Playford Corner Works

Surface and Foul Water Drainage Management Plan

Requirement 18 (1) to (2) & 22 (1) to (2(a))

(Applicable to Work Numbers 39 and 40)

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1. INTRODUCTION AND SCOPE

1.1. Project Overview

1. East Anglia Three Limited (EATL) was awarded a Development Consent Order (DCO) by the Secretary of State, Department of Business, Energy and Industrial Strategy (DBEIS) on 7 August 2017 for the East Anglia THREE Offshore Windfarm (EA THREE). The DCO granted consent for the development of a 1,200MW offshore windfarm and associated infrastructure and is live until 28 August 2022. The DCO has now been subject to three non-material variations:

- In March 2019 EATL submitted a non-material change application to DBEIS to amend the consent to increase the maximum generating capacity from 1,200MW to 1,400MW and to limit the maximum number of gravity base foundations to 100. In June 2019 DBEIS authorised the proposed change application and issued an Amendments Order.
- In July 2020 EATL submitted a second non-material change application to DBEIS to amend the parameters of its offshore substations (reducing the number of these to one) and wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). On 15 April 2021 DBEIS authorised this proposed change application and issued an Amendments Order.
- In August 2021 EATL submitted a third non-material change application to DBEIS to amend the consent to remove the maximum generating capacity of 1,400MW and to amend the parameters of its wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). The application is currently in the consultation phase.

2. The onshore construction works associated with EA THREE will have a capacity of 1,400MW and transmission connection of 1,320MW. The construction works will be spread across a 37km corridor between the Suffolk coast at Bawdsey and the converter station at Bramford, passing the northern side of Ipswich. As a result of the strategic approach taken, the cables will be pulled through pre-installed ducts laid during the onshore works for East Anglia ONE Offshore Windfarm (EA ONE), thereby substantially reducing the impacts of connecting to the National Grid (NG) at the same location. The infrastructure to be installed for EA THREE, therefore, comprises:

- The landfall site with one associated transition bay location with two transition bays containing the connection between the offshore and onshore cables;
- Two onshore electrical cables (single core);
- Up to 62 jointing bay locations each with up to two jointing bays;
- One onshore converter station, adjacent to the EA ONE Substation;
- Three cables to link the converter station to the National Grid Bramford Substation;
- Up to three onshore fibre optic cables; and
- Landscaping and tree planting around the onshore converter station location.

3. Since the granting of the DCO, the decision has been made that the electrical connection for EA THREE will comprise a high voltage direct current (HVDC) cable rather than a high voltage alternating current cable and, therefore, the type of substation that will be required is a HVDC converter station. The substation will, therefore, be referred to here as a 'converter station' and this amended terminology has been agreed with the relevant authorities on 15 October 2020. It has also been determined that only one converter station will be constructed rather than two and that the converter station will be installed in a single construction phase.

1.2. Purpose and Scope

4. This Surface and Foul Water Drainage Management Plan (SFWDMP) focuses on the procedures for managing the drainage with respect to the Playford Corner Works Stage of the EA THREE construction works. This document has been produced to fulfil DCO Requirement 18 which states:

> **Surface and foul water drainage**
> ***18.-—(****1) No stage of the connection works may commence until for that stage written details of the surface and (if any) foul water drainage system (including means of pollution control) have, after consultation with the relevant drainage authorities, Suffolk County Council and the Environment Agency, been submitted to and approved by the relevant planning authority.*
> *(2) The details agreed in paragraph (1) must accord with the proposals for a surface water and drainage management plan contained in the outline code of construction practice and include a surface water drainage scheme for Work No. 67, which is based on sustainable drainage principles and an assessment of the hydrological and hydrogeological context of the development.*

(3) The surface and foul water drainage system for the relevant stage must be constructed in accordance with the approved details.

5. This document also fulfils part of DCO Requirement 22 which also requires a surface water and drainage management plan:

Code of construction practice
22.- *(1) No stage of the connection works may commence until for that stage a code of construction practice (which must accord with the outline code of construction practice) has been submitted to and approved by the relevant local planning authority, in consultation with the relevant highway authority.*
(2) The code of construction practice must include—
(a) a surface water and drainage management plan;

6. The scope of this document relates to the SFWDMP associated with the construction of the Playford Corner Works. Works in this stage comprise Work No.s 39 and 40 as part of the onshore cable route running from the landfall location at Bawdsey to the Converter Station works located near Bramford, Suffolk (Figure 1 Site Context Plan). SFWDMPs have been produced for each stage of the onshore connection works and are provided under separate cover.

7. The Playford Corner Works will be some of the first works to be undertaken along the cable route. These works have been designated as a stage in their own right to allow the works to commence at this location prior to works commencing along the cable route as a whole (i.e. the main cable works construction phase). The access and Construction Consolidation Site (CCS) will be constructed in Summer 2022 and the jointing bay installation, cable pull through and reinstatement will be undertaken as part of the main cable works construction phase.

8. With respect to Playford Corner Works, it is East Suffolk Council (ESC) who are the relevant planning authority. However, EATL has acknowledged from an early stage that Suffolk County Council (SCC) (as the Lead Local Flood Authority), the East Suffolk Internal Drainage Board, and the Environment Agency are important consultees in the process for the SFWDMP.

9. The purpose of the document is to describe the basis of the drainage scheme and management of water during construction of the works, in order to meet the following objectives:

- To protect surface and groundwater by ensuring that appropriate measures are in place to prevent contaminants from entering the surrounding environment and in particular pathways that might lead to water receptors. The Project Environmental Management Plan (EA3-LDC-CNS-REP-IBR-000010) also deals with controls for hazardous materials;
- To comply with relevant legislation and good practice in terms of managing surface and foul water abstractions and discharges; and
- To maintain and protect private water supplies during construction.

10. The measures contained herein shall be adhered to by the Principal Contractor and the implementation and compliance will be monitored by the Construction Management Team. These measures will only be revised with the agreement of ESC.

11. This plan should be read in conjunction with the Code of Construction Practice (CoCP) (EA3-LDC-CNS-REP-IBR-00047) and in particular the following:

- Project Environmental Management Plan (Appendix 10)
- Pollution Prevention and Emergency Incident Response Plan (Appendix 7)
- Flood Plan (Appendix 2)
- Section 14 Protection of Surface and Groundwater and also Section 14.5 Licences.

12. In addition, a Restoration Plan will be prepared to the approval of ESC in conjunction with SCC as Local Highway Authority, in accordance with Requirement 30 of the DCO. This Plan will set out how land that has been used temporarily for the EA THREE construction works will be reinstated within 12 months of the completion of that stage.

2. ABBREVIATIONS

CBS	Cement Bound Sand
CCS	Construction Consolidation Site
Chapter 8	Guidelines for (Public) Highways signing, lighting and guarding
CoCP	Code of Construction Practice
DBEIS	Department of Business, Energy and Industrial Strategy
DC	Direct Current
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EA ONE	East Anglia ONE
EA THREE	East Anglia THREE
EATL	East Anglia THREE Limited
EnvCoW	Environmental Clerk of Works
ESC	East Suffolk Council
ES	Environmental Statement
GWD	Groundwater Directive (2006/118/EC, including amendments to Annex II detailed under Directive
HVDC	High voltage direct current
LLFA	Lead Local Flood Authorities
MW	Megawatt
NG	National Grid Plc
NPPF	National Planning Policy Framework
PPG	Pollution Prevention Guideline
RPS	Regulatory Position Statement
SCC	Suffolk County Council
SPP	Suffolk SuDS Palette
SuDS	Sustainable Drainage System
WFD	Water Framework Directive (2000/60/EC)

3. CONSTRUCTION DETAILS

3.1. Cable Works – Overview

13. The construction works will be spread across a 37km corridor between the Suffolk coast at Bawdsey and the Converter Station at Bramford, passing the northern side of Ipswich. The cables will be pulled through pre-installed ducts laid during the onshore works for East Anglia ONE. The construction activity within each section along the onshore cable route will be as follows:

- Any minor temporary modifications to the public road network;
- Establish the Construction Consolidation Sites (CCSs);
- Establish accesses to, and temporary haul road to, the jointing bay locations;
- Establish temporary jointing bay compounds;
- Excavate jointing bay pit to locate the existing ducts at each of the compounds;
- Construct jointing bay;
- Transport of cables to site, pull cables through ducts and undertake jointing;
- Topsoil replacement and seeding;
- Remove temporary compounds (jointing bays and CCS); and
- Reinstate all disturbed land and permanent fences and hedges.

14. Some temporary modification of the existing road networks may be required such as localised widening, temporary widening or socketing of street signs and temporary moving of street furniture in order to allow larger vehicles than normal to access the jointing bays. This will be completed prior to the start of the main construction works within relevant sections of the cable corridor route.

15. EATL will require up to seven temporary construction compounds to aid in the construction of the proposed East Anglia THREE project. These have been designated as 'Primary Construction Consolidation Site' (PCCS) and 'Secondary Construction Consolidation Site' (SCCS) depending on their uses. Two PCCS and up to five SCCS will be installed, which will all be temporary and will be removed once construction is complete.

Table 3-1 – Construction Consolidation Site Locations

CCS Type	ID	Address
Secondary	A	Bullen Lane, Bramford, Ipswich, Suffolk IP8
Primary	B	Paper Mill Lane, Claydon, Ipswich, Suffolk IP6 0AP
Secondary	C	Witnesham Road, Ipswich, Suffolk IP6
Secondary	D	Playford Corner, Playford Mount, Ipswich, Suffolk IP6 9DS
Primary	E	Top Street, Martlesham, Suffolk IP12
Secondary	F	Clappits, Woodbridge Road, Newbourne, Woodbridge, Suffolk IP12 4PA
Secondary	G	Park Lane, Ipswich, Suffolk IP10

16. The PCCSs will:

- Form the main point of access onto the linear construction site;
- Provide areas for the storage of materials and equipment;
- House site administration and welfare facilities for the labour resources;
- Form an interchange hub for deliveries of material, equipment and resources; and
- Allow HGVs to park prior to entering the local road network during peak hours.

17. The SCCSs will act as hubs for the delivery of materials, equipment and resources along the route and will enable access to the cable route for construction. They will be of sufficient size to accommodate limited storage of materials, equipment and labour welfare facilities.

18. It is anticipated that 29 jointing bays will be required along the 37km cable route, in addition to a transition bay at the landfall. Each jointing bay will comprise a concrete box 10m long by 3m wide by 1.5m high buried so that the base is 2.5m below ground level. A jointing bay construction compound will be required adjacent to each jointing bay and will have hardstanding areas of up to 900m^2 within the compound which would typically measure 24m x 115m i.e. 2,760m^2.(in accordance with Requirement 12(11) which stipulates that the footprint must not exceed 3,740m^2). The compounds will have hardstanding and accommodate containers, drum trailer movement, parking, and welfare. A typical layout is shown in Figure 2 of the Code of Construction Practice (EA3-LDC-CNS-REP-IBR-000047).

19. Existing accesses and farm tracks will be upgraded and used where possible to access the jointing bay locations. Once these accesses reach the cable corridor, the routes to connect to the jointing bays are referred to as 'haul road'. The length of haul road for the cable route is limited by Requirement 12(12) of the DCO to 18.05km.

20. In addition, the ducts to be used for EA THREE, which were installed during the EA ONE project construction works, will require to be 'proved' to ensure that they are intact and free of debris. This will be undertaken by the use of foam pigs which will be driven under pressure from jointing bay to jointing bay. Each stretch of duct that was installed using Horizontal Direct Drilling (HDD) will, however, require duct-proving excavations at each end of the HDD, to allow the use of different size foam pigs, due to a difference in the diameter of these compared to the ducting installed using open trench techniques.

3.2. Playford Corner Works

21. Playford Corner Works comprise a stage of the onshore connection works and cover Work No.s 39 and 40. The infrastructure within these Work No.s comprises:

- The Playford Corner SCCS (CCS D) in Work No. 40;
- Jointing Bay 12 in Work No. 39;
- Two accesses with the public roads as follows:

- Access AP-X (Work No. 40) southwards from Playford Mount, to access the Playford Corner SCCS and Jointing Bay 12; and
- Access AP-W (Work No.39) eastwards from Holly Lane to access Jointing Bay 13 in Work No 38 (this Jointing Bay is not part of the Playford Corner Works);

- A crossing of Church Road (CR08 and CR09); and
- The access tracks/haul roads required to access Playford Corner SCCS, Jointing Bay 12 and also, in part, Jointing Bay 13 in Work No. 38.

22. These are shown on Figure 2.

3.2.1. Accesses AP-X and AP-W, the Crossing Point, Access Tracks and Haul Roads

23. Playford Corner SCCS will be accessed from Playford Mount using Access AP-X. This access was used for the EA ONE project but was fully reinstated following the EA ONE works, so will need to be constructed again under the EA THREE DCO. From Access AP-X, a new temporary vehicular access track of 360m length and 5.5m width will be used to access the Playford Corner SCCS and also reach the edge of the cable corridor (Work No. 39), where 190m of 5.5m wide haul road will link to Jointing Bay 12 (via a crossing of Church Road). The amount of temporary haul road required to access Jointing Bay 12 will be 190m.

24. Access AP-W will be constructed from Holly Lane, along with 670m of 5.5m wide haul road to reach Jointing Bay 13. This access was not used as part of the EA ONE construction works. 210m of this haul road will be within Work No. 38 and is not part of the Playford Corner Works.

25. A crossing of Church Road (CR08 and CR09) will be required. This will be in the same location as that used for EA ONE.

26. No watercourse crossings will be required for the Playford Corner Works.

27. The construction methodologies associated with the accesses, access track and haul roads are typically as follows:

- Set out the access and track/haul road with the use of Global Positioning Systems (GPS) Real Time Kinematic (RTK) equipment;
- Locate, divert and cap any existing field drains;
- Set out and install drainage features the length of track to be constructed;
- Remove vegetation, then remove and locally store topsoil material over the working width; seeding topsoil if it is to be stored for longer than 6 months;
- Excavate to formation level and store any excess material;
- Under-track drainage will be installed where necessary and in accordance with drainage requirements;
- Place a geotextile onto existing subsoil to improve the bearing capacity of the sub-soil, depending on ground conditions, programme and landowner requirements; and
- Place imported stone in accordance with the design to form the track structure.

3.2.2. Secondary Construction Consolidation Site (Work No. 40)

28. The Playford Corner SCCS will be a hub for the delivery of materials, equipment and resources. The dimensions of the Playford Corner SCCS will be 60m long by 20m wide covering a surface area of 1,200m^2, in accordance with Requirement 12(9)(a) of the DCO which limits the size of each SCCS to 1,200m^2. The Playford Corner SCCS will also be within the area previously used for the EA ONE SCCS in this location.

29. The construction of the SCCSs involves stripping of topsoil, importing and laying stone for the compound base and installing cabins and welfare facilities. Construction of the Playford Corner SCCS will take approximately 3 weeks and the methodology will be as follows:

- The extent of SCCS will be marked out with the use of GPS RTK equipment;
- Any existing field drains will be located, diverted and capped;
- Drainage features will be set out and installed as required;
- Security fencing will be erected around the perimeter of the SCCS;
- Once vegetation has been removed, topsoil material over the SCCS area will be removed and locally stored and seeded if it is to be stored for longer than 6 months;
- Any excess material will be excavated to formation level and stored; and
- Imported stone will be placed in accordance with the design of the SCCS base structure.

30. The SCCS will be constructed first, with the jointing bay and cable pull through occurring at a later date (anticipated in 2024). It is intended that the SCCS will provide an early onsite presence for the onshore cable construction works and will be used as a base for mitigation and survey works being undertaken as well as for the construction team to visit site during the later stages of the planning and design process. It may also be used for stakeholder and other site meetings.

31. The Playford Corner SCCS will remain in situ for the duration of the onshore cable works, prior to being restored as described in Section 3.2.5.

3.2.3. Jointing Bay 12 (Work No. 39)

32. The jointing bay will be located within Work No. 39, 90m to the east of Church Road (Grid Ref 621869, 248384).

33. Once the location of the jointing bay compound has been established (using GPS RTK equipment), creation of the compound will commence with erection of temporary security fencing, removal of topsoil layer and installation of hardstanding areas.

34. The jointing bay will then be excavated to a depth of up to 2.5m with adequate slope batter or shoring on all sides of the excavation to prevent the soil from collapse. The existing ducts will be uncovered and concrete slabs constructed to provide a level working area. Two sump pits will be included to facilitate drainage and dewatering and water will be treated, where necessary, before being discharged. Installation and jointing of the cables will then take place, along with installation of earthing link boxes and fibre optic cable chambers, before area is back filled with subsoil.

35. The creation of the jointing bay compound and excavation of the jointing bay will each take a week.

3.2.4. Cable Installation

36. The electrical transmission cables will be delivered to the Playford Corner SCCS where they will be transferred to the jointing bay compound when needed. The cable drums will comprise abnormal loads and their delivery will be managed as set out in the Traffic Management Plan (EA3-LDC-CNS-REP-IBR-000039). Two cable lengths of approximately 1260m will be required to pull through between each pair of jointing bays. The cable ducts will be proved before the cable is pulled through. Once the cables are received at the jointing bay compound, they will be temporarily stored on the hardstanding area prior to installation in the pre-installed ducts.

