk states that a FRA will be required to support the planning application for all developments that are greater than 1 hectare (ha) located in Flood Zone 1. Review of the development proposals confirms that the Project Site area is greater than 1 ha, hence a FRA is required.

1.1.3 The FRA will be conducted in accordance with National Planning Policy Framework (NPPF), the supporting Technical Guidance to NPPF and Overarching National Policy Statement for Energy (EN-1) to provide a predominantly qualitative analysis of flood risk to support the Development Consent Order (DCO) application. The assessment will include the following:

- Confirmation of the sources of flooding which may affect the site;
- A predominantly qualitative assessment of the risk of flooding to the site and to adjacent sites as a result of development;
- Demonstration of how the development and any occupants will be kept safe from flooding;
- Identification of other measures to reduce flood risk to acceptable levels and cause no significant increase in flood risk elsewhere as a result of the development;
- Proposals for the sustainable management of surface water runoff.

1.1.4 The FRA will consider risks for the present day situation and over the lifetime of the Project, taking climate change allowances into consideration.

1.2 Development Proposals

1.2.1 The three main elements of the Project comprise:

- A new **Power Generation Plant** - a SCGT gas fired power generating station capable of providing up to 299 MW, incorporating up to five gas turbine generators (GTG) with up to five exhaust gas flue stacks.

- A new **Electrical Connection** to export electricity from the Power Generation Plant to the National Grid Transmission System. This element incorporates a new underground cable circuit connection (the **Cable**), and a new access road (the **Access Road**), with a new road junction off the A140 (the **A140 Junction**), and a new **Electrical Connection Compound** (ECC) comprising a new substation (the **Substation**) and sealing end compound (the **Sealing End Compound**) (SEC); and
- A new gas pipeline connection (referred to as the **Gas Connection**) to bring natural gas to the Power Generation Plant from the NTS in the vicinity of the Project Site. This element incorporates an **Above Ground Installation** (AGI) at its southern end and a new access road off Potash Lane.

1.2.2 The Power Generation Plant, Electrical Connection, and Gas Connection are referred to as the **Project**. All of the land upon which the Project will be developed is referred to as the **Project Site**, and the land upon which the Power Generation Plant is situated is referred to as the **Power Generation Plant Site**.

1.2.3 Illustrations of the Project, including the layout of the Power Generation Plant and route of electrical and gas connections, are provided in Appendix A. A location plan of the Project is also provided in Figure 1 below.

1.2.4 The Power Generation Plant will occupy an area of approximately 7.5 ha. Up to 1.9 ha of this area will be impermeable, comprising buildings, roads, construction/maintenance compound and hard standing. The remaining 5.6 ha will remain undeveloped.

1.2.5 The Power Generation Plant will be accessed via Potash Lane, a private road to the south of the site. Potash Lane in turn connects to Castleton Way via the former main runway.

1.2.6 The proposed route for the Gas Connection is from the south of the site adjacent to Castleton Way. It is proposed to bring the pipeline alongside Castleton Way and the A140 before directing it towards the Power Generation Plant to the south of White House Farm. The pipeline will be buried and the ground reinstated to existing conditions.

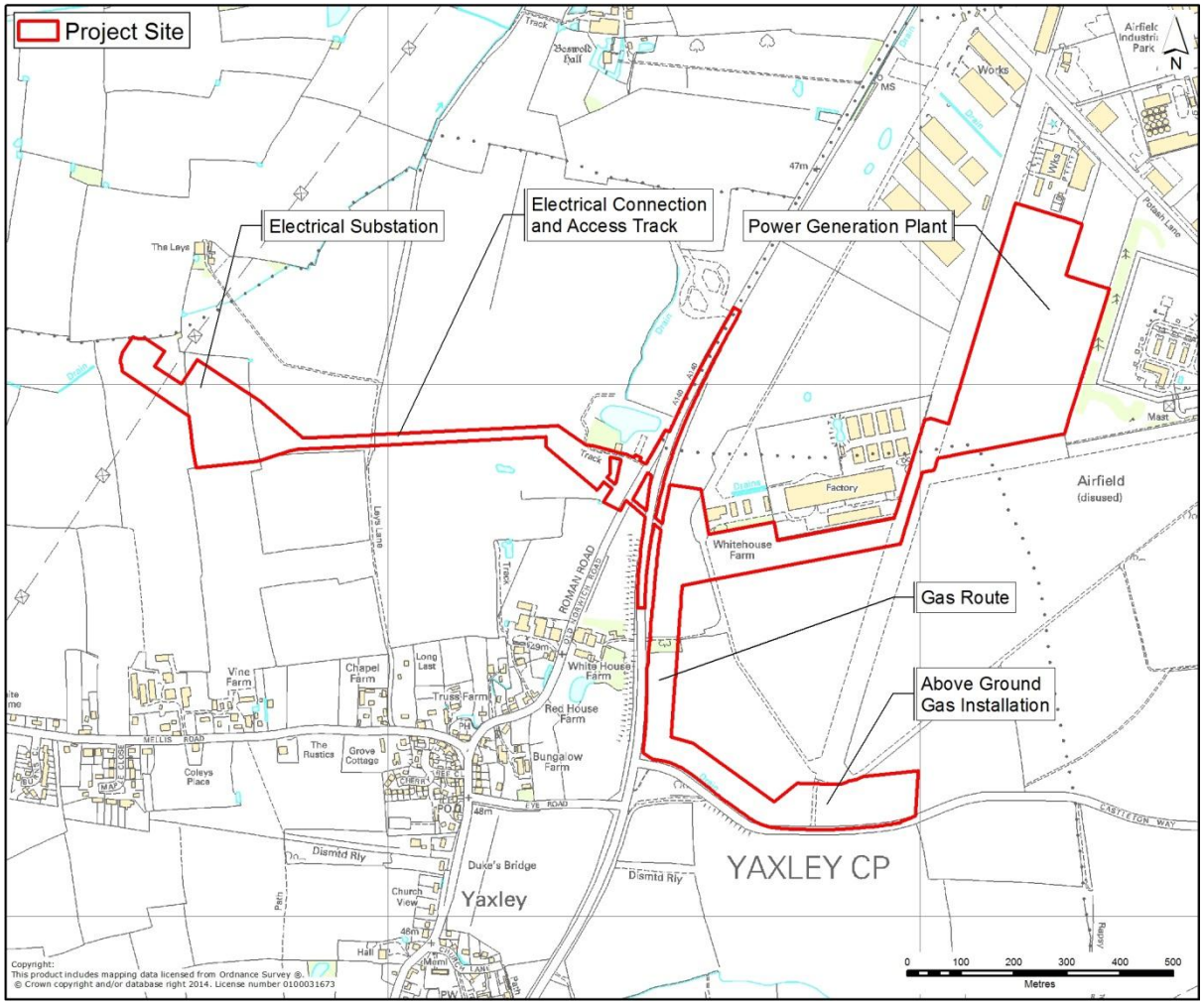
1.2.7 The proposed AGI will occupy an area of 0.6 ha and comprise 0.027 ha of impermeable surfaces, the remainder of which will be a compacted gravel construction and semi-permeable. It will be accessed by a new access track with an area of approximately 0.3 ha from Castleton Way. The access track will be a tarmac construction.

1.2.8 The proposed route of the Cable runs from the Power Generation Plant to the south of White House Farm before crossing under the A140 and continuing west. The Cable will be buried and the ground reinstated to existing conditions with the exception of the route beneath the A140 and beneath watercourses where directional drilling will provide the route for the Cable.

1.2.9 It is proposed to locate a Substation and SEC alongside the National Grid overhead line, approximately 1.5 km west of the Power Generation Plant Site, to facilitate connection of the Power Generation Plant to the National Grid Network.

1.2.10 The proposed ECC will occupy an area of approximately 0.9 ha, of which approximately 0.19 ha will comprise impermeable surfaces and the remaining 0.71 ha will either remain undeveloped or comprise permeable gravel surfaces. Access to the Substation will be provided by the Access Road from the A140 that will follow the route of the Cable. The area of the Access Road is approximately 0.4 ha, including the new area of junction onto the A140. The Access Road will be a tarmac construction.

Figure 1 Project site location



1.3 Consultation

1.3.1 A Scoping Opinion was received from key consultees via The Planning Inspectorate in June 2013 in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. A summary of key responses relevant to this FRA is summarised in Table 1.

Table 1 Summary of Scoping Opinion relevant to this Flood Risk Assessment

Consultee	Summary of response

Consultee	Summary of response
Secretary of State	Welcomes the preparation of a FRA that covers groundwater, surface water and fluvial impacts. Recommends that a surface water management plan is prepared that includes a review of existing drainage facilities and the provision of interceptors on site.
Environment Agency	Confirmation that the Project site is located in Flood Zone 1 and the need for a site specific FRA prepared in accordance with NPPF with focus on the effects of surface runoff and surface flooding. Confirmation that any runoff from the Project shall not exceed the existing greenfield runoff rates for a range of equivalent return period rainfall events over the lifetime of the Project, up to and including the 1 in 100 year event. Evidence that the SUDS management train has been considered, the incorporation of SUDS in the design, and proposals for the management of overland flows that exceed the drainage network. Details of future adoption and maintenance of the surface water management system.
Suffolk County Council	For any planning decisions made during or after April 2014, Suffolk County Council requires the applicant to obtain drainage approval for any works affecting surface water in accordance with the Flood and Water Management Act 2010. SUDS should maintain greenfield runoff rates and be designed to be integrated into a wider network in due course to ensure efficient use of space in the airfield. Stresses the need to ensure that the Project and associated mitigation does not prejudice the ability of future development of the former Eye Airfield to come forward in accordance with the Mid Suffolk Eye Airfield Development Framework.
Mid Suffolk District Council	Consideration should be given to all surface water bodies within the vicinity of the site and the use of SUDS. The Eye Airfield Development Framework is soon to be adopted.

Consultee	Summary of response
Yaxley Parish Council and Thrandeston Parish Council	Consideration should be given to minor watercourses located in the area, namely those that feed into Stuston Beck and Thrandeston Beck. Consideration should be given to surface water drainage that runs westwards under the A140 and its limited capacity to take more water.
Eye Town Council	The need for careful planning of surface water treatment and runoff, particularly with the existing runoff problems effecting Eye.

1.3.2 No response was received from Waveney, Lower Yare and Lothingland Internal Drainage Board.

1.3.3 Further consultation was undertaken with the EA in May 2013, June 2013 and July 2013 to discuss the proposed methods for surface water management. The EA confirmed that a surface water discharge must be limited to equivalent Greenfield runoff rates up to and including the 1 in 100 year event (and allowing for the potential effects of climate change) and that a discharge rate of 10.11 l/s/ha during this event would be acceptable. Further information regarding the calculation of Greenfield and post-developed runoff rates is provided in Section 5.3 of this FRA.

1.3.4 Following production of the Preliminary Environmental Information Report (PEIR), prepared by Parsons Brinckerhoff, consultation with the relevant bodies was undertaken. In response to this consultation, the EA confirmed the requirements noted previously in Table 1. Yaxley and Thrandeston Parish Councils expressed concern over how increased quantities of surface water would be dealt with and Anglian Water noted that public sewers under their management lie within the site and that easements will be required for access to these.

SECTION 2

ASSESSMENT METHODOLOGY

2 ASSESSMENT METHODOLOGY

2.1 Introduction

2.1.1 This FRA has been conducted in accordance with NPPF and Overarching National Policy Statement for Energy (EN-1). These documents provide guidance on how new developments must take into account flood risk, including making allowance for climate change impacts. Specifically, they encourage decision makers to:

- Steer new development to lower risk locations that are appropriate to the proposed use and ensure development is safe;
- Prevent any increase in flood risk elsewhere and reduce flood risk through the layout and form of the development and the appropriate application of sustainable drainage systems;
- Reduce flood risk by making space for water by creating flood flow paths and by identifying, allocating and safeguarding space for flood storage;
- Use regeneration to help relocate development to lower risk locations when climate change is expected to mean that some existing development may not be sustainable in the long-term.

2.2 Methodology

2.2.1 The methodology adopted in this FRA comprises:

- Review of available flood risk data to identify existing flood risk from fluvial, tidal, groundwater, overland flow and artificial sources;
- Consideration of existing ground conditions on-site to determine groundwater levels, soil permeability, groundwater vulnerability and contamination risks;
- Review of the development proposals in terms of flood risk vulnerability and flood zone compatibility;
- Consideration of how the development proposals may affect flood risk to the site and surrounding land; and
- Proposals for the appropriate management of flood risks to facilitate development whilst not increasing risks elsewhere.

2.2.2 Data regarding flood risk relevant to the Project has been obtained from the following sources:

- EA indicative flood risk maps and groundwater maps;
- Envirocheck Report, dated June 2013;

- Sewerage maps obtained from Anglian Water;
- Sewerage information obtained from relevant land owners;
- Mid Suffolk Strategic Flood Risk Assessment (SFRA), 2008;
- Mid Suffolk District Core Strategy Development Plan Document, September 2008;
- Eye Airfield Development Framework, February 2013;
- Direct consultation with the EA and relevant local authorities as discussed in Section 1.2.

2.3 Definition of Flood Risk

2.3.1 Flood risk is the product of the likelihood or chance of a flood occurring (flood frequency) and the consequence or impact of the flooding (flood consequence).

Flood Frequency

2.3.2 Flood frequency is identified in terms of the return period and annual probability. For example, a 1 in 100 year flood event has a 1% annual probability of occurring. Table 2 provides a conversion between return periods and annual flood probabilities.

Table 2 Flood probability conversion table

Return Period (years)	2	5	10	20	50	100	200	1000
Annual Flood Probability (%)	50	20	10	5	2	1	0.5	0.1

2.3.3 NPPF identifies Flood Zones in relation to flood frequency. The zones refer to the probability of river (fluvial) and sea (tidal) flooding, whilst ignoring the presence of defences. Table 3 summarises the relationship between Flood Zone category and the identified flood risk.

Table 3 Flood Zones

EA Flood Zone	**Identification**	**Annual Probability of Fluvial Flooding**	**Annual Probability of Tidal Flooding**
Zone 1	Low Probability	<0.1%	<0.1%
Zone 2	Medium Probability	1% - 0.1%	0.5% - 0.1%

Zone 3a	High Probability	>1%	>0.5%
Zone 3b	Functional Floodplain	>5%	>5%

Flood Consequences

2.3.4 The consequence of a flood event describes the potential damage, danger and disruption caused by flooding. This is dependent on the mechanism and characteristics of the flood event and the vulnerability of the affected land and land use.

2.3.5 The EA have identified five classifications of flood risk vulnerability and provide recommendations on the compatibility of each vulnerability classification with the Flood Zones, as shown in Table 4.

2.3.6 Full details of the EA flood zones and flood risk vulnerability classifications can be found in the Technical Guidance to NPPF.

Table 4 Flood risk vulnerability and flood zone compatibility

EA Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b	Exception test required	✓	×	×	×

✓ Development considered acceptable

× Development considered unacceptable

2.4 Potential Sources of Flooding

2.4.1 In accordance with NPPF, the following sources of flooding will be considered in this assessment:

- Fluvial flood risk from nearby watercourses;
- Overland surface water flooding from adjacent sites;
- Site generated surface water runoff;
- Surcharging of sewers;
- Groundwater flooding; and
- Tidal flooding.

2.5 Potential Effects of Climate Change

2.5.1 Scientific consensus is that the global climate is changing as a result of human activity. While there remain uncertainties in how a changing climate will affect areas already vulnerable to flooding, it is expected to increase risk significantly over time. For the UK, projections of future climate change indicate that more frequent short-duration high-intensity rainfall events and more frequent periods of long-duration rainfall could be expected.

2.5.2 The Technical Guidance to NPPF provides recommended national precautionary sensitivity ranges for possible peak rainfall intensities

resulting from climate change for the next 100 years (based on a 1990 baseline), as shown in Table 5.

Table 5 Recommended national precautionary sensitivity ranges for peak rainfall intensities and peak river flow

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peal rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		

2.5.3 The design life of the Power Generation Plant and associated drainage systems is estimated to be 25 years. In accordance with NPPF climate change guidance, rainfall intensity could increase by up to 10% during the lifetime of the development.

2.6 The Flood and Water Management Act 2010

2.6.1 The Flood and Water Management Act 2010 (FWMA) introduces new responsibilities for designated Risk Management Authorities with regards to flood risk and sustainable drainage. The most notable features of the FWMA with regards to the Project are discussed below.

2.6.2 Under the FWMA, the unitary authority or county council for an area, in this case Suffolk County Council, is designated the 'Lead Local Flood Authority' (LLFA), with responsibility for managing flood risk from surface water, ground water and ordinary watercourses within their area.

2.6.3 Schedule 3 of the FWMA introduces new National Standards for Sustainable Drainage Systems (SUDS) against which proposed drainage systems should comply.

2.6.4 Under Schedule 3 of the FWMA, LLFAs will become the SUDS Approving Body (SAB) for surface water drainage systems for new development and approval from the SAB for drainage proposals must be agreed prior to construction. For drainage systems that serve more than one property, the SAB will have responsibility for the adoption and maintenance of SUDS schemes that meet SAB requirements.

2.6.5 The role of the SAB is due to come into force in late 2014.

2.7 Mid Suffolk Core Strategy Development Plan Document

2.7.1 The Mid Suffolk Core Strategy Development Plan Document (DPD) was adopted in September 2008. This document is key to the Mid Suffolk Local Development Framework (LDF) and sets out the vision, objectives, spatial strategy and core policies that will guide development across the district until 2025 and beyond.

2.7.2 The vision for the Core Strategy DPD includes the needs for new development to tackle the predicted impacts of climate change, including increased flood risk. This vision is integrated within the strategic policies as set out within Section 3 of the Core Strategy DPD, specifically Policy CS 4 that states that the Council will support development proposals that avoid areas of current and future flood risk, and which do not increase flooding elsewhere, adopting the precautionary principle to development proposals. This includes the implementation of SUDS into all new developments where technically feasible.

2.7.3 The Eye Airfield Industrial Estate is allocated within the Core Strategy DPD for employment land between 2001 – 2021 to meet indicative targets for additional jobs in Mid Suffolk, specifically for Use Classes B1, B2 and B8.

2.8 Eye Airfield Development Framework (February 2013 post consultation draft)

2.8.1 Whilst not yet possessing formal status within the Mid Suffolk LDF, the draft Eye Airfield Development Framework (EADF) seeks to provide the Council's interpretation of the Core Strategy and other policies as they relate to Eye Airfield and provide additional baseline information. The intention is to guide investment and provide a framework for the Council's consideration of planning proposals for development as they come forward.

2.8.2 Reflecting the Mid Suffolk Core Strategy DPD, the EADF reconfirms Eye Airfield's importance as an employment area. Different areas of the site are proposed for varying types of development, including; business, residential, energy, common/open space, allotments and agricultural.

2.8.3 The centre of the site has been proposed for energy producing developments, which should be 'appropriate provided they meet environmental criteria that ensure a good quality of life for all around them'.

2.8.4 Chapter 4 of the EADF sets out the development principles for the site. This includes the need for sustainable surface water management within an overall jointly managed surface water drainage strategy. The document goes on to state that it is proposed that SUDS are used on Eye Airfield, but that the details need to be carefully worked out due to heavy clay soils. The range of SUDS measures considered appropriate for this site are discussed in detail within the EADF document.

SECTION 3

SITE DESCRIPTION

3 SITE DESCRIPTION

3.1 Site Location

3.1.1 The Power Generation Plant Site is located within the former Eye Airfield. The former Eye Airfield accommodates several industrial parks, including: Brome Industrial Estate (to the north), Eye Airfield Industrial Estate (to the north-east), Mid Suffolk Business Park (to the east) and Oaksmere Business Park (to the west). The Power Generation Plant Site is located within a larger triangular area directly to the east of the former 'main runway' and north of the former SW-NE runway.

3.1.2 The extent of the Project Site boundary extends to the west of the Eye Airfield Industrial Estate, as illustrated in Figure 2. This defines the total works area for the Project including the electrical and gas connections. A description of the development proposals is provided in Section 1.3.

3.2 Site Description

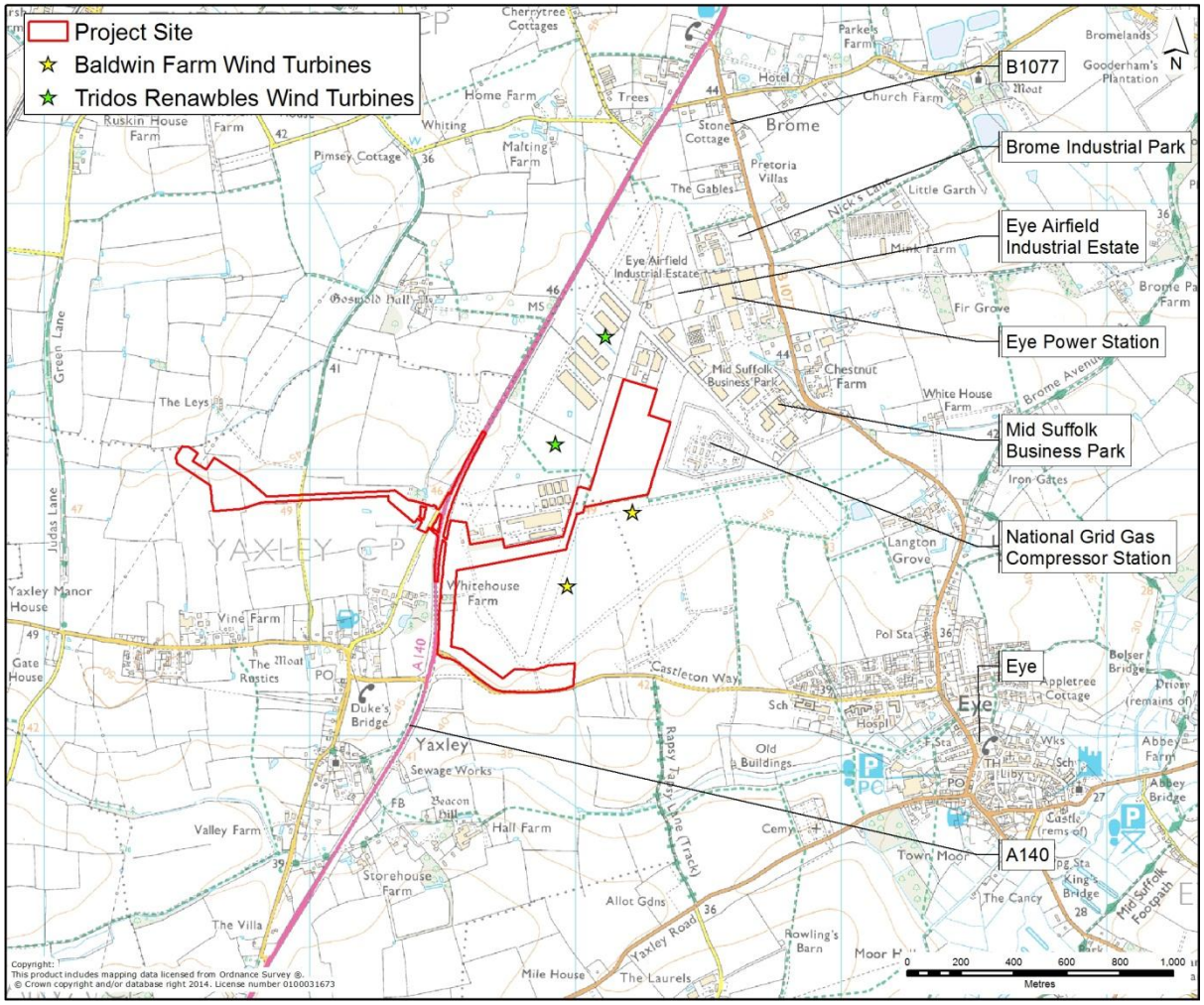
3.2.1 The Power Generation Plant Site and immediate surrounding area is characterised by the remnants of the airfield, including the runway and the access roads. Buildings that once formed part of the airfield have been replaced by industrial units accommodating various industrial activities including a power generation facility located to the north of the site (the 12.7 MW Eye Power Station), factory to the west of the site and a National Grid Gas Compressor Station to the east of the site.

3.2.2 There are also two wind turbines to the west of Potash Lane operated by Triodos Renewables and two more to the south of the Power Generation Plant Site at Baldwin Farm. The approximate location of these turbines is illustrated in Figure 2.

3.2.3 The proposed Project Site area currently comprises greenfield agricultural land with the exception of the A140 and smaller access roads.

3.2.4 The Power Generation Plant Site is generally flat, with slight undulation, falling very gently towards the east and south toward the proposed Above Ground Installation. The local 'high point' of the area of approximately 49m Above Ordnance datum (AOD) is located within the Power Generation Plant Site. Land within the wider site boundary is also generally flat. To the west of the Power Generation Plant, in the area of the proposed Substation and SEC, topography falls very gently towards the north.

Figure 2 Project site locations



3.3 Surface Water Features

3.3.1 There are no known surface water features located within the Power Generation Plant Site. There are also no known surface water features within, or alongside, the Gas Connection.

3.3.2 With regards to the Electrical Connection, the route of the Cable and Access Road to the ECC crosses a drainage ditch approximately 75 m west of the A140, immediately to the south of Yaxley Lake which is used for fishing. Yaxley Lake is not believed to have any formal designation but is stocked with common, mirror, tench and crucian carp. It has been surveyed for newts and it is concluded that newts are likely to be absent from the pond. A detailed description is provided in Section 10 (Ecology) of the Environmental Statement. The drainage ditch was dry on the day of the site visit (November 2013) and there

was no visible flow into or out of the lake. Water within the lake was reported to be stagnant and a large bloom of algae was visible.

3.3.3 A watercourse / highway drain flows adjacent to the A140 (eastern verge) and will be crossed beneath by the Electrical Connection. The watercourse is discussed in greater detail in Section 3.4 below.

3.3.4 There are no other known surface water features within the wider Project Site.

3.3.5 A number of small drainage ditches and ponds are located within the surrounding land outside of the red line boundary, as illustrated in the figure in Appendix B.

3.3.6 Of key importance is the unnamed culverted watercourse to the north of the Power Generation Plant Site that flows from west to east between the A140 and B1077. After passing beneath the B1077, the watercourse flows in an open channel to confluence within the River Dove approximately 15. km east of the B1077. It is believed that this watercourse may have been excavated to support the development of the Mid Suffolk Business Park. It is currently unknown who owns and/or manages this watercourse.

3.3.7 The closest Main River to the Project is the River Dove located approximately 2 km to the east of the Power Generation Plant Site. The River Dove flows in a north-easterly direction to confluence with the River Waveney approximately 3.8 km to the north.

3.4 Existing Surface Water Drainage

3.4.1 The surface water drainage scheme serving the former Eye Airfield is split into a number of catchments. The description of the existing surface water drainage system presented within this FRA is based on information provided within the EADF, review of historic drainage plans and review of drawings provided by Mr Whiting (local land owner) of ditches and culverts to the west of the A140 near the area labelled ‘Goswold Hall’ on Ordinance Survey mapping.

3.4.2 The existing development to the north of the Power Generation Plant Site (namely the Eye Airfield Industrial Estate, Mid Suffolk Business Park and Brome Industrial Estate) is believed to drain predominantly to the existing culverted watercourse that runs from west to east between the A140 and B1077. Runoff will subsequently be conveyed to the River Dove approximately 1.5 km east of the B1077.

3.4.3 Surface water runoff from the Mid Suffolk Business Park is drained via adopted Anglian Water sewers to a pumping station, prior to water being pumped into the culverted watercourse.