37. Installation of the cables into the ducts between Jointing Bay 12 and Jointing Bay 13 (not part of the Playford Corner Works) will begin with a cable pulling system being installed into the bay. A steel bond and winching system with free spinning rollers will be installed along the bottom of the bay. Hydraulic jacks will raise the cable drum off the ground and a winch will be used to pull in cable using a pulling rope. A dynamometer will ensure the maximum pulling tension is not exceeded. Tension on the cable will be reduced using a biodegradable water-based lubricant. This process will be repeated for the second cable being installed in the duct. The cables will then be jointed once 2 cable sections (4 cables) have been installed.

38. It is expected that pulling and jointing operations would take approximately 2.5 weeks, typically spread over a three to four week period, with approximately five workers for each jointing bay. These works will then be repeated to install the cables between Jointing Bays 11 and 12.

3.2.5. Reinstatement

39. Following installation and jointing of the cables, the jointing bay, compound, accesses and haul roads will be reinstated with the stored topsoil and subsoil following trenching. If necessary, the subsoil will be 'ripped' prior to placement if compaction had occurred. Topsoil will be spread in such a way as to ensure that it does not become compacted. The topsoil will then be cultivated and reseeded (if required) and suitable hedgerow species replanted during the first appropriate planting season, in accordance with the Landscape Management Pan (EA3-LDC-CNS-REP-IBR-000042). Temporary fencing around any new planting would be removed once reinstatement was established.

40. The Playford Corner SCCS will remain in situ for the duration of the cable works and will then be removed and reinstated.

4. SITE DETAIL

4.1. Hydrological and Hydrogeological Context

41. Figure 2 provides an overview of the Playford Corner Works site and local water features (based on 1:25,000 scale OS mapping). The site is located approximately 500m northeast of Playford village, its area extending across arable fields and woodland cover with access afforded from Playford Mount to the north. The site was previously used for the construction of an EA ONE CCS, haul road and cable installation works.

42. The ground elevation at Playford Corner Works ranges from 19m AOD to 42m AOD. Higher elevations are situated at the west of the site adjacent to Butts Road, whereafter the gradient gradually declines further east approaching a drainage ditch. To the east of the ditch ground levels rise slightly between Church Road and Holly Road before falling once more to the valley of the River Lark.

43. The drainage ditch flows through the central portion of this site from north to south, draining an upstream catchment estimated at 1.3km^2 including all of the site area. Downstream, the ditch discharges southwards towards the River Fynn. The River Fynn, designated by the Environment Agency as a Main River, is situated 690m south of the site and, at this point, drains an upstream catchment of 27.5km^2.

44. The River Lark, which is designated by the Environment Agency as a Main River, is located 225m east of the site at its closest extent and is the closest main river. This fluvial feature drains an upstream catchment of 38.2km^2 at this point.

45. A number of land drains are present onsite. These were reinstalled as part of the EA ONE construction works.

46. The site is underlain by the Red Crag Formation (Sandstone) and superficial deposits of the Lowestoft Formation – Diamicton (glacial till) lie above this at the site. There are also further superficial deposits of the Kesgrave Catchment Group (Sand and Gravel) and Head – Diamicton located along the drainage ditch running through the site, and at the far east approaching the River Lark.

47. The bedrock (Red Crag Formation) is designated by the Environment Agency as a Principal Aquifer while Kesgrave Group - Sand and Gravel deposits are defined as a Secondary A aquifer. These designations are applied to more permeable units that are likely to be important for water resources and supply of baseflows to local watercourses.

48. The Lowestoft - Diamicton (glacial till) is designated as a Secondary Aquifer (undifferentiated), where large scale utilisation of water for consumption is unlikely due to variable characteristics of the rock. The site is located wholly in a Zone 3 (Total Catchment) Source Protection Zone and lies on the edge of a Zone 1 Source Protection Zone (to the west of Butts Road).

49. There are no licensed or private surface water or groundwater abstractions within the site boundary. There are multiple private abstractions in the vicinity of Playford village to the south of the site, and the village of Bealings to the east. No details of the private abstractions are available, although the abstractions which are not directly adjacent to hydrologic surface water features are likely to be groundwater abstractions. These groundwater abstractions could be utilising groundwater from either the sand and gravels of the Red Crag, or the underlying Chalk. These are considered in more detail in the Playford Corner Hydrogeological Risk Assessment included as Appendix 1.

4.2. Risk of Flooding

50. A Flood Risk Assessment was conducted in 2015 by Royal HaskoningDHV and the findings of this were included in the Environmental Statement (Vol 3 Chapter 21 as Appendix 21.2). Reference was made to the Environment Agency (EA) Flood Zone Map, which was used to identify the flood risk potential along the route of the cable works.

51. The EA Flood Map identifies three categories of Flood Zones, which reflect the risk of an area being affected by flooding from either rivers or the sea, where there are no flood defences. The zones are described as follows:

- Flood Zone 1: land defined as having less than a 1 in 1000 annual probability of flooding from rivers or the sea);
- Flood Zone 2: land having between a 1 in 1000 and a 1 in 100 annual probability of flooding from rivers or between a 1 in 1000 and a 1 in 200 annual probability of flooding from the sea; and
- Flood Zone 3: land having greater than a 1 in 100 annual probability of flooding from rivers or greater than 1 in 200 annual probability from the sea.

52. Based on the EA Flood Zone Map (Figure 21.5 of the ES), the report confirmed that the Playford Corner Works site is located within Flood Zone 1 (i.e. a less than 1 in 1000 year annual probability of flooding from rivers or the sea) and therefore (according to EA criteria) is considered to have a 'Very Low' risk of flooding from these sources. Current UK flood mapping[1] indicates that this remains the case. The site is not in a location that qualifies for Flood Alerts or Flood Warnings from the Environment Agency.

53. The points of access to Playford Corner Works (Playford Mount and Holly Lane) are not located within Environment Agency Flood Zones, nor in areas that receive Flood Alerts or Flood Warnings. Nevertheless, a Flood Plan has been prepared (Appendix 12 of the Code of Construction Practice) and information regarding flood and weather alerts is include in Section 8.5 of this plan.

5. SURFACE AND FOUL WATER DRAINAGE MANAGEMENT PLAN GOVERNANCE

54. Prior to the commencement of construction, an Environmental Clerk of Works (EnvCoW) will be appointed by the Principal Contractor to manage *inter alia* the implementation of the SFWMDP. Contact details for the Principal Contractor's EnvCoW will be submitted to ESC for their records prior to commencement of construction.

55. The EnvCoW will be responsible for ensuring that effective surface water drainage management measures are in place for each relevant stage of construction and ensure that the relevant contractor also has in place a plan and appropriate means to respond to unforeseen events. This forward planning and implementation are critical to the effective management of surface water during construction and is a key lesson learnt from the construction of the East Anglia ONE project.

56. Prior to commencement of construction, the Principal Contractor will also submit details of their Accreditation (e.g. ISO) and Environmental Policies to the relevant stakeholders along with the following details for each key role relating to this plan:

- Role;
- Contact;
- Company Name and Address;
- Contact number and email; and
- Key responsibilities.

6. RELEVANT STANDARDS AND LEGISLATION

57. The Playford Corner Works drainage strategy has been developed in accordance with the following relevant standards and guidance.

6.1. British Standards / Eurocodes

- BS EN 858-1:2002 Separator Systems for Light Liquids (e.g. Oil & Petrol)
- BS 8582:2013 Code of practice for surface water management for development sites

6.2. Legislation and Planning Policy

- The Water Framework Directive (2000/60/EC) (WFD)
- The Groundwater Directive (2006/118/EC, including amendments to Annex II detailed under Directive 2014/80/EU) (GWD)
- The Floods Directive (2007/60/EC)
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 which transposes the WFD and aspects of the GWD into UK legislation
- The Groundwater (England and Wales) Regulations 2009 which implements in England and Wales Article 6 of the GWD which details measures to prevent or limit inputs of pollutants into groundwater The Flood Risk Regulations 2009 transposes the EU Floods Directive into UK legislation and sets out requirements of the Environment Agency and local authorities in preparing assessments and mapping of flood risk for each river basin district in England and Wales
- Flood and Water Management Act 2010 includes provisions for the management of risk in connection with flooding and sets out requirements for Lead Local Flood Authorities (LLFA) in preparing strategies for local flood risk management
- The Land Drainage Act 1991 and 1994
- The Environment Act 1995

[1] https://flood-map-for-planning.service.gov.uk/

- The Environmental Permitting (England and Wales) Regulations 2016 consolidate and replace the Environmental Permitting (England and Wales) Regulations 2010, which have been amended 15 times to date. The 2010 Regulations are still in force and are the main implementing regulations for the environmental permitting regime
- National Planning Policy Framework (NPPF), July 2021
- Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems, March 2015, Department for Environment, Food and Rural Affairs.
- The Water Abstraction and Impounding (Exemptions) Regulations 2017.

6.3. CIRIA Guidance

- CIRIA C532 Control of Water Pollution from Construction Sites (2001)
- CIRIA C502 Environmental Good Practice on Site (2015)
- CIRIA C753 SuDS Manual (Dec 2015)
- CIRIA C762 Environmental Good Practice on Site (4th Edition 2016)
- CIRIA 648 Control of Water Pollution from Linear Construction Projects – Technical Guidance (2006)
- CIRIA 649 Control of Water Pollution from Linear Construction Projects – Site Guide (2006)
- CIRIA SP156 - Control of water pollution from construction sites - guide to good practice, (2002)

6.4. Local Guidance

- Suffolk Coastal and Waveney District, Strategic Flood Risk Assessment, Main Report, February 2008, Scott Wilson on behalf of Suffolk Coastal District Council (now ESC)
- Suffolk Coastal and Waveney District Councils Level 1 Strategic Flood Risk Assessment 2018
- Suffolk Coastal and Waveney District Strategic Flood Risk Assessment, Appendix B – Suffolk Coastal District Council Report January 2009, Scott Wilson on behalf of Suffolk Coastal District Council
- Sustainable Drainage Systems (SuDS) a Local Design Guide, Appendix A to the Suffolk Flood Risk Management Strategy, Suffolk Flood Risk Management Partnership, May 2018
- Suffolk SuDS Palette (SPP) – Guidance, Suffolk County Council

6.5. Design Manual for Roads & Bridges

- Design Manual for Roads & Bridges (DMRB): *CD 529 Design of outfall and culvert details*
- DMRB: CD 522 Drainage of runoff from natural catchments

6.6. Environment Agency Guidance Notes[2]

- Pollution Prevention Guidelines (PPG) General Guide to the Prevention of Water Pollution
- PPG3 Use and Design of Oil Separators in Surface Water Systems
- PPG4 Disposal of Sewage where no Mains Drainage is Available
- PPG5 Works in, or liable to affect Watercourses
- PPG6 Working at construction and demolition sites;
- PPG8 Storage and disposal of used oils;
- PPG20 Dewatering of underground ducts and chambers;
- PPG21 Pollution incident response planning;
- The Environment Agency's approach to groundwater protection (version 1.2 February 2018)
- Pollution Prevention for Business, (DEFRA and Environment Agency) May 2019.

6.7. Regulatory Position Statements

- Treating and using water that contains concrete and silt at construction sites: RPS 235, November 2020
- Temporary dewatering from excavations to surface water, Environment Agency, April 2021.

[2] The Environment Agency no longer provides 'good practice' guidance in the form of PPG and these documents were withdrawn in December 2015. The Environment Agency will be reviewing the validity of the archived documents as part of the government 'smarter guidance' project. While this process is concluded, the archived PPG documents are found at: https://www.gov.uk/government/collections/pollution-prevention-guidance-ppg

7. WATER FRAMEWORK DIRECTIVE

58. It has been agreed with the Environment Agency (14/1021) that a Water Framework Directive (WFD) Assessment is not necessary for the Playford Corner Works due to the mitigation measures outlined in this Surface Water and Drainage Management Plan and also the Code of Construction Practice (EA3-LDC-CNS-REP-IBR-000047).

8. SURFACE WATER DRAINAGE STRATEGY

8.1. Introduction

59. The requirement for a SFWDMP is based on the duty to ensure that surface water quality and quantity is managed throughout the construction process to mitigate impacts off site. It will also play a role in protecting the quality of soils on site by preventing loss of composition and nutrients. Surface water runoff is a risk to the quality of all controlled water bodies and a nuisance to adjacent landowners. Surface water flooding can also delay works activities and become a risk to human health.

60. The impacts of the installation of the EA THREE onshore cables as a whole on surface water have been minimised by the strategic decision to install the ducts for the project as part of the EA ONE construction works. The EA THREE cables will, therefore, be pulled through these pre-installed ducts rather than requiring open trenching across the route. The existing ducts are located underground / below riverbed to minimise potential impacts to flood risk receptors. Furthermore, the locations of the jointing bays are at least 10m from watercourses and at a maximum depth of 2.5m and have been designed to avoid the known area of contamination at Tuddenham St Martin (i.e. Work No. 41). There will, therefore, be no excavations or works within this area. The initial routing of the cable corridor was designed to also avoid mineral extraction areas.

61. A CoCP (EA3-LDC-CNS-REP-IBR-000047) has been prepared and agreed with ESC and SCC and includes best practice measures for the protection of surface waters. A Pollution Prevention and Emergency Incident Response Plan (Appendix 8 to the CoCP) has been prepared and includes a description of the general requirements in place to identify and manage likely sources of pollution from the construction activities. Pollution prevention measures will be implemented in accordance with Environment Agency guidance (see Section 6). Procedures and contingency plans will be put in place at each work site to deal with the clean-up of small spillages and any emergency incidents. Staff will be suitably trained to deal with spillages, including the use of spill kits and other practical measures, to retain any pollution on site. The used spill kits or absorbents will be disposed of off-site at a suitably licenced facility.

62. Detailed evaluation of each section of the works will be undertaken prior to construction works commencing and selection of the most appropriate mitigation measures for each area will be applied. Such evaluation will consider, but not be limited to, extent of work areas, topography of the site, geology and soil conditions, hydrology and surrounding receptors.

63. The construction and environmental management team will call on specialist consultants (i.e. ecologists, hydrologists, ornithologists etc.), as and when necessary, to ensure that construction is being carried out in accordance with the requirements of the Environmental Statement, the Requirements of the DCO, environmental best practice and the approved Method Statements.

64. The workforce will receive “toolbox” talks outlining the aims of the water management strategy and its importance in maintaining a safe working environment and protecting water features along the route.

65. All necessary permits will be obtained by the Principal Contactor prior to commencement of these works. In accordance with the Land Drainage Act 1991 and local byelaws, where required written consent will be sought from the East Suffolk Internal Drainage Board on the final methodology for any temporary or permanent works associated with or any discharge to Ordinary Watercourses within the East Suffolk Internal Drainage District. Written consent from the SCC (the lead Local Flood Authority)) will be obtained for the final methodology for any temporary or permanent works associated with Ordinary Watercourse crossings outside of the East Suffolk Internal Drainage District (pursuant the Land Drainage Act 1991). No such works with respect to ordinary watercourses are, however, currently envisaged for the Playford Corner Works.

8.2. Existing Drainage

66. Existing land drainage systems will be maintained during construction, where possible, and reinstated on completion. Consultation with landowners and occupiers will be undertaken to establish existing drainage arrangements, the location of drains and any other relevant information. Further mitigation will include the use of a specialist, local drainage contractor to undertake surveys to locate drains and create drawings both pre- and post-construction and ensure appropriate reinstatement. Where drains are shallower than

1.5m, temporary culverting or diverting may be employed. Where possible, these will be cut off and capped inside the works area, to prevent silt leaving site and new field drains will be installed on the site boundary. Following construction, field drainage systems and ditches will be fully reinstated where possible in consultation with landowners / occupiers.

67. Where construction operations may impact the wider drainage regime, the work will be undertaken in consultation and agreement with the East Suffolk Internal Drainage Board and/or SCC as relevant. During the construction phase, local drainage will only be interrupted for the shortest possible period and will be reinstated as soon as practicable to minimise any effect on local drainage or soil moisture content.

8.3. Drainage Design

68. Once completed the cable will be a below ground structure and restoration will be undertaken to return the disturbed areas to their greenfield state with all original drainage connections restored. The drainage for the completed works will therefore comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS), specifically paragraphs S2[3] and S4[4], and will achieve Greenfield Runoff Rates for all storms. This will thereby ensure that flood risk is not increased (required as per paragraph 163 of the National Planning Policy Framework).

69. The surface water systems to be used during the construction of the onshore cable works will comprise Option 2 in the SCC Construction Surface Water Management Plan Template i.e. install, use and remove a temporary surface water drainage system. Where works are undertaken in proximity to sensitive receptors (watercourses and built development) this construction drainage will also be specified and implemented in line with the Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS) attenuating flows to the Greenfield Runoff Rates for all event up to the 1 in 100 annual probability storm. Elsewhere (i.e. crossing agricultural fields remote from surface watercourses) construction drainage arrangements will be designed to accommodate and control flows to Greenfield Runoff Rates for all storm up to the 1 in 10 annual probability event. This lower standard reflects both the temporary nature of the works and the minimal consequences of an exceedance event in these areas (i.e. localised ponding in fields).

70. Where appropriate, the principles of SuDS will be applied in order for the surface water discharge from the construction works to mimic natural drainage as far as is practicable. The key principles that influence the planning and design process, therefore, comprise:

- Storing runoff and releasing it slowly (attenuation);
- Allowing water to soak into the ground (infiltration);
- Slowly transporting (conveying) water on the surface;
- Filtering out pollutants; and
- Allowing sediments to settle out by controlling the flow of the water.