3.4.4 Drainage plans produced in 2002 (Cotton and Downes) indicate an existing collector drain located along the western boundary of the Power Generation Plant Site. This drain appears to collect runoff from a french drain arrangement located within the Power Generation Plant Site, and discharges to an existing drain located adjacent to Eye Power Station that continues to flow north. A copy of this plan is provided in Appendix C. This drain may discharge to the existing culverted watercourse that runs from west to east between the A140 and B1077, or it may discharge to the watercourse / highway drain that runs along the A140 (as discussed below).

3.4.5 Development on the west of the former Eye Airfield (adjacent to the A140) is believed to discharge via a balancing pond and settlement tank to a watercourse / highway drain that runs along the A140. This section of the watercourse / highway drain is believed to discharge into the culverted watercourse that crosses north of the Power Generation Plant Site as discussed above, although this connection has not been confirmed. The EADF suggests that this section of the Eye Airfield Industrial Estate may discharge to the west across the A140 and maps provided by Mr Whiting illustrating farm drainage to the west of the A140 also indicates this to be the case. If this is the case, the surface water discharges into a series of land drains that passes through the farms to the west of the A140 at this point and discharges into the Thrandeston Beck. The drainage of this area of the Project Site will need to be confirmed during the detailed design of the proposed drainage system.

3.4.6 Surface water runoff from the former runways on the former Eye Airfield are generally channelled into holes drilled into the airfield which discharge to a french drain arrangement. This network of drains is prevalent throughout much of the greenfield land within the former Eye Airfield. Review of historic drainage plans suggest that the drains in the northern and western parts of the former Eye Airfield connect to carrier drains within the A140, which in turn may discharge to the culverted watercourse that crosses the former Eye Airfield or may discharge to the west across the A140 as discussed above.

3.4.7 Review of historic drainage plans suggests that drains in the south of the former Eye Airfield connect to a carrier drain located in Castleton Way. Surface water runoff from arable land in the southeast of the former Eye Airfield is believed to drain to a drainage ditch located along a field boundary, which then discharges to an adopted sewer across

Castleton Way, and into a tributary of the River Dove located in the north of Eye.

3.4.8 The majority of the former runway and field drainage system is believed to be in poor condition or completely blocked.

3.4.9 Surface water drainage in the greenfield area where it is proposed to locate the ECC is unknown but expected to be absent. Plans provided by Mr Whiting indicate the nearest watercourse to be a drainage ditch approximately 250m to the north-east of the ECC which flows north-east toward Goswald Hall.

3.5 Geology

3.5.1 The bedrock geology within the area of the Project comprises Crag Group, formed of sand and sedimentary bedrock. The bedrock geology is overlain by superficial deposits comprising Lowestoft Formation (Diamicton), predominantly of chalky till.

3.5.2 The permeability of the superficial deposits is typically low, although its variable nature may mean that local areas of higher permeability may be present. This is confirmed through review of the Mid Suffolk SFRA that states that the chalky till and drift geology within the area of Eye is 'moderately drained and seasonally waterlogged'. The SFRA goes onto to state that, with regards to SUDS opportunities, this geology would be appropriate for combined infiltration and attenuation systems.

3.5.3 Land within the boundary of the former Eye Airfield may be at risk of ground contamination associated with historic land uses. This includes the Power Generation Plant Site as well as the Gas Connection and Electrical within the boundary of the former Eye airfield. Land to the west of the A140 (i.e. in the area of the Cable and ECC) is unlikely to be at risk of contamination. More information is provided in Section 10 (Geology, Land Contamination and Agriculture) of the Environmental Statement.

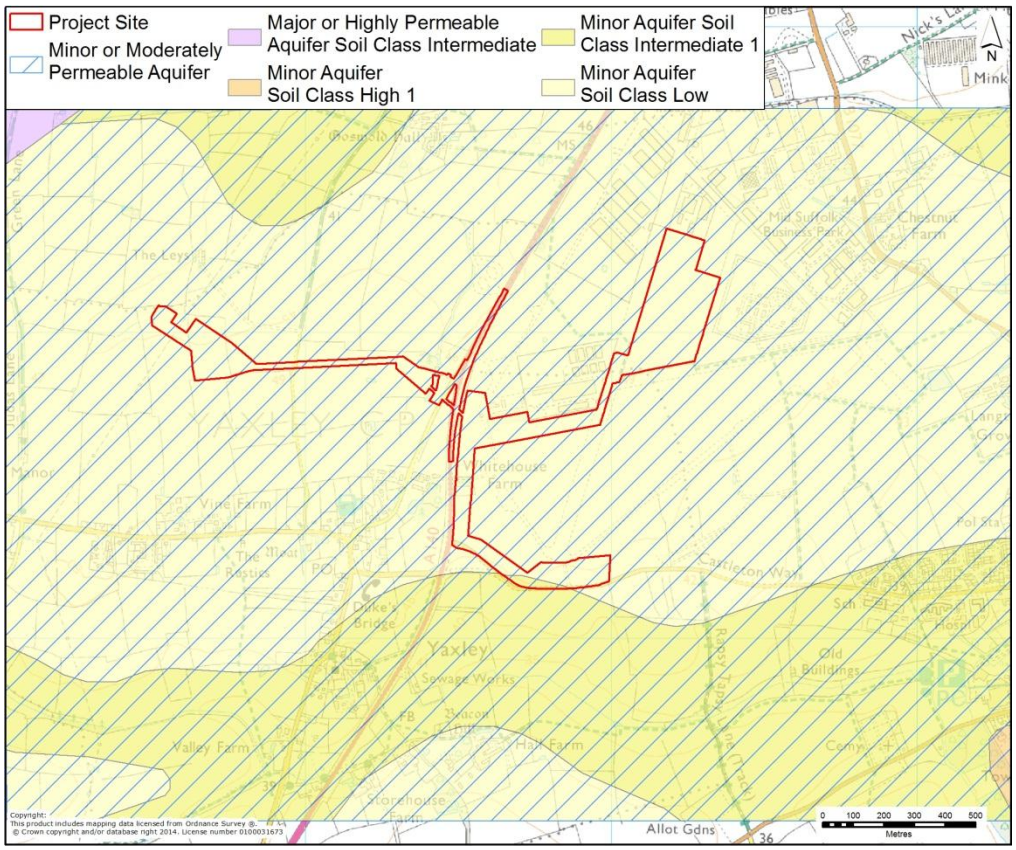
3.6 Hydrogeology

3.6.1 The bedrock geology within this area is classified as a Principal Aquifer. These aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability, meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

3.6.2 The superficial geology within this area is classified as unproductive strata. These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

3.6.3 Review of groundwater vulnerability maps indicates that the soils overlying these aquifers are of low permeability within the areas of the Project Site. This is illustrated in Figure 3. Note that the aquifer designations used within the groundwater vulnerability map below (i.e. Major, Minor and Non-Aquifer) were superseded in 2010 by the terminology used above (i.e. Principal and Secondary), although the soil classifications remain valid.

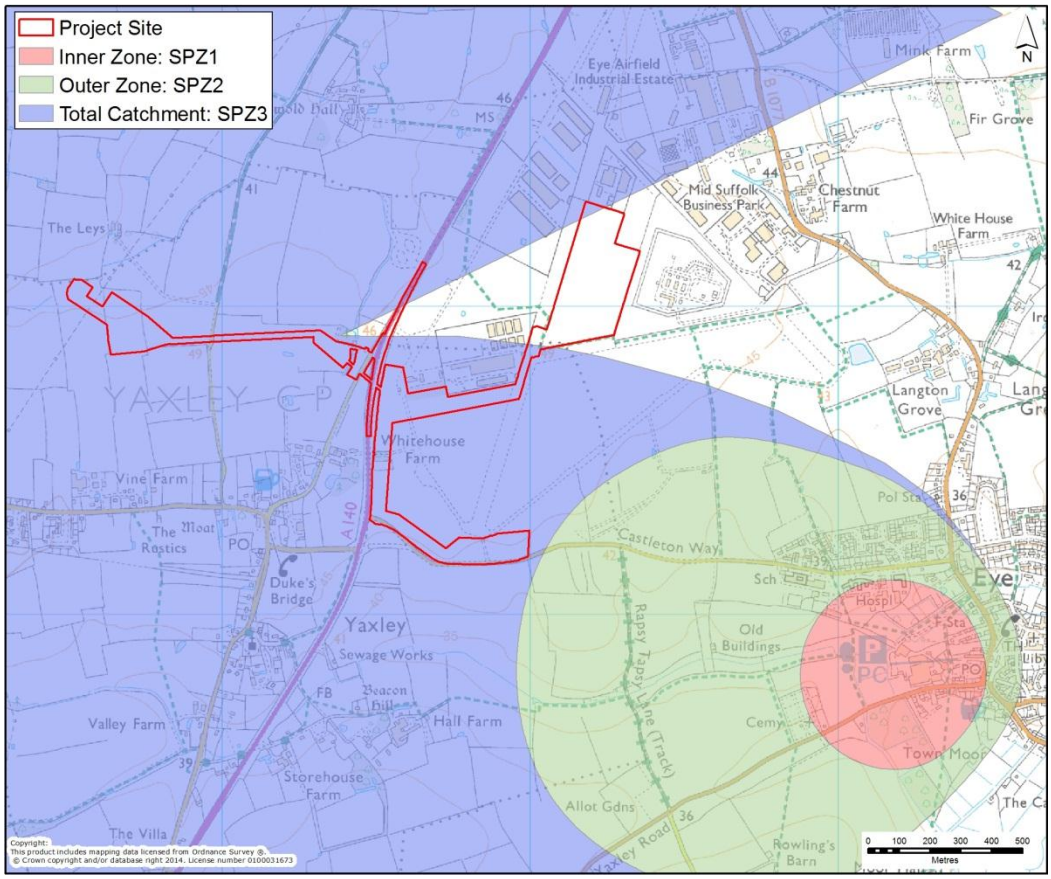
Figure 3: Groundwater vulnerability (Reference: Environment Agency Groundwater Map)



3.6.4 The Principal Aquifer beneath the Project Site forms part of the EA's designated Source Protection Zones (SPZ). A SPZ denotes an aquifer that is used for public potable water supply and activities within the SPZ are controlled by the EA to reduce contaminations risks.

3.6.5 With reference to Figure 4, the red area denotes the inner protection zone (SPZ1) which is the most sensitive and protected area of the SPZ. The green area denotes the outer protection zone (SPZ2) and the blue area denotes the total catchment area (SPZ3) which is the total area needed to support the water demand abstracted from this source.

Figure 4: Groundwater Source Protection Zones (Reference: Environment Agency Groundwater Map)



3.6.6 The northern tip of the Power Generation Plant Site is located within SPZ3. Electrical and Gas Connections are also located in SPZ3.

3.6.7 EA guidance 'Groundwater Protection: Policy and Practice' sets limitations on the discharge of liquid effluent into a SPZ. In summary, it is generally not permitted to discharge surface water runoff from roads, vehicle parking or public amenity areas to SPZ1, although it is permitted to discharge surface water runoff from these areas to SPZ2 and SPZ3 through the use of SUDS. The use of deep soakaways within all areas of a SPZ for surface water disposal will generally not be permitted.

3.6.8 Within all areas of the SPZ, the EA will object to high risk developments (such as loading areas, service yards, chemical storage areas, garage forecourts, lorry parks, scrap yards etc) discharging surface water runoff to ground unless the site has been subject to risk assessment and acceptable effluent treatment is provided.

SECTION 4

EXISTING FLOOD RISK

4 EXISTING FLOOD RISK

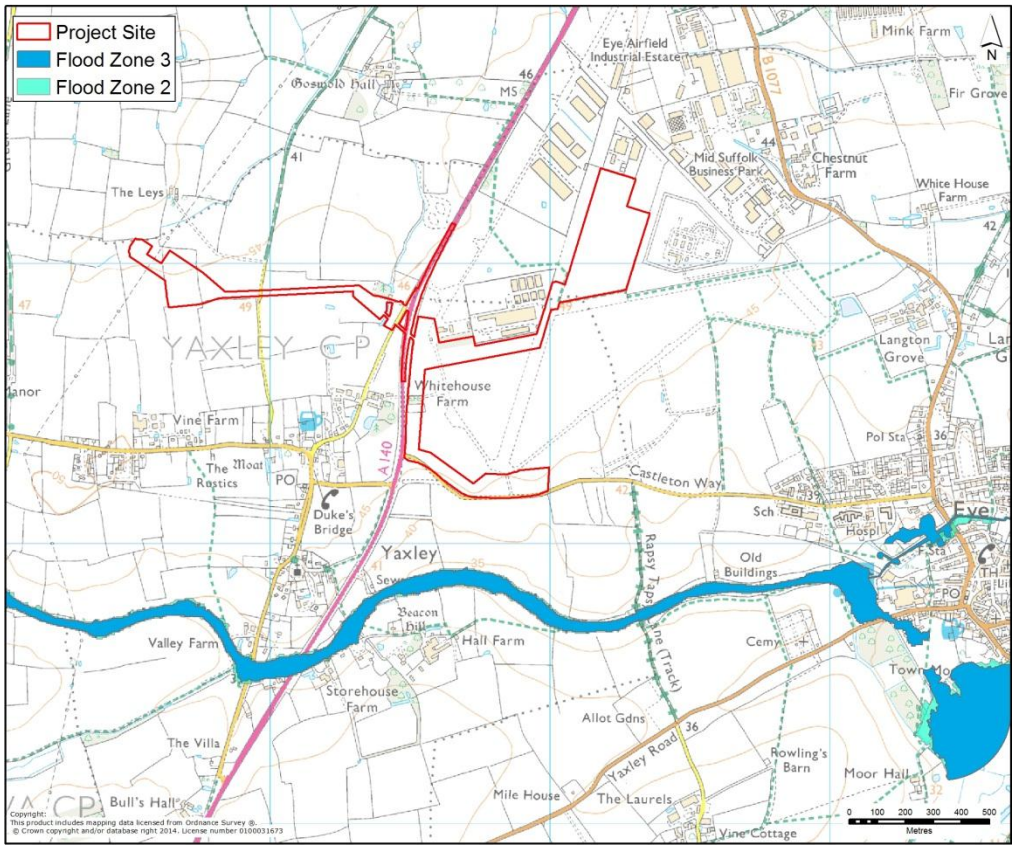
4.1 Introduction

4.1.1 This section of the report provides an overview of any existing flood risk to the Project or surrounding land from fluvial, tidal, groundwater, overland flow and artificial sources. Consideration is also given to the potential effects of climate change on existing flood risk. All data has been sourced through desk based review of published documents and no additional quantitative analysis or modelling has been undertaken to inform this assessment.

4.2 Fluvial Flood Risk

4.2.1 Review of the EA indicative flood maps, as illustrated in Figure 5, indicates that the whole of the Project Site is located within the low risk Flood Zone 1. This has been confirmed through direct consultation with the EA. The development is therefore not considered to be at risk from fluvial flooding.

Figure 5: Indicative fluvial and tidal flood map (Reference: Environment Agency Flood Map for Planning (Rivers and Sea))



4.2.2 Part of the town of Eye to the south-east of the Project Site is at risk from fluvial flooding from the River Dove and its tributary to the west of Eye. The Core Strategy DPD states that the town of Eye has historically been constrained from expanding to the east, south and west by low lying land liable to flooding from the River Dove and its tributaries.

4.2.3 The Project Site and surrounding land (including the town of Eye) is not in an area that receives EA flood warnings.

4.3 Tidal Flood Risk

4.3.1 The Project Site and surrounding land is not in an area deemed to be at risk of tidal flooding.

4.4 Surface Water Flood Risk

4.4.1 Within this FRA, surface water flood risk encompasses flooding associated with ordinary watercourses (not mapped as fluvial flood risks as discussed above), surface water runoff that has not yet entered the surface water drainage system and/or watercourse, and flooding associated with the surcharging of the below ground sewerage network.

4.4.2 The EADF states that parts of the Eye Airfield Industrial Site to the north of the Power Generation Plant have experienced occasional surface water flooding, deemed to be as a result of a combination of blocked surface water drains within the airfield hardstanding, blockages within the culverted watercourse and also a lack of capacity in the culverted watercourse.

4.4.3 The Power Generation Plant is located at a local 'high point' of approximately 49m AOD. The risk of flooding to the Power Generation Plant from runoff from adjacent land entering the site is therefore considered to be low, although any increase in runoff from the Power Generation Plant could increase risks to adjacent land.

4.4.4 Review of the EA's Flood Map for Surface Water (FMfSW) indicates that shallow flooding associated with surface water runoff may occur within the Eye Airfield Industrial Estate and Brome Industrial Estate to the north of the Power Generation Plant Site during the modelled 1 in 30 year event. Other areas of the industrial estates to the north are indicated to be risk of shallow surface water flooding during the larger modelled 1 in 200 year event. The FMfSW assess the likelihood of surface water flooding based on review of site topography. Identified flood risks are therefore likely to be associated with the relative flat

topography of these areas and the presence of buildings that will interrupt the natural flow of water.

4.4.5 The Gas Connection and Electrical Connection are not located in areas to be at significant risk from surface water flooding. The only reported flooding is provided in a report from Mr Whiting that states that on the 5th February 2014 flooding of land at Farms in Thrandeston occurred approximately 2km to the north of the ECC.

4.4.6 The FMfSW indicates that the town of Eye may be at risk of surface water flooding. This appears to be principally associated with runoff from the land to the north, in particular an existing land drain that passes through the town from agricultural land to the north before discharging to the River Dove.

4.5 Groundwater Flood Risk

4.5.1 Groundwater flooding occurs when water stored below ground reaches the ground's surface, causing flooding of below ground structures and often leading to overland flow. Groundwater flooding is commonly associated with porous underlying geology, such as chalk, limestone and gravels.

4.5.2 The superficial geology underlying the Project Site is relatively impermeable and therefore unlikely to support groundwater flooding. This is reaffirmed by the lack of records of groundwater flooding in this area, of which there are none. The reported flooding of farmland near Thrandeston is not attributed to any particular source.

4.6 Artificial Sources of Flood Risk

4.6.1 Artificial sources of flooding are considered to be sources such as canals, reservoirs and lakes.

4.6.2 Review of EA indicative flood maps indicates that the Project Site and surrounding land is not at risk of flooding from reservoirs.

4.6.3 There are no canals or significant lakes within close proximity of the Project Site that are considered to pose flood risk to the area.

4.7 Potential Effects of Climate Change

4.7.1 As discussed in Section 2.5, climate change is predicted to increase rainfall intensity and peak river flow, thus exacerbating existing flood risk.

4.7.2 With regards to fluvial flood risk, this may increase the extent and frequency of flooding associated with main rivers and ordinary

watercourses, although this is not predicted to increase flood risk to the Project Site.

4.7.3 An increase in rainfall intensity could increase the frequency of surface water flooding within parts of the Eye Airfield Industrial Site to the north of the Power Generation Plant Site, in particular flooding that is attributable to a lack of capacity in the culverted watercourse that passes through this area. This increase in flood risk is unlikely to pose an increased risk to flooding within the Power Generation Plant Site, but any increase in discharge to the watercourse (i.e. from the Power Generation Plant) may increase flood risk elsewhere.

4.7.4 Climate change is not predicted to increase flood risks associated with tidal, groundwater or artificial sources within the vicinity of the Project Site.

4.8 Summary of Existing Flood Risk

4.8.1 The Project Site is not considered to be at significant risk from any source of flooding, namely fluvial, tidal, groundwater, overland flow and artificial sources.

4.8.2 The greatest risk of flooding to adjacent land is associated with surface water runoff, with reported flood incidents within the Eye Airfield Industrial Site to the north of the Power Generation Plant Site. This is deemed to be as a result of a combination of blocked surface water drains within the airfield hardstandings, blockages within the culverted watercourse and also a lack of capacity in the culverted watercourse. Climate change could exacerbate flooding from this source.

4.8.3 Any increase in surface water runoff from the Power Generation Plant Site could exacerbate existing surface water flood risk within the Eye Airfield Industrial Site and within the town of Eye to the south-east.

SECTION 5

POST DEVELOPMENT FLOOD RISK AND DRAINAGE STRATEGY

5 POST DEVELOPMENT FLOOD RISK AND DRAINAGE STRATEGY

5.1 Introduction

5.1.1 This section of the report provides a summary of the potential impacts that identified flood risk could have on the Project, as well as the potential impacts that the Project could have on people and property elsewhere. Where appropriate, mitigation measures to manage any identified risks are proposed. This includes a description of the proposed surface water management strategy.

5.2 Development Vulnerability

5.2.1 Review of existing flood risks (and any increased risk associated with climate change effects) has identified that the Project Site is located within the low risk Flood Zone 1 and is not considered to be at significant risk from any source of flooding, namely fluvial, tidal, groundwater, overland flow and artificial sources.

5.2.2 With reference to NPPF Technical Guidance, the Project is classified as Essential Infrastructure in terms of its flood risk vulnerability classification (namely 'electricity generating power stations and grid and primary Substations', Table 2, NPPF Technical Guidance: Flood risk vulnerability classification). With reference to Table 4 in Section 2 of this FRA, this type of development is classified as appropriate in Flood Zone 1.

5.3 Increased Surface Water Runoff

5.3.1 Section 4 of this FRA has identified that the greatest risk of flooding to adjacent land is associated with surface water runoff, with reported flood incidents within the former Eye Airfield Industrial Site to the north of the Power Generation Plant Site. The town of Eye may also be at risk of surface water flooding, principally associated with runoff from the land to the north.

5.3.2 Any increase in surface water runoff from the Project Site, including that associated with climate change effects, could exacerbate existing surface water flood risk within the former Eye Airfield Industrial Site and within the town of Eye to the south-east.

5.3.3 Works associated with the Power Generation Plant Site will result in the most notable increase to the rate and volume of surface water runoff. The increase in runoff associated with the Gas Connection and Electrical Connection will be comparatively less. The assessment of increased flood risk as a result of the Project will therefore focus on the development of the Power Generation Plant Site. Details of flood risk

as a result of the Gas Connection and Electrical Connection are dealt with in Section 5.5.

5.3.4 The Power Generation Plant will occupy an area of approximately 7.5 ha. Up to 1.9 ha of the development will be impermeable, comprising buildings, roads, construction / maintenance compound and hard standing. The remaining 5.6 ha of this area will remain undeveloped or surfaced with gravel and therefore permeable as per current conditions.

5.3.5 If unmitigated, the construction of the Power Generation Plant would most likely increase flood risk within the Eye Airfield Industrial Site to the north and to downstream receptors that are at existing risk of fluvial flooding from the River Dove. The development may also increase flood risk within the town of Eye if water is not intercepted by a drainage system and is instead allowed to runoff naturally.

5.3.6 In order to ensure no increase in flood risk associated with surface water runoff over the lifetime of the Project and to meet the requirements of the EA and Suffolk County Council, the Power Generation Plant Site will be supported by a SUDS system that attenuates surface water runoff to the equivalent greenfield runoff rate up to and including the 1 in 100 year event whilst allowing for the potential effects of climate change.

5.3.7 Existing Greenfield runoff rates have been calculated using the Institute of Hydrology Report 124 (IH124) methodology. These are presented within Table 6, providing runoff rates per hectare and for the Power Generation Site area of 1.9 ha. The runoff rate per hectare has been agreed with the EA through consultation undertaken July 2013.

Table 6 Greenfield runoff for a range of key return periods

Area	QBAR (l/s)	1 in 1 yr event (l/s)	1 in 30 yr event (l/s)	1 in 100 yr event (l/s)
1 ha	2.84	2.47	6.83	10.11
1.9 ha	5.40	4.69	12.98	19.21

Area characteristics:
Hydrological Region = 5 *Soil runoff coefficient = 40%*
SAAR = 600mm

5.4 Surface Water Drainage Strategy

Statutory requirements

5.4.2 The proposed drainage system will be designed to meet the requirements of relevant planning policy and of the relevant authorities, as summarised in Table 7.

Table 7 Summary of requirements regarding surface water management

Policy and/or relevant authority	Summary of requirements
Flood and Water Management Act 2010	Design in accordance with SUDS National Standards if planning decision made during or after implementation in late 2014.
Environment Agency	Limit runoff from the Project site to the existing greenfield runoff rates for a range of equivalent return period rainfall events over the lifetime of the development, up to and including the 1 in 100 year event. Consider the SUDS management train and incorporate SUDS into the design. Design for overland flows that exceed the drainage network.
Suffolk County Council	Use SUDS to maintain greenfield runoff rates. Design in accordance with SUDS National Standards if planning decision made during or after implementation in late 2014. Design to be integrated into a wider network as airfield is developed further.
Mid Suffolk Core Strategy DPD and Mid Suffolk District Council	Do not increase flooding elsewhere. Implement SUDS where technically feasible.

Policy and/or relevant authority	Summary of requirements
Eye Airfield Development Framework	Use of SUDS to manage site's own runoff within an overall jointly managed surface water drainage strategy. Detention/attenuation of surface water runoff to slow it down will be required on each plot as it is developed. Runoff to be restricted to greenfield rates up to the 1 in 100 year event plus climate change allowance. Use of open ponds and wetlands that will have the added benefit of improving the area's biodiversity. Conveyance of water using SUDS principles, along open swales, ditches, filter strips and drains should be designed. Rainwater reuse/harvesting from roofs and car parks, with the collected water being re-used on the airfield. Runoff from car and lorry parking areas will need treatment to remove contaminants.

5.4.3 The draft National Standards for SUDS was published by DEFRA in December 2011 and sets out the principles by which surface water drainage systems should be designed in the future. The final document is still in preparation and is due to be published in late 2014 to enable Schedule 3 of the FWMA to be enacted. Although still in draft form, the surface water drainage strategy proposed within this FRA aims to meet the requirements of the draft National Standards for SUDS.

Surface water discharge

5.4.4 The draft National Standards for SUDS requires that the following methods of surface water disposal are considered in order of preference:

1. Discharge into the ground;
2. Discharge to a surface water body;
3. Discharge to a surface water sewer;
4. Discharge to a combined sewer.

5.4.5 Review of underlying ground conditions suggests that the ground within the site boundary will not support significant infiltration of surface water runoff. Contamination may also be present near the airfield that could limit the use of infiltration systems. Further site investigation will be undertaken during the detailed design of the Project to ascertain likely infiltration rates and contamination risks. If deemed suitable, infiltration of surface water runoff will be maximised through the use of combined infiltration and attenuation systems. However, it is considered likely that some discharge of surface water elsewhere will still be required.

5.4.6 It is proposed that surface water runoff from the Power Generation Plant Site that cannot be managed through infiltration alone will be discharge to the existing drainage connection located to the north of the Power Generation Plant Site adjacent to Eye Power Station (as illustrated in Appendix C). This drain may discharge to the existing culverted watercourse that runs from west to east between the A140 and B1077, or it may discharge to the watercourse / highway drain that runs along the A140 (noting that this drain may also discharge to the same culverted watercourse as discussed above, or to the west across the A140). Further investigation will be required during detailed design of the proposed drainage system to confirm the flow of water in these systems, confirm available capacity and gain approval from the relevant authorities.

5.4.7 The draft National Standards for SUDS requires development to achieve no discharge to a surface water body or feature resulting from the first 5 mm of any rainfall event. The proposed drainage strategy for the Power Generation Plant Site will aim to achieve this requirement by promoting infiltration and/or evaporation of surface water runoff through the use of unlined storage and conveyance systems, as well as the storage and conveyance of water on the ground's surface wherever possible. This is discussed further in the sections below.

Attenuation requirements

5.4.8 Surface water runoff from the Power Generation Plant Site will be attenuated to existing Greenfield runoff rates up to and including the 1 in 100 year event, calculated to be approximately 19.21 l/s (10.11 l/s/ha). For the purpose of sizing required attenuation systems, a worst case scenario has been adopted that assumes no infiltration to ground. The attenuation system will be designed to accommodate the potential effects of climate change over the lifetime of the Project, which is estimated to be 25 years. In accordance with NPPF climate change guidance, rainfall intensity will increase by up to 10% during this time.