71. Prior to undertaking the groundworks for any stage, a Preconstruction Water Management Plan will be developed and implemented to prepare the area of works and to prevent the contamination of both ground and surface water. The Preconstruction Water Management Plan will account for any existing land drainage, hydrological features, ground and surface water. Preconstruction drainage is an essential element in maintaining a suitable working area, reducing the potential for pooling water and preventing contaminated runoff into watercourses.

72. In addition, prior to commencing construction works, a Construction Water Management Plan will be prepared following the SCC Construction Surface Water Management Plan Template and this document will be agreed with ESC and SCC. This Construction Water Management Plan will be implemented during the construction works and will set out the practical steps required to manage drainage. The catchment area(s) for the CCS, jointing bay and access and the watercourse to which the treated water will thereafter be discharged will be identified.

73. Without appropriate controls, the excavation works could provide alternative routes for surface water runoff to follow within the catchment. Drainage systems to be put in place will be designed to prevent any permanent alterations to existing drainage patterns

[3] For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event

[4] Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event

and, at the same time, prevent contamination during temporary rerouting of natural runoff, during construction. The techniques used will be designed to discourage any long-term changes to surface and groundwater movements. Existing drainage systems encountered during excavation, along with natural flow paths, will be fully reinstated, wherever practicable, as the route is progressed (see Section 8.2).

74. As part of the enabling works, shallow ditches will be installed in parallel to and downslope of any excavations and soil bunds to intercept surface water run-off from actively worked / disturbed ground or unconsolidated storage areas. Sumps will be used to collect the runoff from where it can be directed, either by pump or gravity (depending on the topography of the working site), to a settlement basin or water treatment facility (e.g. Siltbuster® unit or similar), where suspended solids will be contained and removed, before the runoff is discharged to a watercourse at Greenfield Runoff Rates (see Section 9.1).

75. The Construction Water Management Plan will identify the location of temporary attenuation ponds of sufficient size for sediment to settle out. This water can be retained for use in construction activities requiring a supply of water such as dust suppression, taking into consideration RPS 235 (Treating and using water that contains concrete and silt at construction sites) and the need to ensure capacity is provided within the surface water drainage system to accommodate future rainfall events. The Construction Water Management Plan will also outline the preferred surface water management strategy and identify the actions, timescales and responsibilities of individuals. The Construction Water Management Plan will identify sensitive receptors at risk from water runoff and the mitigation to be installed.

76. Wherever practical, jointing bays will be backfilled with arisings, in the order they were originally present to minimise alterations to the drainage pattern once construction and restoration have been completed. The reinstatement materials placed within the jointing bay's floor and sides will be at least as erosion-resistant as the original bed material but where appropriate may also be formed from a low- permeability material (e.g. a 'clay plug') to ensure that no preferential drainage pathways are created). Existing ditches and field drains in close proximity to the jointing bay site will be maintained and kept free from potential obstruction.

8.4. Dewatering of Jointing Bay Excavations

77. Jointing bays are reasonably large excavations which often go to a depth below that of the ground water level and therefore can require dewatering. Generally water will be removed from the excavation through the use of a standard surface water pump.

78. The Water Abstraction and Impounding (Exemptions) Regulations 2017 state that no more than 50m^3/day is permitted to be dewatered if within 250m of a well used to supply water for lawful use or within 500m of a nature conservation site. If there is no (legal) well/spring/borehole or conservation site nearby then this can be increased to 100m^3/day. Abstraction under the Exemption conditions is to last less than 6 consecutive months. In the large majority of cases jointing bay excavations will be completed within a period of six months and a discharge rate of 100 m3/d (or 50 m3/d if within 500m of a conservation site or within 250m of a spring, well or borehole used to supply water) will be more than sufficient to keep the excavation dry. In the event that the excavation needs to be kept open and dry for a longer period, or higher rates of dewatering are required, either a separate permit for the works would be sought or works would be rescheduled for the summer when ground conditions are drier.

79. Where needed, sheet piles may be used to minimise groundwater ingress and/or well points may be installed around the excavation to abstract the water from the ground before it could enter the excavation. The requirement for well points/sheet piles will be identified prior to commencing the works using filtration rate data.

80. Where the quality of the water allows, the extracted water will be pumped via soakaways, settling tanks, sediment basins or mobile treatment facilities to remove sediment, before being discharged, if required, into local ditches or drains via temporary interceptor in line with either an approved permit or exemption for discharge to surface waters. Subject to water volumes and the implementation of sufficient measures to remove any suspended solids for example, small volumes of water may be pumped straight to a soakaway within the works area. This process will be implemented in order to prevent increases in fine sediment supply to the watercourses. Treatment of high pH water (due to the presence of Cement Bound Sand) is considered in Section 9.2.

81. It is recognised that the generators required to power the pumps used to dewater excavation can be a source of noise disturbance to nearby residential properties. Construction noise will be controlled in accordance with Best Practicable Means as set out in the Construction Noise and Vibration Management Scheme (EA3-LDC-CNS-REP-IBR-00012). This requires the use of low impact type generators fitted with lined and sealed acoustic covers.

8.5. Flood and Weather Alert

8.5.1. Flood Alert

82. A Flood Plan has been prepared for the construction works and included as Appendix 2 of the CoCP (EA3-LDC-CNS-REP-IBR-000047). The Principal Contractor will sign up to the Environment Agency's flood warning system and the Met Office severe weather warning system. The Flood Plan sets out the actions and responsibilities for the three trigger levels and the all clear as shown in Table 8-1. The contact details of the person(s) responsible for each of these actions (Flood Coordinator and Site Manager) will be submitted to stakeholders for their records prior to commencement of construction.

Table 8-1 Flood Evacuation Procedures

Warning Triggers	General Procedures	Specific Actions
Trigger Level 1	General actions include: • Communicate risk to all staff • Make sure you know who is on site • Take basic measures to prepare for flooding • Stay in a safe place with a means of escape. • Be ready should you need to evacuate.	• Place Staff on Green Alert • Check access and availability to, and condition of equipment: closed road signs, torches (check battery life/spares), high visibility jackets for all staff • Allow for handover should shift change occur before the warning is lowered • Check staff registers are complete and available to ensure all staff are accounted for post- evacuation • Speak to construction teams and request implementation of active measures to reduce the mobilisation fo sediment and other pollutants in storm water runoff. This is likley to take the form of bringing forward basic house keeping measures such a road sweeping and clearance of intercept ditches. • Reschedule (if reasonably possible and will not make situation worse) all engineering works which are liable to generate turbid runoff. This should include all earthworks. • Review active work programme and associated temporary drainage arrangements and confirm that these are all in place and functional. • Undertake survey of all active storm water drainage arranagments to check for damage, blockages or other problems which could impair their correct function and, in the event that defincienciies are identfied, action urgent remedial works.
Trigger Level 2	• Stay away from high risk areas • Turn off gas, electricity and water supplies if safe to do so. • Put flood protection equipment in place if safe to do so. • Cooperate with the emergency services. • Call 999 if you are in immediate danger. • Evacuate site in an orderly and controlled way.	• Stop active work on the site and communicate change in flood status to all staff. • If reasonably possible within a short timeframe (1hr) remove plant and equipment and relocate to elevated area that is away from potential flooding. • Place staff on Red Alert and begin evacuation of jointing bay compound/CCS (Trigger Fire Alarm) • Operate the emergency electrical shut off switches terminating the electricity supply and all power supplies to construction works sites/compounds, but only if safe to do so. • Direct staff toward the flood rendezvous location avoiding any areas that are flooded. • Take register to ensure all staff are accounted for. • Direct all staff to depart the area using the agreed

Warning Triggers	General Procedures	Specific Actions
		flood evacuation route. • Contact the Emergency Services and EA to confirm that the work sites are being closed due to the risk of flooding
Trigger Level 3	• Evacuate site as quickly as can be safely achieved. • Account for all personnel • Leave the area	• Immediately start evacuation of jointing bay compound and CCS if not actioned on receipt of the Flood Warning (Trigger Fire Alarm at compounds) • Direct staff toward the flood rendezvous location avoiding any areas that are flooded. • Take register to ensure all staff are accounted for. • Direct all staff to depart the area using the agreed flood evacuation route. • Contact the Emergency Services and EA to confirm that the work sites are being closed due to the risk of flooding
All Clear	• Be careful. Flood water may still be around for several days. • If you've been flooded, ring your insurance company as soon as possible.	Where the preceeding event related to rainfall or resulted in flood water entering or passing through the site storm water management systems, the Principal Contractor will: • Undertake a survey of all active storm water drainage arranagments to check for damage, blockages or other problems resulting from the storm / flood. • Remedial works should be urgently undertaken on deficient drainage equipment. • Signficiant pollution of any surface waterbody should be reported to the Environment Agency.

9. MITIGATION MEASURES

83. The most common pollutants present in water from a construction site are:

- Sediment (as suspended solids).
- Concrete and cementitious products.
- Hydrocarbons, such as fuel oils and lubricants.
- Pollutants arising from mobilisation of existing contaminated land or groundwater.
- Organic waste (sewage and effluent from welfare facilities).

9.1. Sediment

84. Contamination of surface water runoff is the highest potential risk of pollution during the construction works at Playford Corner. The main source of contamination of the surface water runoff will be sediment. Sediment includes all suspended solids mobilised by the exposure of stored and stripped area of soils to rainfall and are picked up as the surface or groundwater on site flows through, or over, the soil. The impact of excessive amounts of suspended material in a receiving watercourse can have a significant negative impact on the ecology of the stream, smothering the natural fauna and flora.

85. The construction work will be designed to minimise the production of runoff containing elevated levels of suspended solids. The design for achieving this will be refined depending on the local requirements.

86. The measures used for minimising the generation of sediment laden runoff will include a combination of the following measures, with the precise solution varying depending upon the nature and location of the works:-

- On-site retention of sediment will be maximised by routing all drainage through the site drainage systems. Additionally, where required, soil bunds will be created along the edge of the working area to contain any overland flow paths and prevent sediment from being washed outside the working area.
- Containment of heavily silt laden water as near as possible to the source (e.g. silt fencing along toe of soil storage piles or other affected points, addition of filter bags on pump outlets). Additional silt fences will be included in parts of the working area that are in proximity to surface drainage channels to manage water flow and encourage silt settlement.
- Diversion of clean water away from working areas to reduce volumes of dirty water generation. Where significant surface flows are considered possible this will involve the installation of drainage ditches (to divert flows around construction) upgradient of the soil storage areas, running parallel to the trenches and bunds to intercept water that otherwise may flow either into work areas from off-site.
- Appropriate silt traps would be proactively installed where their use is deemed effective to minimise sediment build up within basins or ditches.
- Temporary haul road/access tracks constructed with clean road stone material preventing excessive ground damage from vehicles. Haul road/access tracks to have drainage ditches on either side and also under-track drainage, where necessary and in accordance with the drainage requirements.
- Avoidance of excessive vehicle or plant tracking directly over topsoil stripped areas and the setting of vehicular speeds to minimise soil dispersal. Use of trackmat, or similar, where temporary off-road access is required for excavator or other plant.
- Soil stored locally to excavation to minimise handling and exposure. Soil to be bunded and sealed when stored for prolonged periods in order to shed rainfall and reduce silt laden runoff.
- Covering or seeding of stored topsoil bunds at first opportunity, to reduce surface erosion.
- Strips of undisturbed vegetation will be retained on the edge of the working area where possible.
- Once the topsoil strip has occurred, the construction material will be installed as soon as possible to reduce the area and duration of the exposure to rainfall scour and also ensure the existing drainage patterns are interrupted for the shortest duration possible.
- CCS will generally comprise a permeable crushed stone or aggregate surface laid on a geotextile membrane which will allow direct infiltration of rainfall run-off at the same time as trapping and filtering any sediment and contaminates. Where hard surfacing is considered for utilisation in potentially high risk areas of the construction compound, positive surface water collection systems for the management of rainfall-run-off to prevent the pollution of ground water will be considered where appropriate.
- Early consideration will be given to the types of activities undertaken and materials stored in the laydown area. Any high pollution risk areas will be considered at the outset of the strategy and activities and storage of material in these areas would be restricted.
- All excavated soils will be stored at least 10m from the top of the bank of any watercourse and any potentially contaminated soil will be stored on an impermeable surface and covered to reduce leachate generation and potential migration to surface waters. Procedures for dealing with unexpected contaminated materials are included in Section 11 of the CoCP (EA3-LDC-CNS-REP-IBR-000041).
- Traffic movement would be restricted to minimise the potential for surface disturbance.
- Where systems require a discharge, these will be subject to consultation and in accordance with Environment Agency requirements. Waste silts and sludges will be removed in accordance with Duty of Care requirements.
- The minimisation of excavation volumes and disturbance to the surrounding areas, together with the replacement and reseeding, as required, of any soils inadvertently disturbed during excavations in general accordance with their original structure and location.
- The length of time excavations are kept open will be minimised to reduce the requirement for dewatering; any localised dewatering will have appropriate treatment and disposal applied before being discharged.
- The CCS access will have a wheel wash facility installed to prevent construction vehicles and plant carrying mud off site onto public roads. This will be a closed loop facility with self-contained water and silt collection systems. Collected silts/sludge will be regularly removed and the water topped up to retain function of the wheel wash. Its use, operation and

maintenance will be monitored on site. Regular road-sweeping on the highway will also be undertaken to prevent sediment being washed into nearby watercourses.

87. Ideally the programming of the works will be timed to limit exposure of the subsoil to the most inclement weather, reducing excessive erosion and the generation of suspended solids in the runoff. It will not however be possible to prevent this impact at all times, so appropriate mitigation measures will be in place, as and where appropriate to manage any resultant runoff generated.

88. When removing and working with topsoil or otherwise undertaking major earthworks some disturbance of sediment and generation of sediment laden runoff is inevitable even given the implementation of the control measures outlined above. The exposed subsoil is liable to both surface erosion and erosion via existing land drains, which can lead to silt contaminated water drainage/run-off entering local watercourses.

89. To manage this any potential for the generation of silt laden runoff will be identified and measures put in place to capture and hold these flows upstream of local discharge points. Suitable pollution control measures will then be put in place to ensure all captured flows are treated to a level that can be considered as uncontaminated prior to discharge. If necessary this will involve the use of a Siltbuster® or similar water treatment units. Areas for holding and controlling storm flows will be designed to both assist in the removal of sediment through settlement and in holding and attenuating any excess runoff from compacted ground or areas where vegetation has been removed. Discharge rates from these construction areas will therefore be limited to Greenfield Runoff Rates.

90. To establish the best method of treatment for any particular location, local characteristics including the topography, geology and drainage pathways through the area will be reviewed. Based on this one or a combination of the following options will be employed:

- Pumped to run across flat grassland (grass swathe), discharge to soakaway or an infiltration basin.
- Pumped or drained to an adequately sized settlement lagoon or tank.
- Pass through a silt trap or filtration system.
- Installation of specialist treatment equipment, such as an interceptor or solids separator (e.g. Siltbuster® unit).
- Pumped into a tanker for disposal at a licenced facility or by holding and transferring water to disposal via any of the treatment methods identified above.

9.2. Concrete and Cementitious Products

91. Cement, concrete and grouts are highly alkaline and corrosive and can cause serious pollution to the ground and watercourses. Concrete and cementitious products will, therefore, be prevented from entering the water at source. The construction works will require the delivery of ready mixed concrete for use, for example for use in the jointing bay. Cement polluted water will be generated from concrete washout, concreting operations and any cement grouting. The extent and location of the treatment facilities to be provided will depend on the frequency and volume of washout and the availability on site.

92. Concrete and cement mixing and washing areas will be situated at least 10m away from the nearest watercourse. These will incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment will be undertaken in a contained area.

93. Where a suitable sewer exists, and subject to an appropriate trade effluent consent from the sewerage undertaker, any excess water contaminated with cement would be treated and discharged to sewer. The treatment provided will remove suspended solids in the effluent, using lined settlement basins, enclosed skips or proprietary treatment equipment (Siltbuster® or similar) and will include pH adjustment to an acceptable range. In accordance with, Regulatory Position Statement 235, water that contains concrete will not be discharged to a watercourse or soakaway, even after treatment. If no suitable sewer exists such excess water would be tankered from the site for treatment and disposal at an appropriately licenced facility. Any accumulated solid cement wastes would be removed, in accordance with the Contractor's waste Duty of Care and the requirements of the Site Waste Management Plan (included as Appendix 6 of the CoCP), if necessary, to an appropriately licenced facility for disposal.

94. Dry mix concrete will not be laid in saturated conditions to minimise the potential for leaching of alkaline water. If required in saturated areas the excavation will be dewatered for a sufficient time to lay and cure all concrete. Wet mix pouring will be subject to rigorous controls (shuttering, stand offs, bunding etc) to prevent discharge of cementitious material into drainage features and

watercourses. Where practicable and design allows, the Principal Contractor may utilise a pre cast solution during construction to mitigate any of the concerns with pouring wet concrete.

95. Cement bound sand (CBS) was installed directly around the underground cable ducts and jointing bays during the EA ONE works. Groundwater may travel along the CBS, with potential ingress into the cable ducts. Water from the ducts/CBS may then discharge into the jointing bays during excavation and this is likely to continue throughout the period of time that the jointing bays remain open. When water comes in contact with CBS, the pH can rise to pH 12 or greater because of the release of alkaline hydroxide(OH-) ions and this water will therefore require treatment before discharge. This water will be treated (Siltbuster® or similar)on site before disposal or will be removed to an appropriately licenced offsite treatment facility.