5.4.9 Table 8 presents the calculated storage requirements to attenuate surface water runoff to Greenfield rates, based on a total impermeable

area at the Power Generation Plant Site of 1.9 ha. Estimates were prepared using the MicroDrainage Quick Storage Estimate tool that provides a range of likely required storage volumes. A more accurate sizing of the required storage volume will be undertaken during the detailed design stage of the Project when a more detailed representation of the proposed drainage system can be made. At this stage, the design will ensure that the maximum required storage volume can be accommodated within the site boundary (i.e. 961 m^3).

Table 8 Surface water attenuation requirements

	1 in 1 yr event	1 in 30 yr event	1 in 100 yr event
Maximum discharge rate (l/s)	4.69	12.98	19.21
Required storage volume (m^3)	268-394	566-770	720-961

5.4.10 The draft National Standards for SUDS requires that surface water runoff is managed on the ground surface where it is reasonably practicable to do so. This is reaffirmed by the EADF that promotes the use of open ponds and wetlands, and the use of conveyance systems such as open swales, ditches and filter strips. It is proposed that the attenuation requirements calculated above will be provided within an open detention pond within the Power Generation Plant Site. At this stage it is proposed that the base of this pond will remain unlined to promote infiltration, although this will confirmed following a more detailed site investigation that will assess contaminated risks.

Conveyance

5.4.11 Where practical, surface water runoff from all impermeable areas will be conveyed within open swales, ditches and filter strips located adjacent to the proposed access roads. A detailed topographic survey of the site has been completed which will be used during the detailed design of the Power Generation Plant to inform the design of these systems. Review of OS maps indicates that the site's topography is very flat with a gentle slope towards the south and the east. However, review of the existing surface water drainage system within the Power Generation Plant Site boundary indicates that surface water is currently conveyed towards the north.

Treatment

5.4.12 The Power Generation Plant Site contains items that could pose risk to the receiving surface water environment, such as runoff from roads/parking and accidental spillage from oil and chemical storage tanks.

5.4.13 Detailed mitigation to manage risks associated with these areas is provided within Chapter 9 (Water Quality and Resources) of the Environmental Statement. In summary, runoff from low risk areas, such as building roofs and minor access roads, will be treated through the use of SUDS techniques as discussed above. Runoff from high risk areas, such as the lorry/car parking areas, construction/maintenance compound and storage tanks, will be passed through an oil separator prior to discharge to conveyance structures and/or the detention pond. The separator will be designed in accordance with PPG3: Use and Design of Oil Separators in Surface Water Drainage Systems.

5.4.14 The northern tip of the Power Generation Plant Site is located within SPZ3. Within this zone, the EA generally permits the discharge of surface water runoff from roads and parking areas to the ground through the use of SUDS, although the use of deep soakaways will generally not be permitted. The EA will generally object to high risk activities (such as loading areas, lorry parking, service yards, and chemical and oil storage areas) in SPZ3 unless acceptable treatment is provided.

5.4.15 The proposed methods for managing risks associated with the discharge of potentially polluted runoff will be agreed with the EA during the detailed design of the Power Generation Plant. However, it is considered that the use of a robust oil separator and shallow SUDS conveyance and storage measures will provide adequate protection to groundwater and surface water quality.

Designing for exceedence

5.4.16 The proposed surface water drainage system will be designed to provide capacity for up to the 1 in 30 year event, at minimum, to meet the requirements of the draft National Strategy for SUDS and in accordance with Sewers for Adoption. Flooding from the drainage system will therefore not occur during events equal to or less than the 1 in 30 year event.

5.4.17 The management of surface water runoff during events greater than the 1 in 30 year event will be developed in detail during the detailed design of the Power Generation Plant. This may comprise the use of conveyance structures that have capacity for events greater than the in

1 in 30 year event, or the profiling of land within the site boundary to manage overland flow during events greater than the in 1 in 30 year event. The design will ensure that no flooding will occur to the following receptors up to and including the 1 in 100 year event and allowing for the potential effects of climate change:

- Any part of the workshops, office and store;
- Any plant sensitive to full or partial submergence (such as electrical equipment);
- Land outside of the Power Generation Plant Site boundary.

Summary

5.4.18 In summary, the proposed surface water drainage system for the Power Generation Plant Site will meet the following principles:

- No runoff from the development from rainfall depths up to 5mm;
- No increase in the volume or rate of surface water runoff from the site in the 1 in 1 and 1 in 100 year rainfall events;
- No increase in flooding to people and property elsewhere as a result of the development;
- No surface water flooding within the proposed development in all rainfall events up to and including a 1 in 30 year return period storm;
- Overland flows within the site from rainfall events in exceedence of a 1 in 30 year return period storm are to be managed to minimise risk to people and property, up to the 1 in 100 year return period storm;
- The surface water management proposals are to be designed to allow for a 10% increase in rainfall intensity in the 1 in 100 year rainfall event over the lifetime of the development;
- Surface water runoff will be treated through the use of SUDS and oil separator.

5.5 Gas Connection and Electrical Connection

5.5.1 The proposed Substation and SEC will occupy an area of approximately 0.9 ha, of which approximately 0.19 ha will comprise impermeable surfaces and the remaining 0.71 ha will either remain undeveloped or comprise permeable gravel surfaces. The proposed AGI will occupy an area of 0.9 ha which is assumed to comprise impermeable surfaces only.

5.5.2 The Cable and Gas Connection pipeline will be buried and the ground reinstated as per existing conditions. The increase in surface water runoff associated with the Cable and pipeline is therefore considered to be negligible and no surface water drainage system is proposed.

5.5.3 It is proposed to discharge surface water runoff from the impermeable surface areas at the ECC and the AGI via infiltration into the ground. Whilst infiltration rates are expected to be limited due to the relatively low permeability of local geology, it is proposed that combined attenuation and infiltration structures will be provided that will store runoff from the relatively small impermeable areas prior to infiltration. Further testing will be undertaken during the detailed design of the proposed works to confirm on-site infiltration rates. If infiltration does not prove to be a viable option, alternative methods will be explored that may include the discharge of surface water runoff to a local drainage ditch following consultation and agreement with relevant parties.

5.5.4 Access to the ECC and AGI will be provided by means of a new Access Road from the A140 and a new access from Potash Lane respectively. The roads are proposed to be of tarmac construction. The area of the Access Road is approximately 0.4 ha excluding the area of the new junction already within the A140 boundary. The area of the access road to the AGI is approximately 0.3 ha

5.5.5 It is proposed that surface runoff from the access roads will be managed by allowing surface water to runoff to infiltration trenches to be constructed adjacent to the access roads. This provides above ground management of surface water in line with the draft National Standards for SUDS and, given the proposed infrequent use of these access roads, this is deemed to provide adequate treatment of surface water runoff.

5.5.6 If it is not possible to manage all surface water runoff via infiltration due to soil characteristics, alternative methods will be explored that can provide combined attenuation and infiltration. One option could be to provide an attenuated discharge into existing highway drainage in the A140 and Castleton Way, although this option will require further consultation and agreement with the highways authority. If this option is progressed, it is proposed to use a ‘french drain’ style collector drain adjacent to the access roads. These collector drains will be unlined to promote any infiltration that is available. The collector drains will be sized to attenuate discharge to the Greenfield runoff rate up to the 1 in 100 year event including an allowance for climate change in accordance with the requirements of NPPF detailed in Table 5 of this report.

5.5.7 Tables 9 and 10 show the proposed Greenfield runoff rates (taken from Table 6) and post-development runoff rates for the two access roads should impermeable surfaces be selected for their construction.

Table 9 Substation Access Road surface water runoff and storage requirements

	1 in 1 yr event	1 in 30 yr event	1 in 100 yr event
Greenfield runoff rate (l/s/ha)	2.47	6.83	10.11
Road greenfield runoff rate (l/s)	0.99	2.73	4.04
Storage volume required (m^3)	56-83	120-163	152-203

Table 10 Above Ground Installation access road surface water runoff and storage requirements

	1 in 1 yr event	1 in 30 yr event	1 in 100 yr event
Greenfield runoff rate (l/s/ha)	2.47	6.83	10.11
Road greenfield runoff rate (l/s)	0.74	2.05	3.03
Storage volume required (m^3)	43-64	89-121	114-152

5.5.8 Estimates were prepared using the MicroDrainage Quick Storage Estimate tool that provides a range of likely required storage volumes. A more accurate sizing of the required storage volume will be undertaken during the detailed design stage when a more detailed representation of the proposed drainage system can be made. At this stage, the design will ensure that the maximum required storage volume can be accommodated within the Project Site boundary.

5.5.9 The estimated storage requirements are proposed to be provided within the gravel filled collector drains.

5.6 Adoption and maintenance

5.6.1 The adoption and maintenance of the surface water network at the Project Site is not confirmed but the following considerations have been made:

- The proposed surface water drainage system that serves the ECC, AGI and access roads will most likely be adopted by the plant operator and/or as part of a maintenance contract for the wider Eye Airfield Industrial Site. If the proposed surface water drainage system only serves the Power Generation Plant Site, it is unlikely to be adopted by the SAB (Suffolk County Council) under Schedule 3 of the FWMA.
- It is possible that the owner and/or maintainer of the drain to the west of the Power Generation Plant Site may also wish to take ownership of the Power Generation Plant Site drainage. If this network of drains starts to increase and/or they connect into the Anglian Water sewers to the north, Anglian Water may also wish to adopt this portion of drainage.
- If the proposed surface water drainage system that serves the Power Generation Plant Site will eventually form part of the drainage system that serves other plots, it might then be adopted by the SAB and/or Anglian Water.

5.6.2 The adoption and maintenance of the surface water network at the Project Site will be confirmed during the detailed design of the works.

5.7 Flood Resistance and Resilience Measures

5.7.1 Flood resistance comprises measures that prevent flooding to potentially vulnerable receptors, such as the ingress of water into occupied buildings. Flood resilience measures comprise measures that enable a potential receptor to adapt or recover from a flooding event, for example managing the risk *after* flood water has entered a building. Both measures are equally as important to the management of flood risk to development.

5.7.2 Flood resistance measures that have already been proposed as part of the Power Generation Plant Site, ECC and AGI comprise the provision of a robust surface water drainage strategy as discussed above. In addition, it is recommended that vulnerable aspects of these areas of development (such as occupied buildings and electrical equipment) is protected further through resistance measures such as raising threshold levels or plinths approximately 100-150 mm above ground levels to prevent ingress / submergence from overland flow.

5.7.3 Flood resilience measures that could be considered as part of the design could include the use of water-resistant materials for floors, walls and fixtures and the siting of electrical controls, cables and appliances at a higher than normal level.

5.8 Flood Defence Consent

5.8.1 The Cable and Access Road to the ECC crosses a drainage ditch approximately 75 m west of the A140, immediately to the south of Yaxley Lake.

5.8.2 The Cable also passes beneath a watercourse / highway drain that flows adjacent to the A140 (eastern verge).

5.8.3 This path will be constructed using below ground directional drilling techniques that will not require open excavation. The depth of the drainage ditches is unknown but it is expected that the depth of the drilled electrical connection corridor will be great enough that the drilled connection route will not impact the drains.

5.8.4 The Access Road will require the construction of a culvert to enable access across the drainage ditch south of Yaxley Lake. Details of the culvert design are unknown at this stage and will be developed during the detailed design of the works. However, the design will ensure no impact to the hydraulic capacity of the drainage ditch or the hydromorphological, chemical or ecological status of Yaxley Lake.

5.8.5 Consideration of the impacts to water quality is provided in Section 9 (Water Quality and Resources) of the Environmental Statement.

5.8.6 Consent for working in close proximity to the above mentioned watercourses will be obtained from the relevant authority during the detailed design phase and prior to construction.

SECTION 6

SEQUENTIAL TEST AND EXCEPTION TEST

6 SEQUENTIAL TEST AND EXCEPTION TEST

6.1 The Sequential Test

6.1.1 NPPF recommends that the risk-based Sequential Test should be applied by the Local Planning Authority when considering applications for new development. Its aim is to steer new development to areas at the lowest risk of flooding (Flood Zone 1). Where this is not possible, higher risk flood zones can be considered, but in the context of Flood Risk Vulnerability Classification and the possible application of the Exception Test.

6.1.2 With reference to NPPF Technical Guidance, the Project is classified as Essential Infrastructure in terms of its flood risk vulnerability classification (namely 'electricity generating power stations and grid and primary Substations', Table 2, NPPF Technical Guidance: Flood risk vulnerability classification). With reference to Table 3 of the NPPF (reproduced in Table 4 in Section 2 of this FRA), this type of development is classified as appropriate in Flood Zone 1.

6.1.3 The Project meets the requirements of the Sequential Test.

6.2 The Exception Test

6.2.1 With reference to Table 3 of NPPF, the Exception Test does not need to be applied to the Project as the development lies within Flood Zone 1 and passes the Sequential Test, as discussed above.

SECTION 7

CONCLUSIONS

7 CONCLUSIONS

7.1 Summary of Existing Flood Risk

7.1.1 The Project Site is not considered to be at significant risk from any source of flooding, namely fluvial, tidal, groundwater, overland flow and artificial sources.

7.1.2 The greatest risk of flooding to adjacent land is associated with surface water runoff, with reported flood incidents within the Eye Airfield Industrial Site to the north of the Power Generation Plant Site. This is understood to be as a result of a combination of blocked surface water drains within the airfield, blockages within the culverted watercourse and also a lack of capacity in the culverted watercourse. Climate change could exacerbate flooding from this source.

7.2 Summary of Post-Development Flood Risk

7.2.1 Any increase in surface water runoff from the Project Site, including that associated with climate change effects, could exacerbate existing surface water flood risk within the Eye Airfield Industrial Site and within the town of Eye to the south-east.

7.2.2 The Power Generation Plant Site will occupy an area of approximately 7.5 ha. Up to 1.9 ha of the development will be impermeable, comprising buildings, roads and hard standing. The remaining 5.6 ha of this area will remain undeveloped and will therefore remain permeable as per current conditions.