96. Discharge of treated concrete wash water and also chemically treated water from jointing bay excavations into any surface water will require an Environmental Permit from the Environment Agency.

9.3. Fuel Oils and Lubricants

97. Fuel oils, lubricants and other chemicals will be prevented from entering any drain or watercourse on site. There will always be the potential for a small amount of loss of fuel oils, and lubricants on a construction site from the use of plant and equipment and the storage and refuelling locations. However, with the proper management procedures in place, this risk will be minimised and effectively controlled, using best practice.

98. Each task undertaken on site will be subject to the approval of a detailed method statement and risk assessment, which will help to minimise any unacceptable risk of the loss of this type of material. An integral part of the risk assessment also requires the contractor to describe how they will prevent spillage or loss (e.g. refuelling procedures, storage and handling arrangements, and maintenance of plant) and how they will deal with an unexpected loss or spillage and confirm they have the knowledge and capability to do so. The prevention of loss or containment and removal of spilt or lost oil products will include one or more of the following;

- Oil, water and silt separators will be used where applicable on construction compound surface water management systems just prior to any outfall from site, to remove oils and fuels accidentally spilled/accumulated during construction. These will be maintained in accordance with the manufacturer's instructions to ensure they remain efficient. This level of capture and treatment will be applicable to main refuelling areas in the CCS where bulk storage will be contained.
- All fuels, oils, lubricants and other chemicals will be stored in an impermeable bund with at least 110% of the stored capacity. Any facilities installed shall be in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001. Facilities storing hazardous materials will be locked and made secure when not in use. Damaged containers will be removed from site. A register of fuel volumes stored on each site will be maintained.
- All refuelling will take place in a dedicated impermeable area, using a bunded bowser.
- Fuel storage and refuelling will be a minimum of 30m from watercourses.
- Use of oil-absorbent materials to absorb and remove small quantities of oil and provide ready access to the same oil-absorbent materials for use in emergency spillage clean-up.
- Use of drip trays or plant "nappy" pads under plant and equipment when static and during refuelling.
- Safe storage and handling procedures.
- Regular inspection and maintenance procedure for plant and equipment and storage facilities. All oil/fuel bunds should be monitored on a daily basis to ensure that any rainwater that has collected is removed.
- Any contaminated rainwater in the bunds may need to be removed as hazardous waste.
- Removal and suitable licenced disposal of ground accidentally contaminated.
- Biodegradable oils will be used where possible.

9.4. Contaminated Land

99. Excavations through ground in locations that have been subject to previous contamination can result in pollutants, including total and soluble heavy metals, being transferred to the surface water and groundwater. This water can subsequently collect in open excavations during construction and, in some situations, this can present a problem for the discharge of this type of water offsite. Section 11 of the CoCP (EA3-LDC-CNS-REP-IBR-000047) summarises the approach to the encountering of unknown contaminated land.

9.5. Sewage and Organic Waste

100. Whilst it is preferable for sewage generated by site welfare units to be disposed of to a foul sewer, there are currently no foul sewers available at the Playford Corner Works site. Sewage and other foul water from welfare and accommodation units will therefore be discharged to sealed tanks. From these tanks it will be routinely collected by tanker, for disposal at a licenced facility by a suitably licensed and registered waste carrier in accordance with Duty of Care requirements, with details and records maintained in accordance with the Site Waste Management Plan (Appendix 6 of the CoCP (EA3-LDC-CNS-REP-IBR-00028).

10. DISPOSAL OPTIONS AND TEMPORARY OUTFALLS

101. An Environmental Permit is usually required to discharge liquid or waste water (poisonous, noxious or polluting matter, waste matter, or trade or sewage effluent) into surface water, e.g. rivers, streams, estuaries. However, for the temporary discharge of uncontaminated water comprised of runoff from construction activities and excavations to surface water (e.g. pumping clean water out of excavations) a permit is not required, provided the discharge is made in full compliance with the Environment Agency's Regulatory Position Statement (RPS). Under the following circumstances, the Environment Agency considers such a discharge to be low risk and have therefore issued a RPS to provide the appropriate level of control.

102. The RPS guidance 'Temporary dewatering from excavations to surface water, April 2021' covers the discharge of uncontaminated water from excavations and is applicable; provided the discharge complies with all of the following conditions, the discharge must:

- Be temporary and last less than 3 consecutive months (applicable to any one location).
- Be made to a surface water (river, stream or to the sea).
- Not pollute surface water or adversely affect aquatic life, or designated sites or species.
- Not result in the spread of non-native invasive species, parasites or disease.
- Not cause flooding from surface water.
- Not cause erosion of the banks or bed of surface water.
- Not contain any chemical dosing agents or treated or untreated concrete / cementitious washout water.
- Have a method statement that outlines the task and minimises the risk of pollution.

103. There are restrictions to this exemption that will be adhered to when deciding locations that are suitable for discharge from the onshore construction works.

104. No discharge must be located within, or less than 500m upstream of:

- Sites of Special Scientific Interest (SSSI);
- Special Areas of Conservation (SAC);
- Special Protection Areas (SPA);
- Sites in process to become SACs or SPAs ('candidate SACs', 'possible SACs', 'potential SPAs' and 'sites of community importance (SCIs);
- Internationally designated Ramsar sites;
- Other nature conservation sites, (e.g. ancient woodlands, Local and National Nature Reserves); or
- Local wildlife sites (i.e. sites with high local value for wildlife.

105. The RPS guidance 'Treating and using water that contains concrete and silt at construction sites: RPS 235' also includes criteria with respect to storing and treating water containing concrete or silt, including the following prohibitions:

- Storage of more than 30m^3 of water containing concrete or silt at any time in any single location on the construction site
- Carrying out of activities associated with treating or using water that contains concrete or silt within 10m of any watercourse
- Carrying out of activities associated with treating or using water that contains concrete or silt within less than 50m of:
    - SSSIs
    - SACs
    - SPAs
    - candidate SACs, possible SACs, potential SPAs and sites of community importance
    - Ramsar sites
    - other nature conservation sites, such as ancient woodlands and local and national nature reserves

- local wildlife sites
- Use of any water that contains concrete to suppress dust
- Use of more water than necessary to suppress dust
- Use of treated waste water to suppress dust within a groundwater source protection zone, or within 50m of a private drinking water supply
- Use of water from excavations at sites contaminated by oil, metals, hydrocarbons, solvents, pesticides or other polluting substances.

106. The above features have all been identified in the Environmental Statement and none are located within 50m or 500m downstream of the Playford Corner Works. Environmental briefings will be provided all contractors, as part of the site induction and training process. Any particularly important or sensitive sites will be highlighted in pre-construction briefings and tool box talks that will be delivered to those involved in the works.

11. ABSTRACTIONS AND PRIVATE WATER SUPPLIES

107. Figure 2 shows the locations of all current abstraction licences, domestic abstractions and protected rights within 250m of the Playford Corner Works.

11.1. Abstractions

108. No abstraction of water will be undertaken for consumptive use, either for potable use or for use during site activities, such as concrete batching or washing. Potentially in some situations, dewatering of excavations may require permitting. Where these abstractions are temporary (less than 6 months) a permit would be sought if the maximum daily abstraction volume is likely to exceeded 100m^3 (or 50m^3 in locations less than 500m from a designated nature conservation site, or 250m or less from a spring, well or borehole used to supply water). Where these abstractions are not temporary (greater than 6 months) a permit would be sought if the maximum daily abstraction volume is likely to exceed 20m^3. The Principal Contractor will be responsible for obtaining from the Environment Agency any permits and for monitoring and recording associated abstraction rates or other license requirements to demonstrate compliance.

109. Where required however, surface water run-off will be retained for use. This will only occur where runoff from the land is stored isolated from inland waters (i.e. streams, ditches, lakes etc) and groundwater and which can therefore be classified as harvested rainwater under the definition within the Environment Agency's 'Rainwater harvesting: Regulatory Position Statement'. Such usage would not require an abstraction licence.

110. In the event that abstracted water is required for potable supply, this will be undertaken in consultation with the Environmental Protection Team of ESC to facilitate compliance with the Private Water Supplies Regulations 2016.

111. All existing abstractions will continue to be identified prior to construction, and the protection of any potentially affected water supplies will be maintained during construction works. Standard mitigation, where required, will include the development and application of risk management measures, pre and post-construction monitoring surveys of any particularly sensitive water supply (in liaison with the Local Authorities), and the preparation of alternative contingency supply arrangements.

11.2. Protection of Private Water Supplies

112. As noted in Section 4.1, there are no licensed or private surface water or groundwater abstractions within the site boundary. There are multiple private abstractions in the vicinity of Playford village to the south of the site, and the village of Bealings to the east. No details of the private abstractions are available, although the abstractions which are not directly adjacent to hydrologic surface water features are likely to be groundwater abstractions. These groundwater abstractions could be utilising groundwater from either the sand and gravels of the Red Crag, or the underlying Chalk.

113. A Hydrogeological Risk Assessment has been prepared and is included as Appendix 1. The assessment indicates that as the works involve only shallow excavations which are likely to be 5-15m above the regional water table and are unlikely to extend beneath the base of the Diamicton. The presence of the low permeability Diamicton will limit potential groundwater ingress into excavations and protect the aquifer from spillages or accidents. The works will be undertaken in accordance with relevant mitigation which will have been agreed with the Environment Agency, SCC and ESC and with appropriate best practice, which will ensure that there is no adverse impact on groundwater quality and in turn no impact on surface water quality.

114. Baseline water quality sampling will be undertaken with the permission of the landowners and following consultation with ESC. Sampling may be undertaken throughout the works to ensure no negative impacts occur. Sampling results will be provided to ESC subject to permission from the landowner.

115. .Landowners or users of private water supplies or abstractions will be provided with a suitable point of contact through the establishment of a Communications Protocol, should they experience any problems with their Private Water Supply. All complaints will be investigated thoroughly, following the Project Community and Public Relations Procedure. Regular progress updates will be provided to inform residents when works are likely to be undertaken in their Private Water Supply catchment area.

116. An Emergency Plan shall be put in place to ensure prompt response to any complaint of perceived impact on private water supplies, including monitoring of the water supply in question and the immediate cessation of associated water-sensitive construction activities. In the unlikely event that construction works lead to the temporary deterioration of a Private Water Supply, an alternative temporary supply of water will be provided (e.g. water tankered to property and/or provision of temporary drinking water storage tanks). Damaged filters will be replaced in the unlikely event that a Private Water Supply becomes contaminated with sediments.

117. Mitigation and environmental controls will be put in place, as discussed in previous sections, to apply construction best practices and to follow the Environment Agency water pollution control guidelines to protect all aspects of water quality.

118. A Pollution Prevention and Emergency Incident Response Plan (Appendix 7 of the CoCP) will be in place to ensure there will be a prompt and effective response to any complaint that may have a perceived impact on any identified private water supplies, including the immediate cessation of associated water-sensitive construction activities.

119. During the construction phase, measures will be adopted by the Principal Contractor to prevent suspended silts from being carried into existing watercourses. These measures will be based on construction best practice and guidance provided by the Environment Agency and the Construction Industry Research and Information Association (CIRIA) (as set out in Section 9.1).

12. MONITORING AND REPORTING

12.1. Monitoring

120. The implementation and application of the appropriate mitigation measures for the protection of surface or ground water quality, described above, will be monitored by the EnvCoW, throughout the construction phase. If any non-conformity with any of the mitigation measures is identified, it will be recorded during inspection or a site audit and appropriate remedial actions will be implemented. A record of inspections of mitigation measures and any required maintenance will be maintained. Monitoring to include, but not be limited to, noting evidence of silt ingress, bank condition, and pH monitoring.

121. Site location and water sensitivity will be taken into account when determining the appropriate level and frequency of any sampling. Regular site inspections and in field water quality monitoring and assessment will however be undertaken throughout the construction period. The contractor carrying out the construction activities will be responsible for the management and control of all surface water and any other water arising from the activity. Visual checks on water quality will be the most frequent to determine any localised impacts, or to highlight any potential for water quality risks. Inspection findings and site check analysis will be recorded and reported back through construction site management.

12.2. Reporting

122. A baseline water quality report was prepared for the ES, using the data collected in the baseline water quality monitoring programme. This provides details of any contamination concentrations recorded and will be used to describe the “background pollution levels” for the various locations. The results were compared to the most relevant Environmental Quality Standards appropriate and to assess the status according to the Water Framework Directive.

123. Any apparent environmental deterioration observed will be highlighted through ongoing checks and monitoring of water quality. In the event of a pollution incident or suspected deterioration, the incident will be immediately reported to the Environment Agency’s 24/7 incident hotline and also ESC. Relevant monitoring points will be sampled to determine any impacts, in particular any relative to baseline data. A report detailing the findings will be prepared for any incident and recommendations provided for further monitoring and / or requisite mitigation measures.

124. All information recovered during the monitoring process will be collated and a routine assessment made regarding any impact to be reported on the surface and groundwater of the construction activities.

12.3. Personnel

125. All personnel taking samples or analysing and reporting water quality in the field will be suitably qualified. All laboratory analysis will be carried out using a suitably accredited laboratory including written analysis.

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APPENDIX 1 PLAYFORD CORNER HYDROGEOLOGICAL RISK ASSESSMENT

Playford Corner Works

Hydrogeological Risk Assessment

Appendix 1 to the Surface and Foul Water Drainage Management Plan

(Applicable to Work Numbers 39 and 40)

Revision Summary				
Rev	**Date**	**Prepared by**	**Checked by**	**Approved by**
1	12/01/22	Stephen Muggeridge	Phil Rew-Williamson	Gareth Mills
2	19/04/22	Kay Griffin	Phil Rew-Williamson	Gareth Mills

Description of Revisions			
Rev	**Page**	**Section**	**Description**
1	ALL	ALL	New document
2	ALL	ALL	Amendment of Commencement Works to Works Minor changes to site layouts

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1. INTRODUCTION AND SCOPE

1.1. Project Overview

1. East Anglia Three Limited (EATL) was awarded a Development Consent Order (DCO) by the Secretary of State, Department of Business, Energy and Industrial Strategy (DBEIS) on 7 August 2017 for the East Anglia THREE Offshore Windfarm (EA THREE). The DCO granted consent for the development of a 1,200MW offshore windfarm and associated infrastructure and is live until 28 August 2022. The DCO has now been subject to three non-material variations:

- In March 2019 EATL submitted a non-material change application to DBEIS to amend the consent to increase the maximum generating capacity from 1,200MW to 1,400MW and to limit the maximum number of gravity base foundations to 100. In June 2019 DBEIS authorised the proposed change application and issued an Amendments Order.
- In July 2020 EATL submitted a second non-material change application to DBEIS to amend the parameters of its offshore substations (reducing the number of these to one) and wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). On 15 April 2021 DBEIS authorised this proposed change application and issued an Amendments Order.
- In August 2021 EATL submitted a third non-material change application to DBEIS to amend the consent to remove the maximum generating capacity of 1,400MW and to amend the parameters of its wind turbines (a decrease in the number of turbines and an increase in their hub height and rotor radius). The application is currently in the consultation phase.

2. The onshore construction works associated with EA THREE will have a capacity of 1,400MW and transmission connection of 1,320MW. The construction works will be spread across a 37km corridor between the Suffolk coast at Bawdsey and the converter station at Bramford, passing the northern side of Ipswich. As a result of the strategic approach taken, the cables will be pulled through pre-installed ducts laid during the onshore works for East Anglia ONE Offshore Windfarm (EA ONE), thereby substantially reducing the impacts of connecting to the National Grid (NG) at the same location. The infrastructure to be installed for EA THREE, therefore, comprises:

- The landfall site with one associated transition bay location with two transition bays containing the connection between the offshore and onshore cables;
- Two onshore electrical cables (single core);
- Up to 62 jointing bay locations each with up to two jointing bays;
- One onshore converter station, adjacent to the EA ONE Substation;
- Three cables to link the converter station to the National Grid Bramford Substation;
- Up to three onshore fibre optic cables; and
- Landscaping and tree planting around the onshore converter station location.

1.2. Purpose and Scope

3. SLR Consulting Ltd (SLR) has been appointed by EATL to provide a Hydrogeological Risk Assessment (HRA) for the Playford Corner Works for the EA THREE onshore construction works. The works in this stage comprise Work Numbers 39 and 40.

4. The Environment Agency (EA) has requested that an HRA is undertaken before works commence for any groundwater abstractions and groundwater dependent water features (e.g. ponds, springs) within 250m that are vulnerable to adverse impacts in terms of both levels and water quality. In addition, it is noted that the draft pre-commencement requirements for EA ONE North and EA TWO Offshore Windfarms have requested that an HRA is completed prior to commencement of any construction activity that could cause changes to aquifer flow or affect water quality within 500m of any groundwater dependent habitats within ecological sites.

An initial scoping exercise has therefore been completed based on these same search radii on the Playford Corner site, as presented on Figures 4 and 5. These present the locations of all ecological sites, groundwater abstractions and groundwater source protection zones within a 500m radius of the site. The figures indicate that the site is located within groundwater Source Protection Zone 3 (Total Catchment). There are no private or licensed abstractions recorded within 250m radius of the redline boundary although there are several drains which are considered to be potential springs and have been reviewed as part of this HRA. There are no designated ecological sites within a 500m radius of the boundary of the Playford Corner Works.

5. As shown on the plan in Appendix 1, and as set out in Section 3 of the Surface and Foul Water Drainage Management Plan, the infrastructure within the Playford Corner Works will comprise:

- A Secondary Construction Consolidation Site (SCCS) in Work No. 40;
- Jointing Bay 12 in Work No. 39;
- Two accesses with the public roads as follows:
    - Access AX-08 (Work No. 40) southwards from Playford Mount, to access the SCCS and Jointing Bay 12;
    - Access AP-W (Work No.39) eastwards from Holly Lane to access Jointing Bay 13 in Work No 38 (this Jointing Bay is not part of these Playford Corner Works);
- A crossing of Church Road (CR08 and CR09);and
- The access tracks/haul roads required to access the SCCS, Jointing Bay 12 and also, in part, Jointing Bay 13.

6. This HRA has been prepared as an appendix to the Surface and Foul Water Drainage Management Plan for Playford Corner Works and includes a desktop review of the site's baseline geology, hydrogeology and hydrology in order to develop a conceptual site model (CSM). This CSM is then used to assess the potential impact of the works on identified hydrogeological or hydrological receptors and to outline any mitigation which will be required to ensure the works do not adversely impact identified receptors.

2. ABBREVIATIONS

BEIS	Business, Energy and Industrial Strategy
BGS	British Geological Survey
CEMP	Contractor Environmental Management Plan
CCS	Construction Consolidation Site
CSM	Conceptual Site Model
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
ESC	East Suffolk Council
EA THREE	East Anglia Three Offshore Windfarm
EATL	East Anglia Three Limited
GPP	Guidance for Pollution Prevention
HRA	Hydrogeological Risk Assessment
HIA	Hydrogeological Impact Assessment
mAOD	Metres above ordnance datum
mbgl	Metres below ground level
NGR	National Grid Reference
PPG	Pollution Prevention Guidance
SCC	Suffolk County Council
SCCS	Secondary Construction Consolidation Site
SPZ	Groundwater Source Protection Zone

3. METHODOLOGY

7. This HRA has been developed in accordance with relevant EA guidance on completion of groundwater risk assessments[1] and Hydrogeological Impact Appraisals (HIA)[2] and includes the following stages:

- Section 5 provides a baseline assessment of the site. This includes a summary of the site geology and hydrogeology including information on ground conditions, groundwater levels and flows, groundwater quality and the location of potential receptors which could be impacted as a result of construction activities at the site. Finally, a CSM of the current hydrogeological regime is provided.
- Section 6 provides an assessment of the potential impact that the works could have upon the identified receptors and regional hydrogeology and hydrology. Appropriate mitigation measures are outlined where required.
- Section 7 provides a summary of the overall impact that the works could have upon the local hydrogeology and any identified receptors.

8. A qualitative risk assessment methodology has been used to assess the potential significance of impact associated with the development works. Two factors are considered using this approach: the sensitivity of the receiving environment and the magnitude of any potential impact. This approach provides a mechanism for identifying where additional mitigation measures are potentially required to reduce the risk to groundwater or surface water receptors.

4. SOURCES OF INFORMATION

9. The following sources of information have been consulted to characterise the geology, hydrogeology and hydrology of the area within and surrounding the site:

- British Geological Survey (BGS) online maps (https://www.bgs.ac.uk/map-viewers/geoindex-onshore/) for details of geology and borehole logs;
- Hydrogeological map of Southern East Anglia, sourced from the BGS website (https://largeimages.bgs.ac.uk/iip/hydromaps.html?id=southern-east-anglia.jp2);
- National Soils Resource Institute Website for details on soils (https://www.landis.org.uk/soilscapes/);
- Defra Magic Map Website (https://magic.defra.gov.uk/) for details on groundwater classifications, source protection zones and groundwater and surface water dependent designated ecological sites;
- Groundwater and surface water quality and status as presented in the EA catchment planning datasets (https://environment.data.gov.uk/catchment-planning/); and
- Details of the site layout, development, and other site details provided by the client.

5. CONCEPTUAL SITE MODEL

10. The geological and hydrogeological regime of the Playford Corner site and the surrounding area is considered under the following headings: location and topography; geological setting; and hydrogeological setting, all of which have been used to develop a CSM.

5.1. Location and Topography

11. The site, centred on (NGR) TM 21790 48430, extends in a predominately west-east layout for circa. 1.5km. The western part of the site is located c.250m northwards of the village of Playford. The eastern part of the site is c.200m to the north of Little Bealings. The boundary for the Playford Corner Works are typically c.50-75m in width, wider in the vicinity of the Playford Corner SCCS.

12. The Playford Corner Works comprise predominately arable land, with also some limited areas of woodland to the east of jointing bay 12.

[1] Available from Groundwater risk assessment for your environmental permit - GOV.UK (www.gov.uk) [Accessed November 2021]
[2] Environment Agency (April 2007) *Hydrogeological Impact Appraisal for Dewatering Abstractions*, Science Report – SC040020/SR1

13. The regional topography is typified by a series of shallow valleys and plateaus, ground elevations across the plateaus are typically 30-50m Above Ordnance Datum (AOD) and then drop into a series of valleys with ground elevations of c.10mAOD.

14. Elevations across the works area are variable and influenced by a valley which runs in a north-south direction to the east of Jointing Bay 12. From west to east ground elevations range from c.40mAOD at the western end of the access track at access AX-08 sloping in an easterly direction to the Playford Corner SCCS at c.35mAOD and the Jointing Bay 12 at c.25mAOD. The low point of the corridor is reached to the east of Jointing Bay 12 where it crosses an ordinary watercourse at c. 17.5mAOD before ground elevations rise to c.33mAOD along Holly lane and the haul road at Access AP-W. The haul road again drops towards the Valley of the River Lark to an elevation of approximately 20mAOD at its eastern end.

15. The layout of the Playford Corner Works is provided as Appendix 1.

5.2. Geology

5.2.1. Soil, Superficial Deposits and Bedrock Geology

16. The Cranfield Soilscapes online soil map viewer indicates that the soils across the majority of the site comprise of ' slightly acid loamy and clayey soils with impeded drainage'. The only exception is the eastern end of the eastern haul road (from Access AP-W) which is located on freely draining slightly acid sandy soils'.

17. BGS historic borehole logs, as presented in Appendix 2, indicate that topsoil in the area is typically in the region of 0.3 to 0.5m thick.

5.2.2. Superficial Geology

18. A geological map showing the regional superficial geology as plotted on the BGS online mapping service Geoindex Onshore is provided as Figure 1.

19. The BGS Geoindex indicates that superficial deposits in the local area comprise Diamicton of the Lowestoft formation overlying Kesgrave Catchment Sands and Gravels present across the higher ground (above c.20mAOD). These deposits are absent from the valleys with bedrock present at or close to surface in the valley sides and alluvium or head deposits present beneath watercourses.

20. The Lowestoft Formation forms an extensive sheet of chalky till, together with outwash sands and gravels, silts and clays. Diamicton is unsorted to poorly sorted sediment containing particles ranging in size, suspended in a matrix of mud or sand.

21. The underlying Kesgrave Catchment Sands and Gavel are described as cross-bedded and massive, moderately sorted sand and gravel, these deposits primarily underlie the Diamicton regionally but are present at outcrop along valley sides, notably on the western and eastern slopes of the valley that runs to the east of jointing bay 12. This outcrop of sand and gravel extends in a northerly-westerly direction along the valley and is shown to be present at surface immediately north-east of the access road from Access AX-08 but the mapping suggests that none of the works areas are located directly on the sands and gravels.

22. Diamicton of the Lowestoft formation also extends for several kilometres northwards of the site. Southwards a thin band of sand and gravel deposits of the Kesgrave Catchment Subgroup are not mapped as being overlain by Diamicton deposits. South of these sand and gravel deposits, BGS mapping indicates an area void of superficial deposits which is c.150-250m wide before a band of alluvial deposits c.50-200m wide is encountered in the vicinity of the River Fynn. The River Fynn is c.600m south of the site, flowing in a generally easterly direction. Alluvial deposits are predominantly composed of clay and silt.

23. Historic borehole logs compiled from the BGS Geoindex website indicate that the Diamicton clayey superficial deposits underlying much of the site are c.4m thick. The thickness of superficial sand and gravel deposits north of the River Flynn are indicated to be variable; recorded locally between 4-9m in thickness.

5.2.3. Bedrock Geology

24. BGS Geoindex mapping indicates that the site is wholly underlain by sand of the Red Crag Formation. These sand deposits are described as *'coarse-grained, poorly sorted, cross-bedded, abundantly shelly sands'* and extend extensively across the local area. The Red Crag is underlain by Thames Group deposits.

25. In the valleys of the River Flynn to the south and River Lark to the east, clays, silts and sands of the Thames Group are indicated as present at or close to surface by BGS mapping. These deposits are described as *'mainly silty clays and clays, some sandy or gravelly, with some silts, sands, gravels and calcareous mudstones'*.

26. Historic BGS logs (see Appendix 2) indicate that the Red Crag deposits are typically first encountered in the local area at a depth of c.5-6m below ground level. However, locally these deposits are encountered shallower at depths of under a metre. Furthermore, where overlain by sand and gravels of the Kesgrave Catchment Subgroup, the transition into Red Crag sand deposits may not always be well defined.

27. Chalk deposits underly the low permeability Thames Group deposits at depth.

28. Bedrock geology, based on BGS Geoindex mapping, is provided in map format in Figure 2.

5.3. Hydrogeology

5.3.1. Recharge Mechanisms

29. The Met Office climate summary (1991 – 2010) for Levington (52.0118, 1.266), located c.9km south of the site, indicates that the average annual rainfall for the site is 569m.

30. Climate averages for Levington are provided below in Table 5-1.

Table 5-1 Met Office Climate Averages for Levington (1991 – 2010)

Month	Max. Temp. (°C)	Min. Temp. (°C)	Rainfall (mm)	Days of Rainfall ≥ 1mm
January	7.58	2.47	47.12	11.14
February	7.98	2.21	42.05	9.58
March	10.50	3.45	37.29	8.41
April	13.76	4.91	34.78	8.03
May	16.96	8.12	39.21	7.24
June	19.92	10.91	50.51	7.90
July	22.69	13.34	49.26	8.93
August	22.54	13.19	47.93	7.96
September	19.41	11.21	48.68	8.27
October	15.17	8.60	59.87	10.17
November	10.81	5.10	55.45	11.00
December	8.05	2.77	56.75	11.24
Annual	14.65	7.22	568.90	109.87

31. Recharge regionally will be variable depending upon the localised superficial geology. Where Diamicton is present across the majority of the site, recharge will potentially be limited by the often-clayey nature of the deposits, however in the central and eastern parts of the site where sand and gravel deposits are present close to surface, recharge will likely be relatively high.

5.3.2. Aquifer Characteristics and Groundwater Vulnerability

32. The aquifer characteristics and EA aquifer designation of the strata within the immediate vicinity of the works are summarised in Table 5-2.

Table 5-2 Aquifer Designations

Deposit Type	Formation	Aquifer Designation
Superficial	Lowestoft Formation - Diamicton	Secondary (Undifferentiated)

	Lowestoft Formation – Sand & Gravel	Secondary A
	Kesgrave Catchment Subgroup – Sand & Gravel	
	Alluvium – Clay & Silt	
	Head Deposits - Diamicton	Secondary B
Bedrock	Red Crag Formation - Sand	Principal
	Thames Group – Clay, Silt & Sand	Unproductive

33. The various classifications are described by the EA as follows:

- Principal Aquifer: *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.*
- Secondary A Aquifer: *permeable layers that can support local water supplies, and may form an important source of base flow to rivers.*
- Secondary B Aquifer: *lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin fissures and opening or eroded layers.*
- Secondary (undifferentiated): *where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.*
- Unproductive Strata: *strata that are largely unable to provide usable water supplies and are unlikely to have surface water and wetlands ecosystems dependent on them.*

34. As outlined above the site is almost wholly underlain by sand of the Red Crag Formation which is classified as a principal aquifer and is considered to be a significant aquifer which provides both significant abstractions for potable water but also significant baseflow to watercourses. The sands and gravels of the Kesgrave Catchment Subgroup are likely to be capable of bearing water and likely have a degree of hydraulic connectivity with the Red Crag Formation.

35. Diamicton is present beneath all of the works area. These deposits will potentially be variable with some groundwater flow possible within sand and gravel horizons, however the typically clayey nature of the deposits make it unlikely that the deposits will provide significant groundwater supply or baseflow to watercourses. The same applies to head and alluvial deposits.

36. The Thames Group deposits in the vicinity of the River Flynn to the south of the site and at depth beneath the Red Crag are unlikely to provide any significant water sources for abstractions. They are likely to have a significantly low permeability, acting as a limitation on groundwater flow rates.

37. As a result of the overlying very low permeability Thames Group deposits, the regional Chalk aquifer is unlikely to be in direct hydraulic connection with the site.

5.3.3. Groundwater Levels and Flow

38. An extract from the 1981 Hydrogeological map of Southern East Anglia, sourced from the BGS website, is presented as Figure 3 and indicates that the potentiometric surface of groundwater within the Red Crag Formation is typically in the region of 20mAOD in the vicinity of the site. Groundwater strikes within historic boreholes confirms this groundwater potentiometric surface.

39. Groundwater flow direction within the Red Crag Formation is indicated to be in a generally east south-easterly direction and is likely to form springs at the junction between the Red Crag and the underlying Thames Group deposits.

40. The 1981 hydrogeological map also indicates the potentiometric surface of groundwater within the Chalk underlying the site is c.5mAOD, and flowing in a predominately south easterly direction towards the River Deben. Groundwater within the Chalk underlying the site is likely to be in continuity with this river. Groundwater within the chalk is likely to be semi-confined by the overlying low permeability Thames Group deposits and not in continuity with the overlying Red Crag.

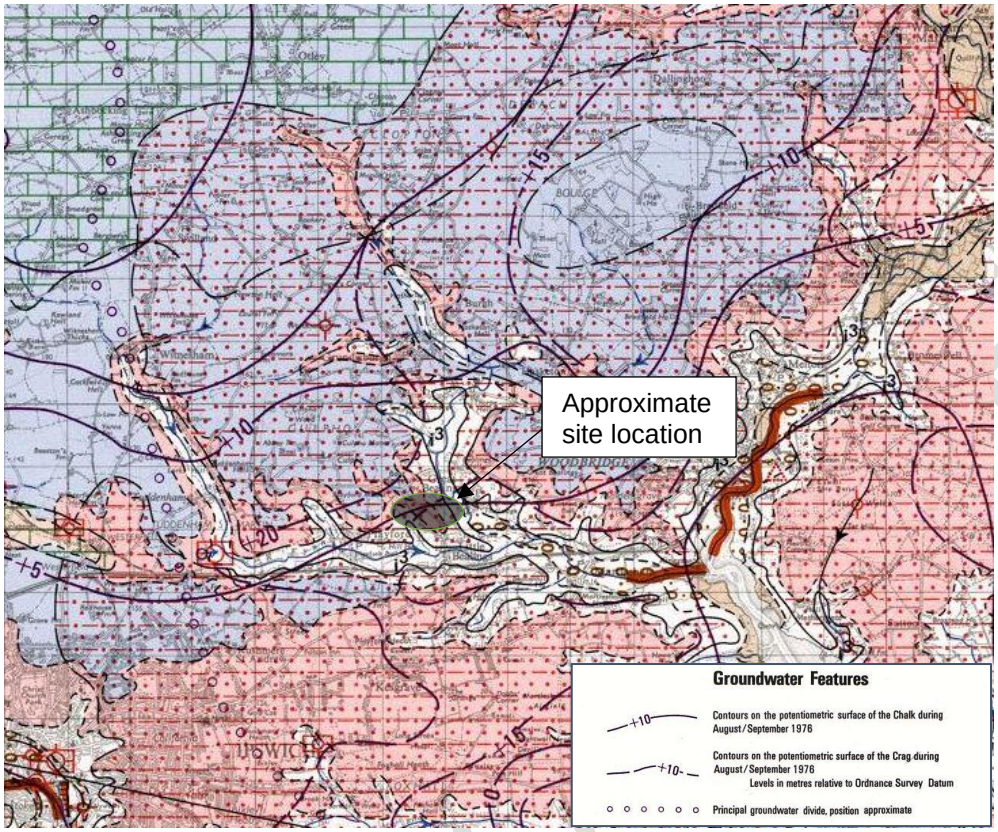

Figure 3 Extract from Regional Hydrogeological Mapping

5.3.4. Groundwater Abstractions and Source Protection Zones

41. Defra's Magic Map website indicates the site is wholly within Zone III of a Groundwater Source Protection Zone (SPZ). Zone II is, however, found in very close proximity to the western boundary of the site.

42. Groundwater SPZ are designated as follows:

- Inner – Zone I
- Outer – Zone II
- Total catchment – Zone III

43. The SPZ along with abstractions are shown on Figure 4.

44. There are no licensed or private surface water or groundwater abstractions within the site boundary. There are multiple private abstractions in the vicinity of Playford village to the south of the site, and the village of Bealings to the east. No details of the private abstractions are available, although the abstractions which are not directly adjacent to hydrologic surface water features are likely to be groundwater abstractions. These groundwater abstractions could be utilising groundwater from either the Red Crag, or the underlying Chalk.

5.3.5. Groundwater Quality

45. With reference to EA catchment planning and assessments, the site is located within the Waveney and East Suffolk Chalk & Crag Groundwater Body. This catchment is 1455km^2 in area.