7.2.3 Preference will be given to the use of infiltration systems for all areas of the Project. If infiltration is unsuitable to manage all surface water runoff from the Power Generation Plant Site, the proposed surface water drainage strategy is to drain surface water runoff to the existing drainage connection located to the north of the site adjacent to Eye Power Station. This drain may discharge to the existing culverted watercourse that runs from west to east between the A140 and B1077, or it may discharge to the watercourse/highway drain that runs along the A140 (noting that this drain may also discharge to the same culverted watercourse as discussed above, or to the west across the A140.).

7.2.4 The discharge of surface water runoff from the Power Generation Plant Site to this existing connection will be attenuated to the existing greenfield runoff rate, up to the 1 in 100 year event. A maximum rate of 10.11 l/s/ha (19.21 l/s) has been agreed with the EA. Storage will be provided in the form of a detention pond located within the Power Generation Plant Site boundary. Calculations indicate that a maximum

storage volume of 961 m^3 will be required to attenuate flow up to and including the 1 in 100 year event and allowing for the potential effects of climate change during the lifetime of the development.

7.2.5 Where practical, surface water runoff from all impermeable areas of the Power Generation Plant Site will be conveyed within open swales, ditches and filter strips located adjacent to the proposed access roads.

7.2.6 Runoff from low risk areas, such as building roofs and minor access roads, will be treated through the use of SUDS techniques. Runoff from high risk areas, such as the lorry/car parking areas and storage tanks, will be passed through an oil separator prior to discharge to conveyance structures and/or the detention pond. The separator will be designed in accordance with PPG3: Use and Design of Oil Separators in Surface Water Drainage Systems.

7.2.7 It is proposed that surface water runoff from the ECC and AGI will be discharged via infiltration into the ground where feasible. In the case of low infiltration rates, connection will be sought into existing surface water ditches/drains following consultation with the internal drainage board and/or other relevant parties.

7.2.8 The proposed access roads will be constructed of tarmac. It is proposed that surface water runoff from these routes will runoff to adjacent infiltration trenches to be constructed alongside the roads. This provides above ground management of surface water in line with draft National standards for SUDS and, given the proposed infrequent use of these roads, this is deemed to provide adequate treatment of surface water runoff. In the event that infiltration is not a viable discharge option, alternative methods will be explored that can provide combined attenuation and infiltration. This may include an attenuated discharge into existing highway drainage in the A140 and Castleton Way, although this option will require further consultation and agreement with the highways authority.

7.2.9 In summary, the proposed surface water drainage system will meet the following principles:

- No runoff from the development from rainfall depths up to 5 mm;
- No increase in the volume or rate of surface water runoff from the site in the 1 in 1 and 1 in 100 year rainfall events;
- No increase in flooding to people and property elsewhere as a result of the development;

- No surface water flooding within the proposed development in all rainfall events up to and including a 1 in 30 year return period storm;
- Overland flows within the site from rainfall events in exceedence of a 1 in 30 year return period storm are to be managed to minimise risk to people and property, up to the 1 in 100 year return period storm;
- The surface water management proposals are to be designed to allow for a 10% increase in rainfall intensity in the 1 in 100 year rainfall event over the lifetime of the development;
- Surface water runoff will be treated through the use of SUDS and oil separator.

7.3 Flood Defence Consent

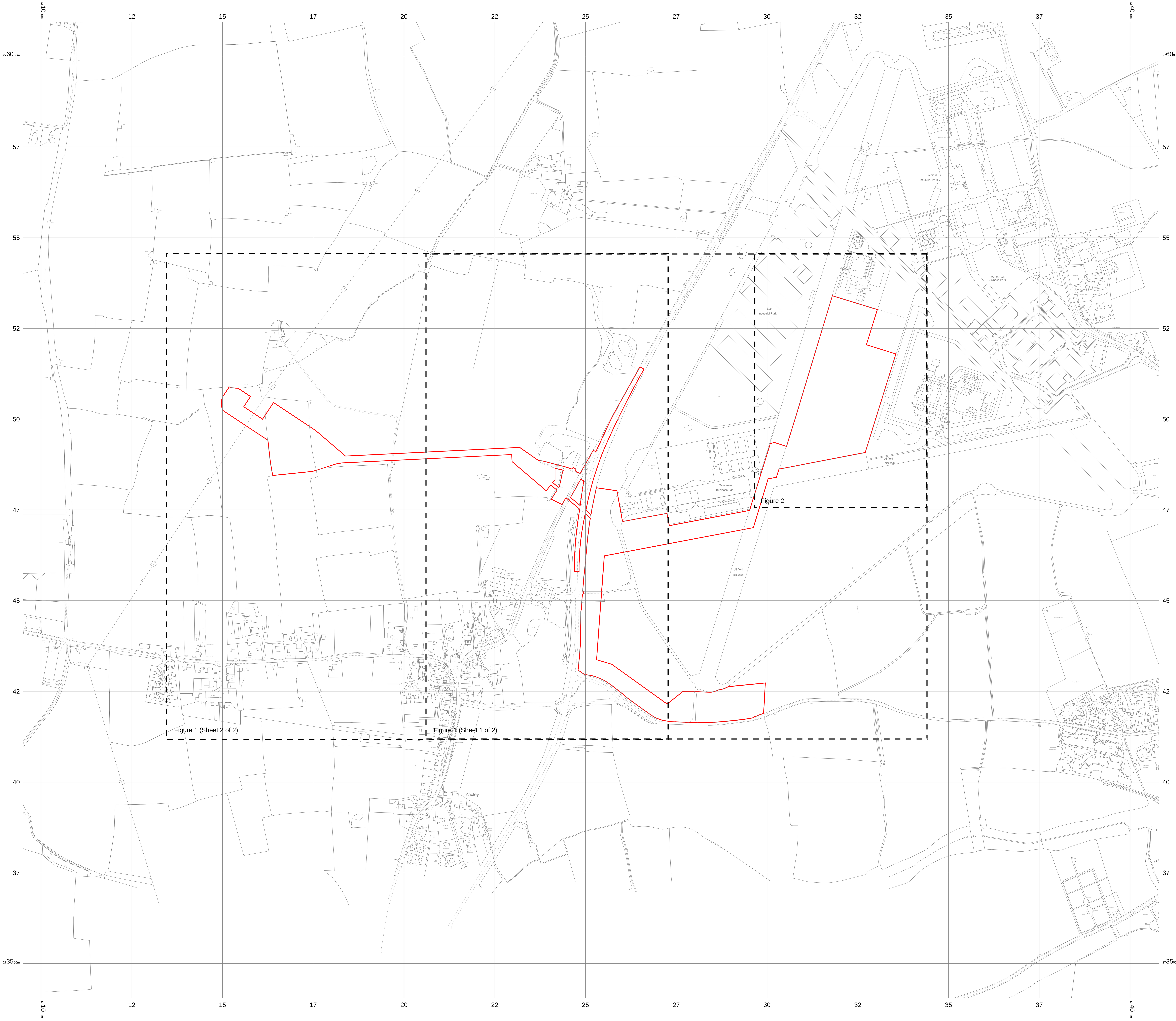
7.3.1 The Cable and Access Road crosses a drainage ditch approximately 75 m west of the A140, immediately to the south of Yaxley Lake. The Cable also passes beneath a watercourse/highway drain that flows adjacent to the A140 (eastern verge).

7.3.2 The trench for the Cable will be constructed using below ground directional drilling techniques beneath the A140 and adjacent drainage ditch. This will not require open excavation.

7.3.3 The new Access Road will require the construction of a culvert to enable access across the drainage ditch south of Yaxley Lake. Details of the culvert design are unknown at this stage and will be developed during the detailed design of the works. However, the design will ensure no impact to the hydraulic capacity of the drainage ditch or the hydromorphological, chemical or ecological status of Yaxley Lake.

APPENDIX A

PROPOSED DEVELOPMENT PLANS



Legend:

Land required for, or affected by, the authorised development (the Order limits)

Figure 1 (Sheet 1 of 2) - Works Plans Figure 1

Figure 1 (Sheet 2 of 2) - Works Plans Figure 1

Figure 2 - Works Plans Figure 2

N

Notes:

Created By:

TerraQuest Solutions Limited
10 Clement Street
Birmingham
B1 2SL

w: www.terraquest.co.uk
e: info@terraquest.co.uk

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Created For:

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33 Cavendish Square
London
W1G 0PW

w: www.progresspower.co.uk

PROGRESS POWER

Title:

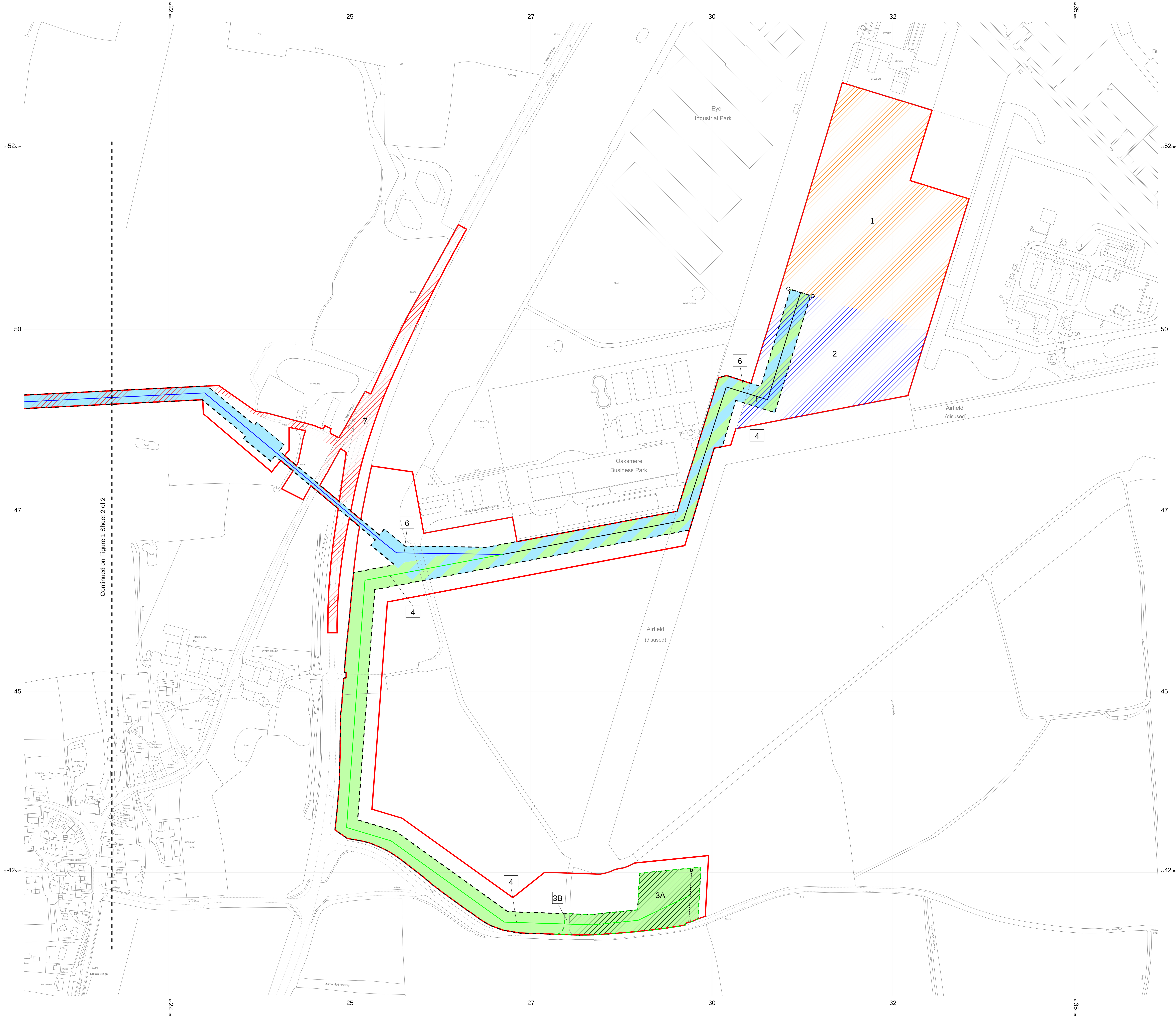
Works Plans Key Plan

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Regulation r5(2)(j) | Document Reference: 2.7

Scale:	Date:
1:5000 @ A1	December 2014
Drawing No:	Revision:
PPL Works Plans Key Plan	revision 1

Approved By:	Checked By:	Drawn By:
Progress Power Limited	Parsons Brinkerhoff	TerraQuest Solutions



Legend:

- Order limits
- Limits of Deviation of numbered works 4 and 6
- Indicative Centre Line of numbered works 4 and 6
- Indicative Centre Line of numbered work 4
- Indicative Centre Line of numbered work 6
- Commencement of numbered works 4 and 6
- Termination of numbered work 4

N

	Work No.	Brief Description (see Schedule 1 to the Development Consent Order)
	1	Power Generation Plant (divided up into numbered works 1A, 1B, 1C and 1D on Works Plan Figure 2) (Outer Limits of Deviation)
	2	Maintenance Compound
	3A	Above Ground Installation Minimum Offtake Connection Compound (Maximum Limits of Deviation)
	3B	Site Vehicular Access from Castleton Way to numbered work 3A (Maximum Limits of Deviation)
	4	Gas Pipeline
	6	Electrical Cable (part of)
	7	Site Vehicular Access to numbered work 5 and new access from the A140 (part of) (Maximum Limits of Deviation)

25 0 25 50 75 100 125 150 175 200
Metres

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TerraQuest Solutions Limited
10 Clement Street
Birmingham
B1 2SL

w: www.terraquest.co.uk
e: info@terraquest.co.uk

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33 Cavendish Square
London
W1G 0PW

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Title:

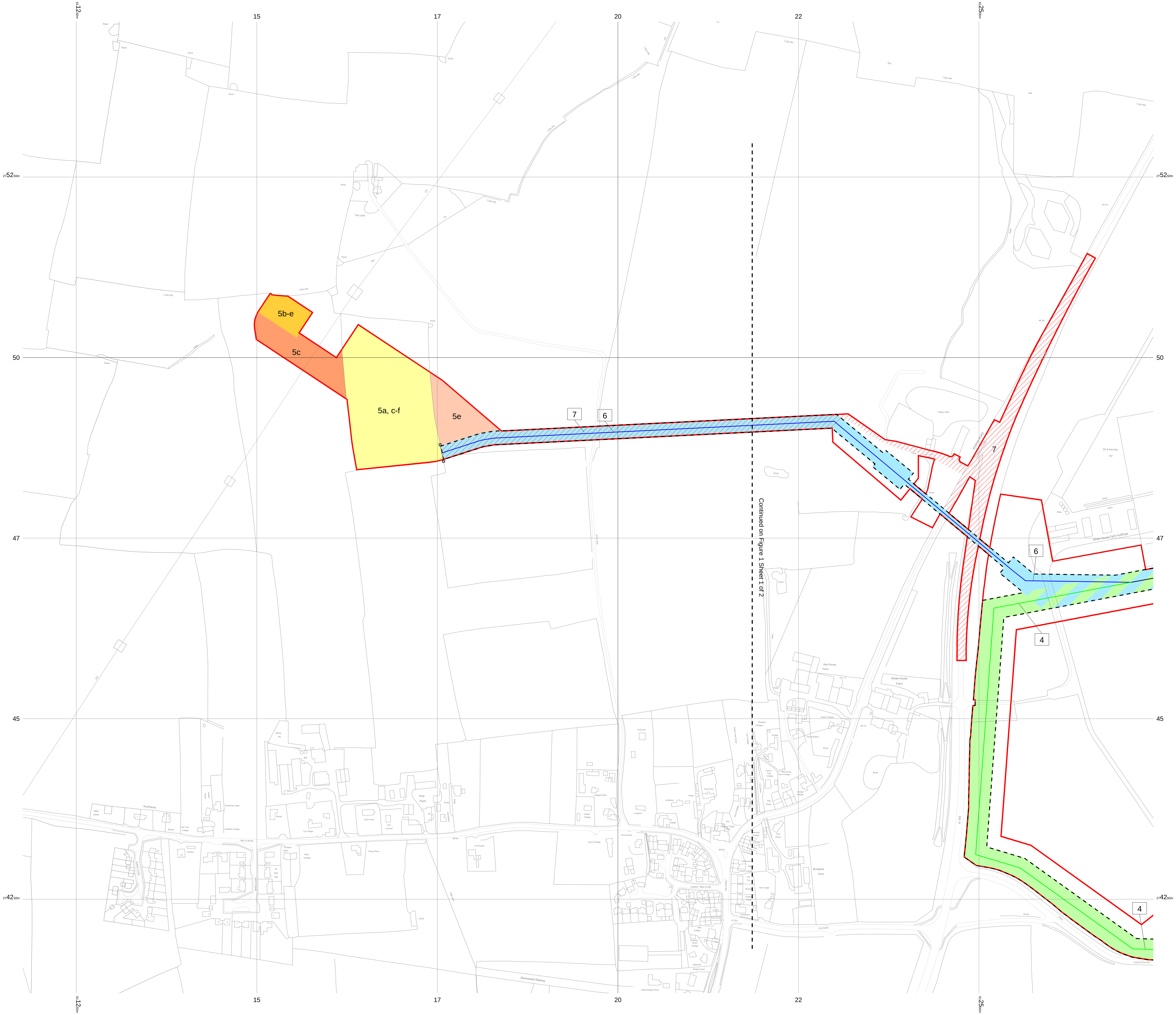
Progress Power Limited - Works Plans Figure 1 (Sheet 1 of 2)

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Regulation r5(2)(j) Document Reference: 2.7

Scale:	Date:
1:2500 @ A1	December 2014
Drawing No:	Revision:
PPL Works Plan Figure 1	revision 1

Approved By:	Checked By:	Drawn By:
Progress Power Limited	Parsons Brinkerhoff	TerraQuest Solutions



Legend:

- Order limits
- Limits of Deviation of numbered works 4 and 6
- Indicative Centre Line of numbered works 4 and 6
- Indicative Centre Line of numbered work 4
- Indicative Centre Line of numbered work 6
- Termination of numbered work 6

N

	Work No.	Brief Description (see Schedule 1 to the Development Consent Order)
	4	Gas Pipeline (part of)
	5	Electrical Connection Compound (a, c - f inclusive) (Maximum Limits of Deviation)
	5	Electrical Connection Compound (b - e inclusive) (Maximum Limits of Deviation)
	5	Electrical Connection Compound (c) (Maximum Limits of Deviation)
	5	Electrical Connection Compound (e) (Maximum Limits of Deviation)
	6	Electrical Cable (part of)
	7	Site Vehicular Access to numbered work 5 and new access from the A140 (Maximum Limits of Deviation)

25 0 25 50 75 100 125 150 175 200
Metres

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Birmingham
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w: www.terraquest.co.uk
e: info@terraquest.co.uk

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London
W1G 0PW

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Title:

Progress Power Limited - Works Plans Figure 1 (Sheet 2 of 2)

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Regulation r5(2)(j) Document Reference: 2.7

Scale:	Date:
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Drawing No:	Revision:
PPL Works Plan Figure 1	revision 1

Approved By:	Checked By:	Drawn By:
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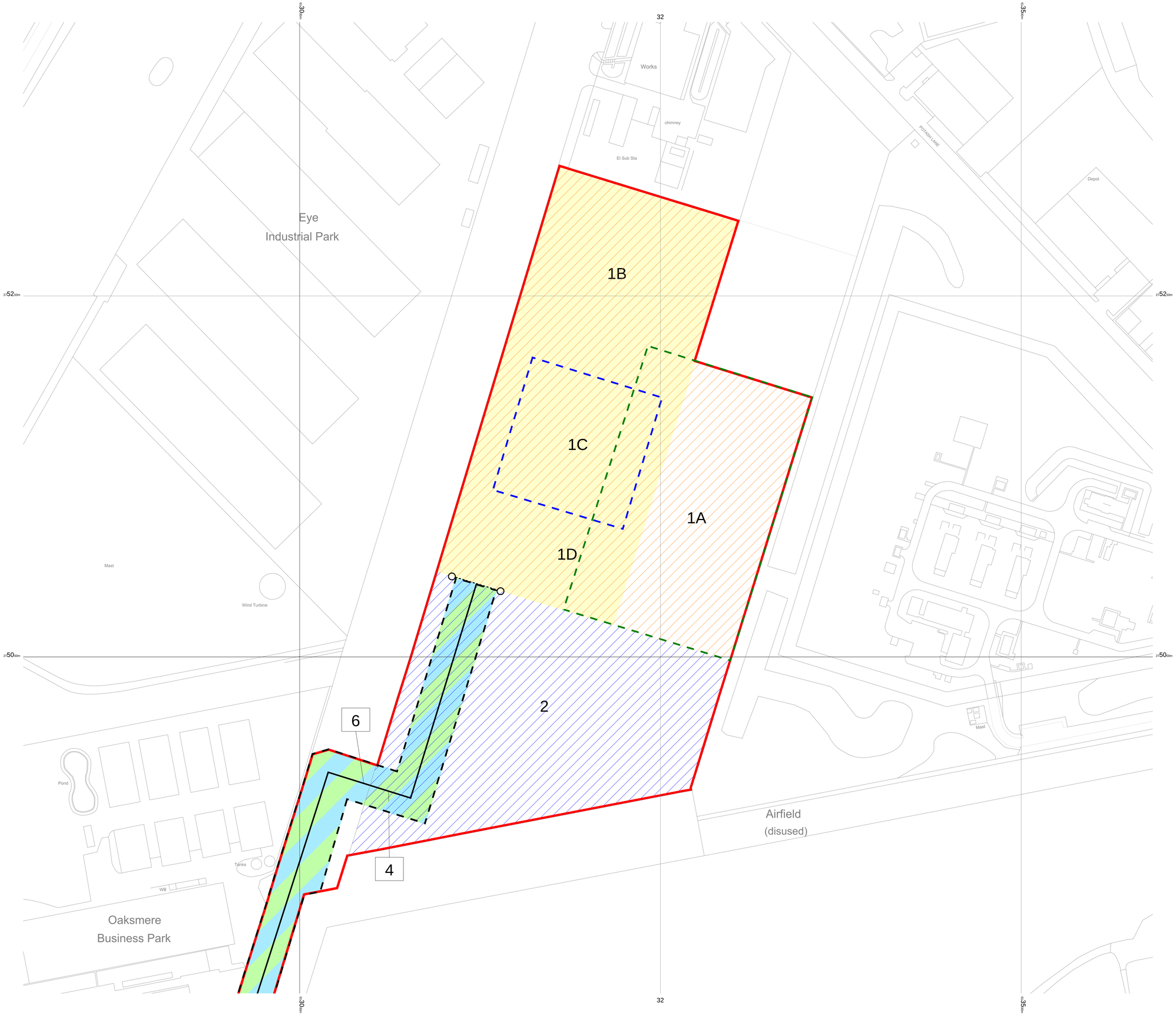

Legend:

- Order limits
- Limits of Deviation of numbered works 4 and 6
- Indicative Centre Line of numbered works 4 and 6
- Commencement of numbered works 4 and 6

	Work No.	Brief Description (see Schedule 1 to the Development Consent Order)
	1A	Power Generation Plant (Maximum Limits of Deviation)
	1B	Power Generation Plant (Maximum Limits of Deviation)
	1C	Power Generation Plant (Maximum Limits of Deviation)
	1D	Power Generation Plant (Maximum Limits of Deviation)
	2	Maintenance Compound
	4	Gas Pipeline (part of)
	6	Electrical Cable (part of)

10 0 10 20 30 40 50 60 70 80 90 100
Metres

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Birmingham
B1 2SL

w: www.terraquest.co.uk
e: info@terraquest.co.uk

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London
W1G 0PW

w: www.progresspower.co.uk

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Title:

Progress Power Limited - Works Plans Figure 2

Showing Numbered Works 1, 2, 4 (part of) and 6 (part of)

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Regulation r5(2)(j)

Document Reference: 2.7

Scale:	Date:
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Drawing No:	**Revision:**
PPL Works Plan Figure 2	revision 1

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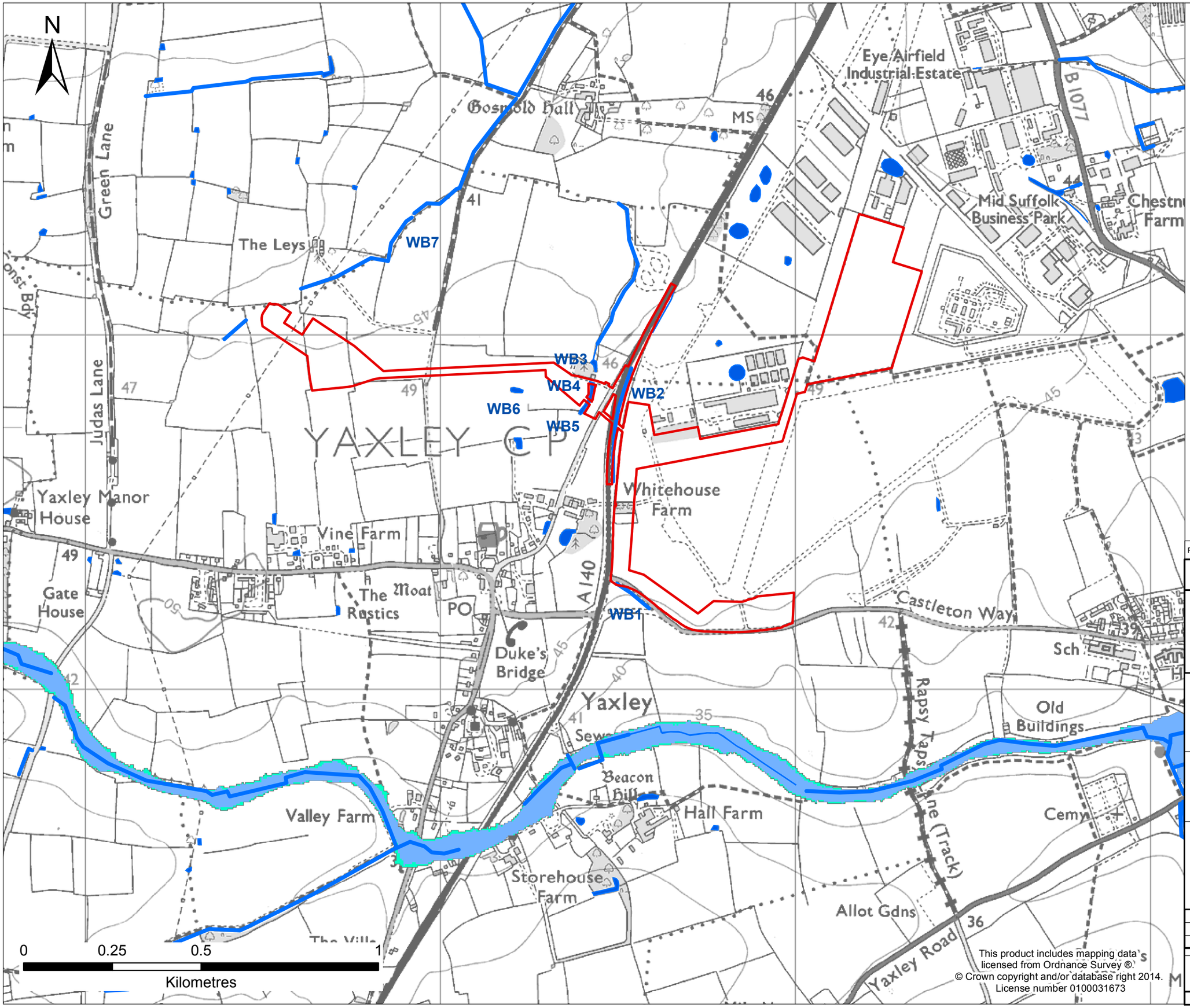
APPENDIX B