46. The most recent assessment[3] in 2019 determined that the catchment has 'poor overall status' due to a 'poor' overall quality and quantity status. A list of individual parameters of recent Waveney and East Suffolk Chalk & Crag Water Body classification criteria is presented in Appendix 03. Pollution from poor livestock management is indicated as a source of contaminants.

5.3.6. Hydrology

47. The Playford Corner Works primarily fall within the catchment of an ordinary watercourse which flows in the base of the valley discussed above. This "drain" rises to the west of Playford Grange and flows in a south-easterly direction to its confluence with the River Flynn, 1.2km down-stream. Whilst the OS mapping does not indicate any springs in the vicinity of this watercourse it is noted that it is underlain by Red Crag formation and therefore it is possible that the Crag will provide some baseflow to the watercourse. This watercourse will not be crossed by the works.

48. The River Fynn, designated by the EA as a Main River, is situated c.700m south of the site and flows in an easterly direction, at this point. The river drains an upstream catchment of c.27.5km^2

49. The eastern haul road will fall within the catchment of the River Lark, which is designated by the EA as a Main River. The River Lark is located 225m east of the site at its closest extent. This fluvial feature drains an upstream catchment of 38.2km^2 at this point. The River Lark is underlain by Thames Group deposits and will therefore not be in hydraulic continuity with groundwater beneath the site, although it is possible that some of the drains along the western side of the valley (to the east of the eastern haul road) will be fed from seepages from the Red Crag and overlying superficial sands and gravels.

5.3.7. Surface Water Quality

50. With reference to EA catchment planning and assessments, the site is located within the Fynn Water Body catchment. This catchment is 27.5km^2 in area and relates to a river water body which is found flowing to the south of the site in a predominately easterly direction at its closest point.

51. The most recent assessment in 2019 determined that the Fynn Water Body catchment has 'Poor Ecological Status' but also a chemical status of 'Fail'. The priority hazardous substances of Mercury and Polybrominated Diphenyl Ethers were recorded as failures with respect to 2019 water quality assessments. Physico-Chemical quality was assessed as 'Moderate' overall, with Ammonia and pH recorded as 'High', Phosphate as 'Poor' and Dissolved Oxygen as 'Moderate'. A list of individual parameters of recent Fynn Water Body classification criteria is presented in Appendix 4.

52. The eastern part of the site encroaches upon the catchment area of the Lark Water Body. This catchment is 38.8km^2 in area and relates to a river water body flowing in a southerly direction between Otley and the east of Little Bealings.

53. The most recent assessment in 2019 determined that the Lark Water Body catchment has 'Moderate Ecological Status' and a chemical status of 'Fail'. The priority hazardous substances of Mercury and Polybrominated Diphenyl Ethers were recorded as failures with respect to 2019 water quality assessments. Physico-Chemical quality was assessed as 'Moderate' overall, with Ammonia and pH recorded as 'High', Phosphate as 'Poor' and Dissolved Oxygen as 'Moderate'. Specific Pollutants were also recorded as 'High', due to the 'High' recorded value for Iron. A list of individual parameters of recent Fynn Water Body classification criteria is also presented in Appendix 4.

5.3.8. Water-Dependent Ecological Sites

54. A review of the Natural England Magic Map webpage indicates that there are no water dependent ecological sites within a 500m radius of the site. There is a Site of Special Scientific Interest (SSSI) within a 2km radius of the site, as detailed below in Table 5-3. This site is not considered likely to be hydraulically connected to the development site.

[3] Environment Agency (n.d.) *Catchment Data Explorer*. [online] Available at: https://environment.data.gov.uk/catchment-planning/ [Accessed November 2021].

Table 5-3 Summary of Water-Dependent Ecological Sites within a 2km Radius

Site Name	Designation	Reason for Designation	Distance from Site Boundary	In Hydraulic Connection?
Sinks Valley Kesgrave	SSSI	Various habitats including: • Broadleaved, Mixed and Yew Woodland • Dwarf Shrub Heathland • Fen, Marsh and Swamp Areas	1.75km S	No

5.4. Conceptual Site Model

55. The assessment of the baseline conditions of the site indicates that the site is underlain by extensive high permeability Red Crag sandstone aquifer which will potentially be in hydraulic continuity with overlying superficial sands and gravels. These superficial sands and gravels are typically overlain by lower permeability Diamicton deposits of several metres thickness across the majority of the site including beneath access AX-08, the access track, SCCS and Jointing Bay 12, although it is noted that the diamicton appears to be absent beneath the majority of access AP-W and haul road east of Holly Lane which BGS mapping suggests will be directly underlain by sands and gravels.

56. Groundwater in the underlying Red Crag is considered as the primary receptor, and private abstractions in the local area may be utilising it as a water source, although no abstractions are recorded within 250m of the works area. The Red Crag is also likely to form spring flow along the junction between the Red Crag and low permeability Thames Group in the valley sides.

57. Available groundwater level data indicate groundwater levels in the Red Crag of c.20mAOD and there is therefore an unsaturated zone of between 5m and 15m beneath the works areas which are located at elevations of between 25mAOD and 40mAOD. It is also noted that the low permeability Diamicton overlying the sands and gravels would also confine the groundwater levels in the Red Crag / sands and gravels in the event they rose higher than the base of the Diamicton.

58. There are no main rivers or major surface water features present on the site. A drainage ditch runs southwards through the central valley to the east of Jointing Bay 12 towards the River Fynn. This channel will receive surface runoff from the site and is potentially in a moderate degree of continuity with groundwater from the Red Crag.

59. Water quality assessment indicates that the surrounding groundwater and surface water quality is poor.

60. There are no nearby designated ecological sites that are considered to be in direct hydraulic continuity with the site.

6. HYDROGEOLOGICAL & HYDROLOGICAL IMPACT ASSESSMENT

6.1. Development

61. As shown on the plan in Appendix 1, Playford Corner Works comprise a stage of the onshore connection works and cover Work No.s 39 and 40. The infrastructure within these areas comprises:

- The Playford Corner SCCS in Work No. 40;
- Jointing Bay 12 in Work No. 39;
- Two accesses with the public roads as follows:
  - Access AX-08 (Work No. 40) southwards from Playford Mount, to access the SCCS and Jointing Bay 12;
  - Access AP-W (Work No.39) eastwards from Holly Lane to access Jointing Bay 13 in Work No 38 (this Jointing Bay is not part of these Playford Corner Works);
- A crossing of Church Road (CR08 and CR09);and
- The access tracks/haul roads required to access the SCCS, Jointing Bay 12 and also, in part, Jointing Bay 13.

62. The Playford Corner works are shown in Appendix 1.

63. The deepest excavation would be 2.5m at the jointing bay location. At the SCCS only topsoil will be stripped so that hardstanding can be put down. Topsoil will be stripped for the access track and haul road.

6.2. Assessment of Impact

64. The potential impact of the Playford Corner Works on groundwater and surface water receptors are outlined in Section 6.2.1 using qualitative risk assessment methodology based on the sensitivity of the receptor and likelihood of impact occurring. Impacts assessed as moderate or high are considered to require further mitigation.

6.2.1. Potential Effects

65. Without appropriate design and controls, construction of the works theoretically has the potential to impair local hydrology (water quality) and hydrogeology (groundwater levels, flow and quality), such as:

- The use of machinery and the movement of soils has the potential to generate suspended solids in run-off and/or introduce oils or hydrocarbons to the water environment;
- Existing groundwater flow paths could be disturbed or altered, impacting on nearby groundwater abstractions.

66. Standard construction techniques and best practices are to be used to avoid or reduce these potential impacts. Details are given in the following section.

6.2.2. Embedded Mitigation

67. Best practice construction techniques and procedures that have been developed through a series of management plans for approval by the EA, East Suffolk Council (ESC) and Suffolk County Council (SCC), in accordance with the requirements of the DCO. These include:

- Playford Corner Works Surface Water and Drainage Management Plan (EA3-LDC-CNS-REP-IBR-000037)
- Playford Corner Works Code of Construction Practice (EA3-LDC-CNS-REP-IBR-000047) including:
  - Pollution Prevention and Emergency Incident Response Plan; and
  - Project Environmental Management Plan.

68. The construction works will also be undertaken in accordance with good practice guidance within the following documents:

- CIRIA SP156 Control of Water Pollution from Construction Sites - Guide to Good Practice, 2002;
- CIRIA C502 Environmental Good Practice on Site C741, CIRIA 2015;

69. The Pollution Prevention Guidelines (PPGs) (which are progressively being replaced with Guidance for Pollution Prevention (GPPs)) provide environmental good practice for the whole of the UK and relevant PPGs/GPPs will be followed, including:

- GPP01: Understanding your environmental responsibilities – good environmental practices (Oct 2020)
- GPP02: Above Ground Oil Storage Tanks (Jan 2018);
- GPP04: Treatment and Disposal of wastewater where there is no connection to the public sewer (Nov 2017);
- PPG6: Working at construction and demolition sites (2012);
- GPP08: Safe storage and disposal of used oils (July 2017);
- GPP13: Vehicle Washing and Cleansing (April 2017);
- PPG18: Managing fire water and major spillages (June 2000);
- GPP21: Pollution incident response planning (June 2021);
- GPP22: Dealing with Spills (Oct 2018);

6.2.3. Impact upon Groundwater Levels and Flow Regimes

70. There will be no excavations deeper than 2.5m and the development of the SCCS will not require any excavation other than site levelling and removal of topsoil. The only below ground level excavation required is at Jointing Bay 12 which will require an excavation of up to 2.5m.

71. The superficial mapping indicates that the superficial deposits in the vicinity of Jointing Bay 12 comprises Diamicton overlying sands and gravels. A BGS log (TM24NW8) located adjacent to Church Road, just west of the jointing bay, indicates that the Diamicton is approximately 4.3m in thickness at this location and therefore the excavation is unlikely to extend beneath the Diamicton. The excavation works are therefore unlikely to directly impact any groundwater bearing strata (superficial sands and gravels or Red Crag bedrock). It is also noted that the regional groundwater table is located at approximately 20mAOD and is therefore also likely to be below the base of the excavation.

72. It is noted that there is uncertainty as to the exact water table within the Red Crag and overlying superficial sands and gravels. There is the potential for groundwater levels to be higher than indicated on the hydrogeological mapping or for shallow perched groundwater within the superficial deposits and therefore encountering groundwater cannot be ruled out.

73. In the event that shallow groundwater is encountered within the excavations, these will be dewatered and discharged back to ground, following treatment if necessary. Given the lack of any nearby abstractions, springs or designated ecological sites, the potential impact on groundwater levels and flows is assessed as **'negligible'** to **'low'** and no further mitigation is required.

6.2.4. Impact upon Surface Water Flow Regime

74. As outlined above, the potential impact on groundwater flows is assessed as negligible to low and therefore there will be no material change to any base flow to the nearby watercourses or any nearby springs.

6.2.5. Impact on Groundwater Quality

75. The construction works at the site will inevitably give rise to suspended solids which if not managed could pollute surface waters and groundwaters. The construction works will also involve the use of mobile plant which could give rise to fuel spills which could potentially contaminate surface waters and groundwaters.

76. The SCCS, jointing bay, accesses, access tracks and haul roads construction will be undertaken in accordance with the management plans outlined in Section 6.2.2 which provide details of how construction will be completed in an environmentally safe manner and minimise the potential for spillages.

77. Best practice techniques will be incorporated within the management procedures for construction activities onsite in order to protect the water environment from pollution incidents. Key mitigation measures, as set out in the management plans, can be summarised as follows:

- during operation there will be heavy machinery required onsite and, as a result, it is appropriate to adopt best working practices and measures to protect the water environment, including those set out in the EA's Guidance for Pollution Prevention (GPP1);
- in accordance with GPP2 all above ground onsite fuel and chemical storage will be bunded;
- an emergency spill response kit will be maintained onsite;
- a vehicle management system will be put in place wherever necessary to reduce the potential conflicts between vehicles and thereby reduce the risk of collision;
- a speed limit will be imposed on site to reduce the likelihood and significance of any collisions;
- in accordance with GPP5 the amount of time stripped ground and soil stockpiles being exposed will be minimised and vegetation will only be removed from the area that needs to be exposed in the near future.
- plant and wheel washing will be carried out in a designated area of hard standing at least 10 metres from any watercourse or surface water drain or rock outcrop (hard rock at surface).

78. It is also noted that, in the west of the site (beneath Access AX-08, the access track, SCCS , haul road and jointing bay) the aquifer is overlain by low permeability Diamicton deposits which, due to their low permeability and clayey nature, would provide additional attenuation prior to discharging into the aquifer in the unlikely event of pollution occurring.

79. Given the embedded mitigation in place, the potential risk during construction to groundwater quality or surface water quality of any down-stream watercourses in hydraulic continuity with the Red Crag Formation is assessed as **'negligible'** to **'low'**.

80. This potential risk assessment applies also to the outer (Zone II) and inner (Zone I) Groundwater Source Protection Zones in close proximity to the west of the site.

81. No additional mitigation beyond that outlined above is considered necessary.

6.2.6. Impact upon Ecological Sites

82. As outlined within Section 5.3.8, there are not considered to be any designated ecological sites which could be considered a potential receptor.

7. CONCLUSION

83. A hydrogeological and hydrological impact assessment has been undertaken to assess the potential impact upon the local hydrogeological and hydrological regime of the Playford Corner Works.

84. Groundwater within the underlying Red Crag principal aquifer will act as a potential receptor for any adverse impact from the works, this will also potentially be in hydraulic continuity with the overlying superficial sands and gravels. Whilst this is a potential receptor, it is noted that there are no recorded private or licensed abstractions within a 250m radius of the site. It is also noted that most of the site is separated from the underlying aquifer by the presence of c.4m thick low permeability Diamicton deposits at the surface.

85. The ordinary watercourse running through the site potentially receives some baseflow or spring flow from the Red Crag and is therefore considered a secondary receptor. The River Fynn and River Lark south and east of the site are not considered potential receptors as they are not in hydraulic continuity with the Red Crag.

86. There are no water dependent ecological sites within a 2km radius of the site.

87. An assessment of the potential impact of the works on groundwater levels, groundwater quality, surface water flows and surface water quality has been undertaken. The assessment indicates that as the works involve only shallow excavations which are likely to be 5-15m above the regional water table and are unlikely to extend beneath the base of the Diamicton. The presence of the low permeability Diamicton will limit potential groundwater ingress into excavations and protect the aquifer from spillages or accidents.

88. The works will be undertaken in accordance with relevant management plans which will have been agreed with the EA, SCC and ESC and with appropriate best practice, this embedded mitigation will ensure that there is no adverse impact on groundwater quality and in turn no impact on surface water quality.

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APPENDIX 1 INDICATIVE LAYOUT

621500 622000 622500 623000

249000 248500 248000

Access AP-X

Playford Corner SCCS

Crossing Point CR-8

Crossing Point CR-9

Jointing Bay 12

Access AP-W

Track

GP

ROAD

Boot Street

Path (um)

CHURCH ROAD

HOLLY LANE

THE

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

Works No.s Overview

Abbey Farm
Culpho
Hill Farm
Great Bealings
Farrows End
Clematis Cottage
Boot Street
39
40
Playford
Little Bealings

EA THREE DCO Corridor
Secondary Construction Consolidation Site
Jointing Bay Compound
Top Soil
Access Track
Haul Road
EA THREE Existing Cable Ducts
EA ONE Existing Cable Ducts

Works No.s
39
40

Rev	Date	By	Comment
B	05/04/2022	PW	Second Issue
A	31/03/2022	JRS	First Issue

Original A3 Plot Scale 1:5,000

0 100 200 Metres

Playford Corner Works Stage

Site Context Plan

Drg No	05356.00006.12.0021.1 Site Context Plan
Rev	2
Date	05/04/2022
Layout	N/A

Document Path: P:\05356 - GoBe Consultants Ltd\00006 East Anglia Three\Tech\GIS\Dwgs\Wking\EA3\Onshore Substation\ONCS and Commencement Master\5356.00006.12.0021.1 Works Site Context.mxd

APPENDIX 2 HISTORIC BGS BOREHOLE LOGS

BGS BOREHOLE REFERENCE: TM24NW2

Easting: 620770
Northing: 248730
Date: 1969
Length: 10.80m

TM 24 NW 2 2077 4873 Culpho, East Suffolk

Surface (+ 31.4 m) + 103 ft
Water struck at (24.7 m) + 81 ft
Wirth B1, 6 inch diameter
February 1969

Overburden (0.3 m) 1 ft
Mineral (10.4 m) 34 ft
Bedrock (0.1 m +) 0.5 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil.	(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Sand. Dark brown sand with clay.	(0.9)	3	(1.2)	4
		Yellow brown sand with occasional flint pebbles.	(2.9)	9.5	(4.1)	13.5
Red Crag	(b)	Sand. Red brown sand with iron concretions changing to dark chocolate to red brown sand at (5.8 m) 19 ft.	(4.0)	13	(8.0)	26.5
		Red brown sand with shell fragments and occasional black pebbles.	(2.6)	8.5	(10.7)	35
London Clay		Blue clay.	(0.1+)	0.5+	(10.8)	35.5

				%	Depth below surface (ft)	Fines −1/16	Percentages Sand +1/16−1/4	Sand +1/4−1	Sand +1−4	Gravel +4−16	Gravel +16
(a)	Gravel 3%	+16 mm	:	1	1 - 4	14	39	36	3	3	5
		−16 +4	:	2	4 - 7	9	31	55	4	1	0
					7 - 10	8	23	67	1	1	0
	Sand 89%	−4 +1	:	3	10 - 13	3	24	70	2	1	0
		−1 +1/4	:	57							
		−1/4 +1/16	:	29							
	Fines 8%	−1/16	:	8							
(b)	Gravel 1%	+16 mm	:	0	13 - 16	8	55	35	1	1	0
		−16 +4	:	1	16 - 19	5	39	54	1	1	0
					19 - 22	6	16	76	1	1	0
	Sand 94%	−4 +1	:	5	22 - 25	4	47	48	1	0	0
		−1 +1/4	:	51	25 - 28	3	39	53	4	1	0
		−1/4 +1/16	:	38	28 - 31	6	31	48	13	2	0
					31 - 35	7	36	44	11	2	0
	Fines 5%	−1/16	:	5							

Institute of Geological Sciences
Mineral Assessment Unit
Sand and Gravel Survey

BOREHOLE RECORD SHEET

Borehole Reg. No.: TM.24 NW 2
Temporary designation:
Nat. Grid Ref.: 20774873
Locality: Culpho, East Suffolk.
Date: Feb. 1969.
Recorded by: S.E. Hollyer.

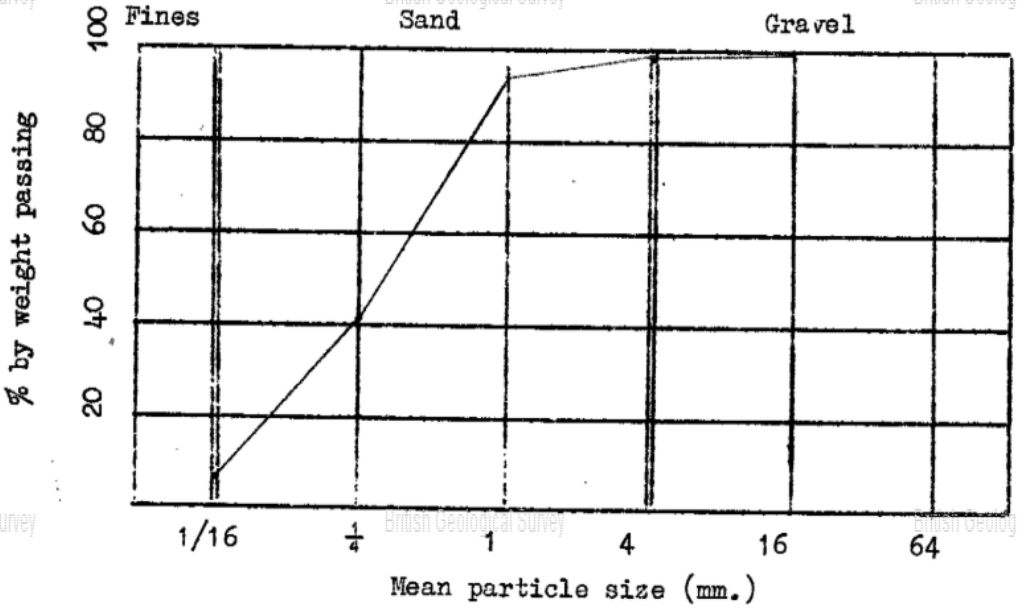
Drilled by: Elmat Ltd
Drill Type: Wilke B1.
Hole diameter: 6½"
Ground level (O.D.): ~~103~~
Water struck at (O.D.): ~~81~~

Horizon	Thickn. m	Thickn. ft.	Nature
Overburden	0·3	1'	Top soil
Mineral	3·8	12'6"	Glacial S-G.
Baserock	6·7	22'6"	Crag S-G.
	0·1		London Clay just touched.

Remarks: Water struck at 22'

Grading Curve (from Sampling Analysis Sheet)

Grading percentages:	Fines	Sand	Gravel
	7	91	2



Description of Strata	Depth to base ft.	Thickn. ft.	Sample Nos.
GLACIAL S-G. Top Soil	1	1	
Fine dark brown sand with clay (50%)	4	3	(1P797)
Med. yellow/brown sand with occ. flint pebble	7	3	(1P798)
Fine to med yellow/brown sand, no pebbles	13'6"	6'6"	(1P799) to (1P801)
Fine red/brown sand with occ. iron concretions	19	5'6"	(1P801) - (1P802)
Med sand, dark chocolate brown.	22'6"	3'6"	(1P803) to (1P804)
CRAG S-G. Med to coarse red/brown sand.	26'6"	4'	(1P804) - (1P805)
Med to coarse red/brown shelly sand with occasional black pebbles. Shells up to 40%	35	8'6"	(1P805) to (1P807)
London Clay (blue)	Just touched. (6")		

BGS BOREHOLE REFERENCE: TM24NW8

Easting: 621790
Northing: 248430
Date: 1969
Length: 21.60m

TM 24 NW 8 2179 4843 Playford, Suffolk

Surface (+ 39.3 m) + 129 ft
Water struck at (+ 20.1 m) + 66 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (4.6 m) 15 ft
Mineral (16.4 m) 54 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
Boulder Clay		Brown weathered clay with abundant chalk pebbles.	(4.3)	14	(4.6)	15
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium yellow-green sand with irregular flint and subrounded quartzite gravel.	(4.3)	14	(8.9)	29
Chillesford Beds	(b)	Sand. Fine sand with silt, pale green.	(3.0)	10	(11.9)	39
Red Crag	(c)	Sand. Medium sand becoming finer at depth. Ochreous red to yellow-red (0.9 m) 3 ft shell band at (14.9 m) 49 ft. Bottom (1.5 m) 5 ft rather silty.	(5.5)	18	(17.4)	57
		Fine to medium sand, some silt and comminuted shells.	(3.6)	12	(21.0)	69
London Clay		Blue-grey clay.	(0.6+)	2+	(21.6)	71

				%
(a)	Gravel	8%	+16 mm :	4
			−16 +4 :	4
	Sand	86%	−4 +1 :	2
			−1 +¼ :	45
			−¼ +1/16 :	39
	Fines	6%	−1/16 :	6
(b)	Gravel	2%	+16 mm :	1
			−16 +4 :	1
	Sand	94%	−4 +1 :	2
			−1 +¼ :	34
			−¼ +1/16 :	58
	Fines	4%	−1/16 :	4
(c)	Gravel	1%	+16 mm :	0
			−16 +4 :	1
	Sand	90%	−4 +1 :	5
			−1 +¼ :	44
			−¼ +1/16 :	41
	Fines	9%	−1/16 :	9

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
15 - 18	8	21	37	6	13	15
18 - 21	4	26	66	2	2	0
21 - 24	7	47	36	3	4	3
24 - 27	7	46	46	1	0	0
27 - 30	6	53	40	0	1	0
30 - 33	4	61	33	1	1	0
33 - 36	2	86	11	0	1	0
36 - 39	6	28	60	4	0	2
39 - 42	5	19	73	2	1	0
42 - 45	6	31	58	4	1	0
45 - 48	6	33	54	4	1	2
48 - 51	5	33	55	3	1	3
51 - 54	18	60	20	1	1	0
54 - 57	16	68	15	0	1	0
57 - 60	16	57	24	2	0	1
60 - 63	8	35	50	7	0	0
63 - 66	7	41	39	12	1	0
66 - 69	8	29	50	12	1	0

Institute of Geological Sciences

Mineral Assessment Unit

Sand and Gravel Survey

BOREHOLE RECORD SHEET

Borehole Reg. No.: TM24 NW/8

Temporary designation: None.

Nat. Grid Ref.: 2179 4843

Locality: Playford, nr Ipswich

Date: March 1st 1969

Recorded by: R. Allender

Drilled by: Elmat Ltd.

Drill Type: Wirth B1

Hole diameter: 6½"

Ground level (O.D.): 129

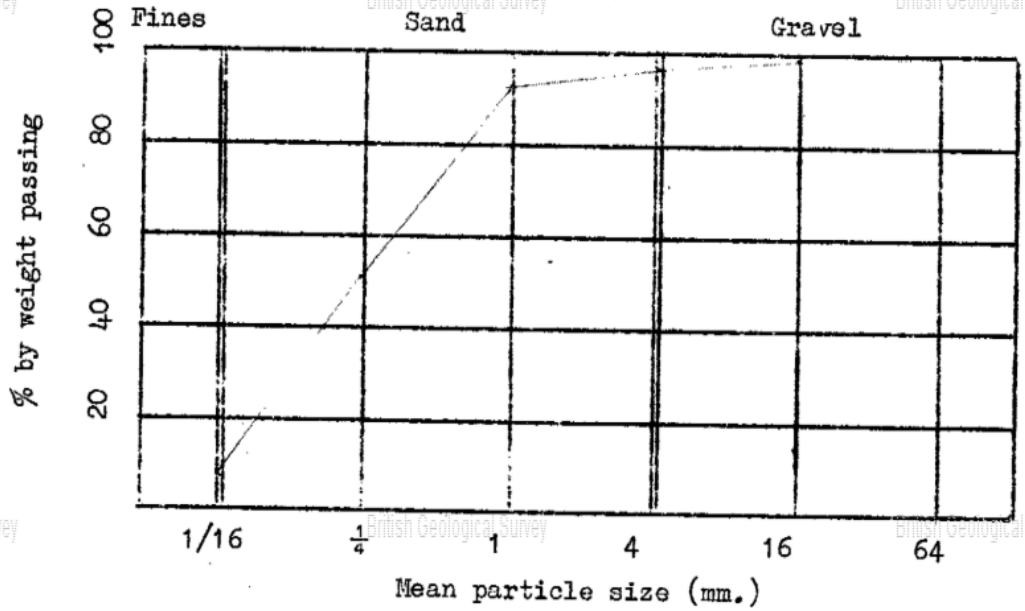
Water struck at (O.D.): 66

Horizon	Thickn. m	Thickn. ft.	Nature
Overburden	4.6	15	Chalky Boulder Clay + TS
Mineral	4.3	14	G.S.G. (Shelly sand Beds)
Baserock	3.0	10	Red Crag
	9.1	30	
	0.6	2+	London Clay

Remarks Water 63' below surface.

Grading Curve (from Sampling Analysis Sheet)

Grading percentages:	Fines	Sand	Gravel
	8	89	3



Description of Strata	Depth to base ft.	Thickn. ft.	Sample Nos.
Soil	1	1	
BCI Boulder Clay, brown (weathered). Abundant chalk pebbles	15	14	
SG Sand, med., greenish-yellow, with c.10% flint gravel, SR gr3, irreg. flints	18	3	IP 820
Sand, fine-med, greenish yellow, with traces of gravel	29	11	821 to 824
CB Sand fine, with silt: pale green.	39	10	824 (part) 825 to 827
CRAG Sand, med-coarse, bright red-brown ("Foxy")	42	3	828
Sand, fine-coarse, bright ochreous-red, yellow and black	45	3	829
Sand, fine-med., reddish yellow. Occ. black pebbles.	48	3	830
Sand med. red c.10% ch.00 +0			

Description of Strata (continued)	Depth to base ft.	Thickn. ft.	Sample Nos.
Silt, brown clayey with sand; no shells in upper 5', occ. shells in lower 3'	60	8	832 – 834
Sand, silty with shells. Brown ferrug. clay at base, also thin layer pale green shelly silt.	63	3	835
Sand, med – coarse, shelly	69	6	836 – 837
London Clay, blue-grey	71	2+	

BGS BOREHOLE REFERENCE: TM24NW13

Easting: 622380
Northing: 248590
Date: 1969
Length: 15.20m

TM 24 NW 13 2238 4859 Great Bealings, Suffolk

Surface (+ 30.5 m) + 100 ft
Water struck at (+ 21.0 m) + 69 ft
Wirth B1, 6 inch diameter
March 1969

Overburden (4.1 m) 13.5 ft
Mineral (10.5 m) 34.5 ft
Bedrock (0.6 m +) 2 ft +

			Thickness (m)	Thickness ft	Depth (m)	Depth ft
		Soil	(0.3)	1	(0.3)	1
		Made ground.	(2.1)	7	(2.4)	8
Boulder Clay		Grey clay with abundant boulders of flint and chalk.	(1.7)	5.5	(4.1)	13.5
Glacial Sand and Gravel	(a)	Sand Fine to medium yellow sand becoming red-yellow at (6.5 m) 21.5 ft. Few pebbles.	(4.1)	13.5	(8.2)	27
Red Crag	(b)	Sand Fine to medium red-brown sand becoming dark chocolate brown to black in lower (0.6 m) 2 ft.	(2.5)	8	(10.7)	35
		Coarse red sand with shell fragments and some quartoze gravel.	(3.9)	13	(14.6)	48
London Clay		Blue clay.	(0.6+)	2+	(15.2)	50

					%	Depth below surface (ft)	Fines	Sand			Gravel	
(a)	Gravel	1%	+16 mm	:	0	13.5 - 15.5	8	37	54	0	0	1
			-16 +4	:	1	15.5 - 18.5	3	66	29	1	1	0
						18.5 - 21.5	3	91	5	1	0	0
	Sand	94%	-4 +1	:	1	21.5 - 24.5	4	41	52	1	1	1
			-1 +¼	:	39	24.5 - 27	7	37	54	1	1	0
			-¼ +1/16	:	54							
	Fines	5%	-1/16	:	5							
(b)	Gravel	1%	+16 mm	:	0	27 - 30	6	42	48	3	1	0
			-16 +4	:	1	30 - 33	10	31	54	4	1	0
						33 - 36	5	22	61	10	2	0
	Sand	93%	-4 +1	:	11	36 - 39	7	20	54	17	1	0
			-1 +¼	:	49	39 - 42	7	24	53	15	1	0
			-¼ +1/16	:	33	42 - 45	5	38	40	15	1	1
						45 - 48	7	48	36	8	1	0
	Fines	6%	-1/16	:	6							

Institute of Geological Sciences

Mineral Assessment Unit

Sand and Gravel Survey

BOREHOLE RECORD SHEET

Borehole Reg. No.: TM24NW 13
Nat. Grid Ref.: 22384859
Locality: Great Bealings
Date: March 1969
Recorded by: R Allender

Drilled by: Elmat Ltd.
Drill Type: Wirth B1
Hole diameter: 6"
Ground level (O.D.): 100
Water struck at (O.D.): 31ft below surface.

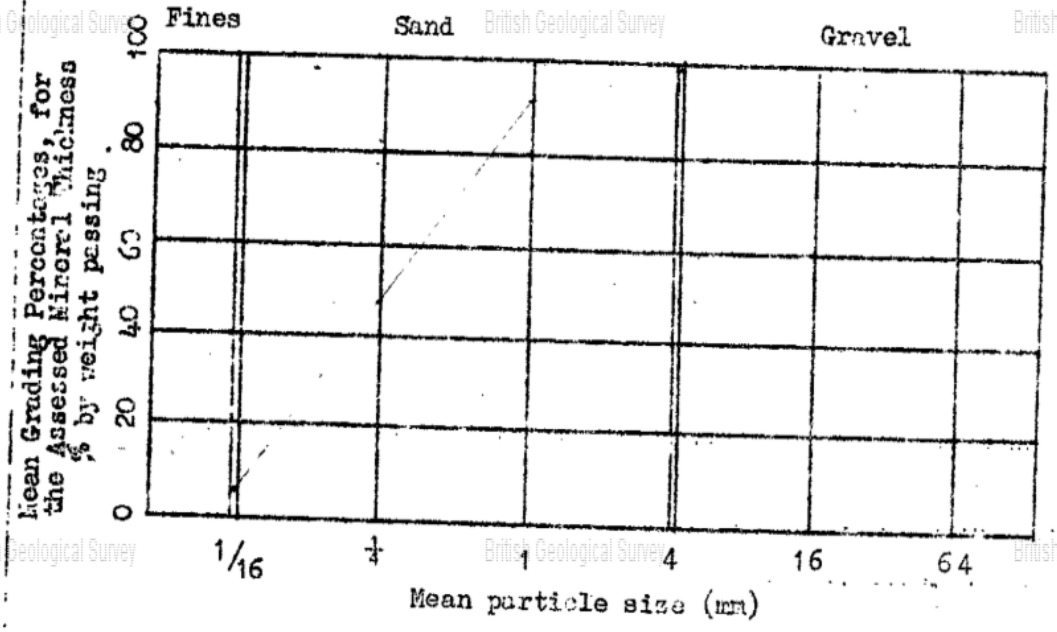
Summary of ground penetrated	Thickn. m	Thickn. ft	Nature
Made	0-1	8	Silty clay
Boulder clay	0-1	5½	Grey chalky Boulder clay
GSG	1.3	3½	Sand
Red Crag	6.4	21	Sand.
LC	0.6	2+	Blue clay

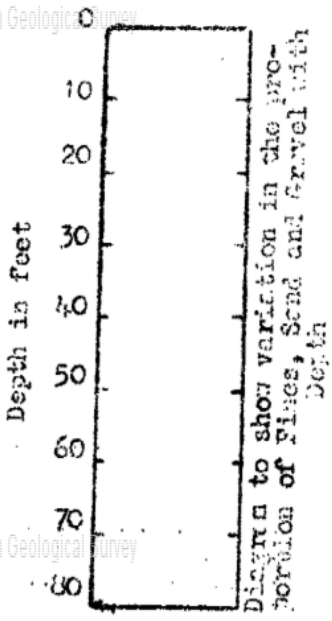
Remarks: Difficult to draw a definite line between "GSG" and Red Crag. (No gravel in upper beds)

Depth bailed:

Grading Record

Mean Grading percentages:	Fines	Sand	Gravel
	6	93	1





Description of Strata	Depth to base ft.	Thickn. ft.	Sample Nos.
Soil	1	1	
made ground: Red silty clay	8	7	
Boulder Clay, grey: abundant hard flint & chalk boulders.	13½	5½	
GSG Sand, fine-med, yellow to 21½, then reddish-yellow. No pebbles	27	13½	IP 854 to IP 861
Crag Sand, red-brown, fine-medium, becoming dark choc. brown to black in lower 2 ft.	35	8	IP 862 to IP 864
Sand, coarse, red, with fine gravel and	48	13	IP [illegible]

BGS BOREHOLE REFERENCE: TM24NW14

Easting: 622920
Northing: 248120
Date: 1969
Length: 14.00m

TM 24 NW 14 2292 4812 | **Little Bealings, Suffolk**

Surface (+ 28.3 m) + 93 ft
Water struck at (+ 25.3 m) + 83 ft
Wirth B1, 6 inch diameter
May 1969.