WATER CONSTRAINTS MAP



Key

- Project Site
- Watercourses
- Waterbodies
- Flood Zone 3
- Flood Zone 2

Water Body ID	Description
WB1	Carlton Way Highway Drain
WB2	A140 Highway Drain
WB3	Yaxley Fishing Ponds
WB4	Small Pond A
WB5	Field Drain
WB6	Small Pond B
WB7	Watercourse at The Leys

Rev	Date	Description	By	Chk	App

PARSONS BRINCKERHOFF
Queen Victoria House
Redland Hill, Redland
Bristol BS6 6US
Tel: 44-(0)117-9339300
Fax: 44-(0)117-9339250

Client: PROGRESS POWER

Site/Project: Progress Power Project

Title: Waterbodies and Flood Zones

Drawn: JSdS		Checked: AG	
Designed: AG		Approved: AG	
Date: 05/12/2014	Scale: 1:10,000	A3	Sheet:
Project Number:		Drawing Number:	Revision:
3512438B		Figure 9.1	

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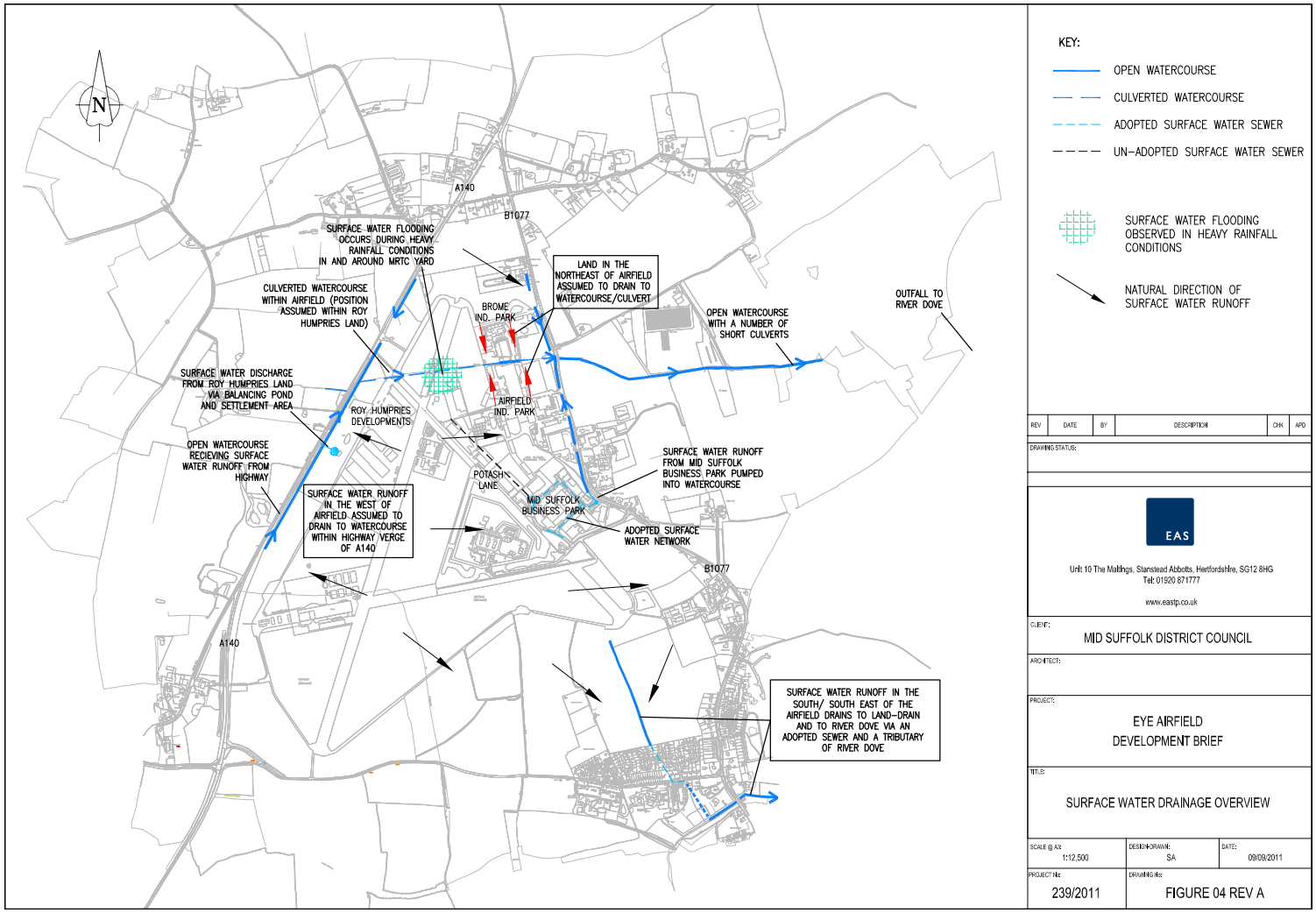
Plot Date: 05/12/2014
Login: leekej

APPENDIX C

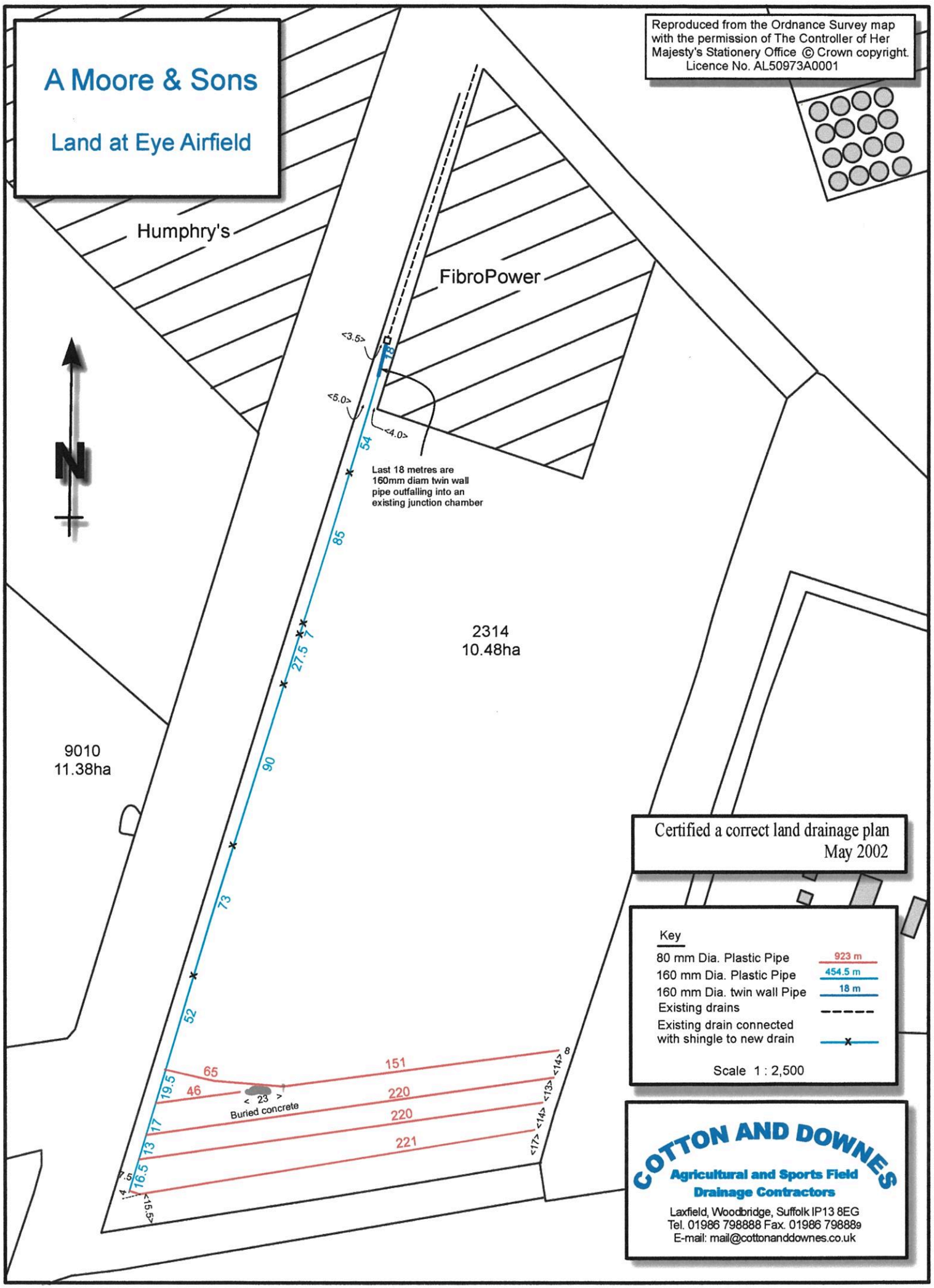
EXISTING DRAINAGE NETWORKS

Appendix A01 Surface Water Drainage



A Moore & Sons

Land at Eye Airfield



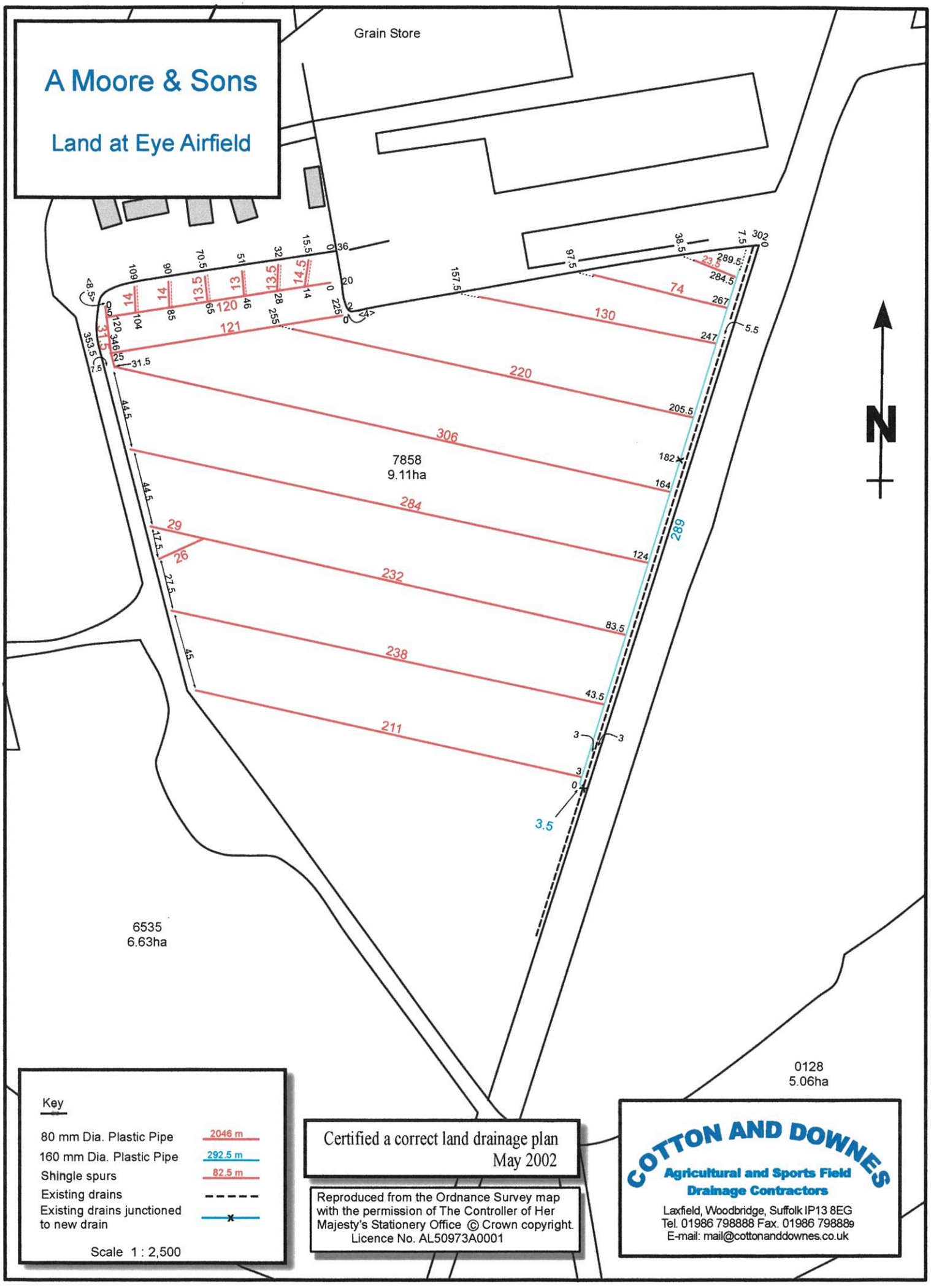
Certified a correct land drainage plan
May 2002

Key

80 mm Dia. Plastic Pipe	923 m
160 mm Dia. Plastic Pipe	454.5 m
160 mm Dia. twin wall Pipe	18 m
Existing drains	
Existing drain connected with shingle to new drain	

Scale 1 : 2,500

COTTON AND DOWNES
Agricultural and Sports Field Drainage Contractors
Laxfield, Woodbridge, Suffolk IP13 8EG
Tel. 01986 798888 Fax. 01986 798889
E-mail: mail@cottonanddownes.co.uk


A Moore & Sons
Land at Eye Airfield
Grain Store
7858
9.11ha
6535
6.63ha
0128
5.06ha
N
Key
80 mm Dia. Plastic Pipe 2046 m
160 mm Dia. Plastic Pipe 292.5 m
Shingle spurs 82.5 m
Existing drains
Existing drains junctioned to new drain
Scale 1 : 2,500
Certified a correct land drainage plan
May 2002
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COTTON AND DOWNES
Agricultural and Sports Field Drainage Contractors
Laxfield, Woodbridge, Suffolk IP13 8EG
Tel. 01986 798888 Fax. 01986 798889
E-mail: mail@cottonanddownes.co.uk