Overburden (0.3m) 1 ft
Mineral (4.6 m) 15 ft
Waste (1.2 m) 4 ft
Mineral (6.8 m) 22.5 ft
Bedrock (1.1 m +) 3.5 ft +

		Soil	Thickness (m)	Thickness ft	Depth (m)	Depth ft
			(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a)	Pebbly Sand. Fine to medium yellow sand with angular flint gravel. Gravel increasing towards the base.	(4.6)	15	(4.9)	16
Chillesford Beds		Red-brown clay, no gravel, passing into black peaty clay with thin layers of red-brown ferruginous clay. Bottom (0.1 m) 0.5 ft clayey gravel.	(1.2)	4	(6.1)	20
Red Crag	(b)	Pebbly Sand. Coarse sand with gravel passing into red-brown medium sand.	(6.1)	20	(12.2)	40
		Red-brown sand with shell fragments.	(0.7)	2.5	(12.9)	42.5
London Clay		Brown clay.	(0.3)	1	(13.2)	43.5
		Blue-grey clay	(0.8+)	2.5+	(14.0)	46

				%
(a)	Gravel	16%	+16 mm :	5
			−16 +4 :	11
	Sand	78%	−4 +1 :	7
			−1 +¼ :	45
			−¼ +1/16 :	26
	Fines	6%	−1/16 :	6
(b)	Gravel	5%	+16 mm :	0
			−16 +4 :	5
	Sand	86%	−4 +1 :	7
			−1 +¼ :	44
			−¼ +1/16 :	35
	Fines	9%	−1/16 :	9

Depth below surface (ft)	Fines −1/16	Sand +1/16 −¼	Sand +¼−1	Sand +1−4	Gravel +4−16	Gravel +16
1 - 4	8	52	32	1	3	4
4 - 7	3	24	57	5	5	6
7 - 10	8	24	56	4	5	3
10 - 13	6	14	39	11	23	7
13 - 16	7	16	42	12	18	5
20 - 22	16	10	30	18	24	2
22 - 25	12	54	24	5	5	0
25 - 28	8	39	50	2	1	0
28 - 31	8	38	47	5	2	0
31 - 34	6	44	48	1	1	0
34 - 37	6	38	52	2	2	0
37 - 40	8	28	55	8	4	2
40 - 42.5	11	34	39	13	3	0

Mineral Assessment Unit

Sand and Gravel Survey

BOREHOLE RECORD SHEET

Nat. Grid Ref.: 2292 4812
Locality: Little Bealings
Date: May 11th 1969
Recorded by: R. Allender

Drilled by: Elmat Ltd
Drill Type: Wirth B1
Hole diameter: 6"
Ground level (O.D.): 93
Water struck at (O.D.):

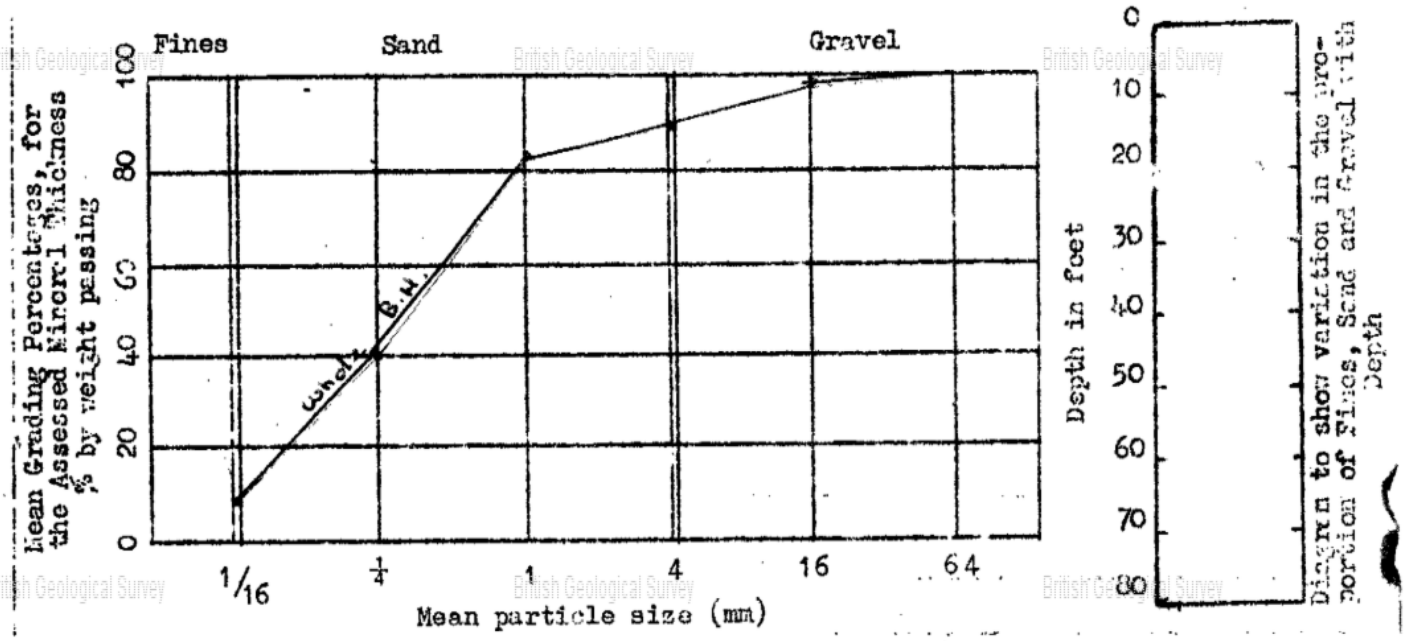
Summary of ground penetrated	Thickn. m	Thickn. ft	Nature
GSG		19½	Sand with Gravel
Red Crag		23	Sand
LC		3½+	Brown & blue clay

Remarks: Water @ 10' b.s. Hole drilled as 14, to 19' (without casing) in March 1969. Collapsed to 14'. Redrilled with casing, in May 1969, as 14/A.

Depth bailed:

Grading Record

Mean Grading percentages:	Whole / BH	Fines	Sand	Gravel
	BH	8	82	10



Description of Strata	Depth to base ft.	Thickn. ft.	Sample Nos.
Soil	1	1	
Sand yellow fine - med, becoming gravelly downwards	4	6	982 983
Sand med - coarse, with gravel.	10	3	984
Silt and sand with up to 50% angular flint gravel.	16	6	985 986
Clay, red - brown, plastic stoneless.	16½	½	
Clay, black, peaty, with thin layer red brown ferruginous clay at base	19½	3	
Red brown loamy clayey gravel	20	½	
Sand coarse and fine gravel	22	2	IP 1038

Sand & Gravel

Clay & Gravel Beds

Description of Strata (continued)	Depth to base ft	Thickn. ft	Sample
Sand, red brown, med. No pebbles	~~40~~	1~~8~~	IP 1039 to IP 1044
Sand red & brown, SHELLY	42½	2½	~~IP 1044~~ IP 1045
LONDON CLAY Brown	43½	1	
Blue	46	2½	

Sample Depths

Sample No.	Depth	Remarks

BGS BOREHOLE REFERENCE: TM24NW41

Easting: 623040
Northing: 248020
Date: 1946
Length: 55.47m

TM 24 NW/41
2304. 4802

207/577 Finches Hill, Little Bealings

Surface +77. Bore 182. Lining tubes: 128 x 4 in from surface. Ck -36. R.W.L. +14½. Yield 300 g.p.h. *Brown, June 1946.*
? Deepened. Depth unknown. *Date unknown.* Electric pump. *1960.*

Sand and Gravel	...	...	25	25
Crag	...	...	11	36
LC	...	...	40	76
WRB	...	...	37	113
UCk	...	...	69+	182+

{Yellow sand 25 25
{Yellow crag 11 36
{L.C 40 76

WRB
{Grey sand 11 87
{Blowing " 15 102 –
{L.C. 5 107
{Green sand 4 111
{Hard silt x flints 2 113 – –

Chalk. 69 182

R.A.

Phone: IPSWICH 2073.

J. R. BROWN & Co., Ltd.,

ARTESIAN WELL ENGINEERS,

28-32, BURRELL ROAD,

IPSWICH.

TM24|51 N540.
LOCATION.
Finches Hill.
BEALINGS.
Nr, Ipswich. E.

207 577

Name Mrs. Howell. Address Finches Hill, Lt. Bealings. Nr, Ipswich.

Bore Dia. 4" Total Depth 182 feet. Water Level ? 62½ ft.

Lining Dia. 4"i.d. Lining Depth 128 ft. Date 18th June, 1946.

	STRATA.	THICKNESS Ft.	THICKNESS In.	DEPTH Ft.	DEPTH In.
Sand & gravel 25	Yellow Sand.	25	-	25	-
Crag U	Yellow Crag.	11	-	36	-
London Clay 40	London Clay.	40	-	76	-
WRB 37	Grey Sand.	11	-	87	-
	Blowing Sand.	15	-	102	-
	London Clay.	5	-	107	-
	Green Sand.	4	-	111	-
	Hard Silt. & Flints on top of chalk.	2	-	113	-
Ucalk 69	Chalk.	69	-	182	-

RA

Yield 300 G.P.H.

Sited on Suffolk 76 NW.E 6.6.46 d on 1"
Situated in wooden shed behind house.
Deepened by Brown ? since 1946.
In use. Electric pump — inaccessible.
OD + 71. Visited & site corrected
RCD 28.6.60

DATA BANK

BGS BOREHOLE REFERENCE: TM24NW59

Easting: 621510
Northing: 247910
Date: 1938
Length: 60.96m

TM 24 NW/59
2151.4791

207/304 Gayfers, Slush Lane, Playford

Surface +60. Lining tubes: 104½ × 5 in from surface. Ck -24. R.W.L. +15.
Yield 750 g.p.h. *Brown, 1938.*
Electric pump. *1960.*

? Crag	...	14	14
LC	...	38	52
WRB	...	32	84
UCk	...	116	200

	Soil	3.	3
? Crag	Small Gravel	8	11
	loam	3	14
Londonclay	London Clay	38	52
Woolwich & Reading beds.	Mottled "	29	81
	Soft Green Sand	3	84.
Chalk.	Chalk	116	200

A W W
N1·41

RA

207/304 Gayfers, Slush Lane, Playford TM24/22

TM 2150 4791

Surface +60. Lining tubes: 104½ x 5 in from surface. Ck -24. R.W.L. +15.

Yield 750 g.p.h. *Brown, 1938.*

Electric pump. *1960.*

? Crag	...	...	14	14
LC	...	...	38	52
WRB	...	...	32	84
UCk	...	...	116	200

	Soil	3.	3.
? Crag	Small Gravel	8	11
	loam	3	14
London clay	London Clay	38	52
Woolwich & Reading beds	Mottled "	29	81
	Soft Green Sand	3	84.
Chalk..	Chalk	116	200

AWW
XII.41

RA

TM 24/22

207/304

RECORD OF WELL (SHAFT OR BORE)

At Gayfers, Slush Lane

Town or Village Playford

County ______ Six-inch quarter sheet 76 NW/W

For ~~Mr.~~ Capt Goldsmith & Mr. Collinson

Exact site of well ______ (Attach a tracing from a map, or a sketch-map, if possible.)

Level of ground surface above sea-level (O.D.) +60 feet.

Is well-top at ground level? ______ If not, state how far above/below; ______ feet.

Shaft ______ ft., diameter ______ ft. Details of headings ______

Bore 200 ft.; diameter of bore: at top 5 ins.; at bottom ______ ins.

Lengths, diameters, perforations, etc., of lining tubes 10 ch 2' × 5" Rising main 39' × 2½" Suction 17' × 1¼"

Water struck at depths, below well-top, of (feet) ______

TEST DETAILS Month ______ Year ______
Rest-level of water 45 ft. above/below well-top. Suction at ______ ft. Yield on ______ hours'/days' pumping 750 gallons per hour (max. capacity of pump ______ g.p.h.), with depression of ______ feet. Recovery to ______ in ______ mins./hours.

WORKING CONDITIONS
Rest-level of water in ______ (month), ______ (year), ______ ft. above/below well-top.
Highest „ in ______ (month), ______ (year), ______ ft. above/below „
Lowest „ in ______ (month), ______ (year), ______ ft. above/below „
Suction at ______ ft. Rate of pumping ______ galls. per ______ for ______ hours per day.
with average depression of ______ ft. Recovery to ______ in ______ mins./hours

Quality of water (*attach copy of analysis if available*) ______

Well made by J. R. Brown, Ipswich Date of well ? 1938

Information from Do, per AWW

ADDITIONAL NOTES.

O.D. 60'. Owner: Captain Goldsmith. The well supplies his house, (of the above address) and also Mr. Collinson's house, situated on the [illegible] above Gayfers.
Electric pump. Sited by visiting on Suffolk. 76 NW/W

AHB. 14.X.41

In use. Electric pump – inaccessible.
Supplies 3 houses – Gayfers, Sevenoaks, & The Ridges.
Inf. from gardener on visit.
[illegible] 28.[illegible]

(For Survey use only) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA If measurements start below ground surface, state how far... ...	THICKNESS Feet ...	 Inches ...	DEPTH Feet	 Inches
	Soil	3		3	
~~Hastings~~	Small gravel	8		11	
? Crag	Loam	3		14	
London Clay	London clay	38		52	
Woolwich & Reading Beds	Mottled "	29		81	
	Soft green sand	3		84	
Chalk	Chalk	116		200	

NW60
XII. 41
JRB

DATA BANK

BGS BOREHOLE REFERENCE: TM24NW60

Easting: 621610
Northing: 248020
Date: 1952
Length: 10.05m

TM 24 NW/60
2161·4802

207/737 **Roots, Church Lane, Playford**

Surface +100. Shaft × 3½. R.W.L. +70. P.W.L. +69. Recovered to +70 in 5 min.
Suction +68. Yield 250 g.p.h. (8 h. test). Electric pump. *Gosling, May 1952.*

? Sand and Gravel) Crag)	...	...	33	33

Sand & gravel & craig

Light-brown sand	10	10
Dirty-white "	2	12
Light-brown "	2	14
Dark-brown "	6	20
" & light "	4	24
Light brown "	6	30
Soft Craig	1	31
Hard brown craig	2	33

LA

RECORD OF WELL (SHAFT OR BORE)

(attach copy of analysis if available)

For Survey use only

N. 53706

TM 24/67

207/737

EXACT SITE OF WELL

At church lane

Town or Village Playford

County Suffolk Six-inch quarter sheet 76 NW/SW.

For Mr. L. J. Pipe State whether owner, tenant, builder, contractor, consultant, etc. :— Builder Owner

Address (if different from above) as above.

Level of ground surface above sea-level (O.D.) +100 ft. If well-top is not at ground level, state how far ... above; below; ft.

SHAFT ft.; diameter ft.; Details of headings

WELL BORE 33 ft.; diameter of bore: at top 42 ins.; at bottom 42 ins.

Details of permanent lining tubes

Water struck at depths of ft. below well-top.

TEST CONDITIONS

Rest-level of water 30 ft. above ~~below~~ well-top. Suction at 32 ft. Yield on 8 hours' days' test

pumping at 250 galls. per hour with depression to 31 ft. below well-top.

Recovery to rest-level in 5 mins. ~~hours~~ Capacity of pump 400 g.p.h. Date of measurements may '52

NORMAL CONDITIONS

Description of permanent pumping equipment: not installed by this boy.

Make and/or type Argosy Motive power Electric motor

Capacity 250 gallons per hour. Suction at ft.

Amount pumped 200 galls. per day. Estimated consumption 1000 galls. per week.

Well made by John J. Gosling & Co. Date of well may '52

Information from

ADDITIONAL NOTES

Visited and sited by O.
Present occupier Mrs. Fiske.
House to supply house.

SMA 20.4.1953

No - one in.
OD + 100. Visited. RCD. 28·6·60.
Mrs. Fiske died a few weeks ago.
House called 'ROOTS'
House also on mains. Mr. from gardener at Sayfers.
? In use. RCD. 28·6·60.

A. & B.W.Ltd. Gp.685

(For Survey use only) Geological Classification	NATURE OF STRATA If measurements start below ground surface, state how far ...	Thickness Feet ...	 Inches ...	Depth Feet	 Inches
	Light Brown Sand.	10	-	10	-
	Dirty white "	2	-	12	-
? Sand & gravel + Crag 33	Light Brown "	2	-	14	-
	Dark " "	6	-	20	-
	" & light " "	4	-	24	-
	Light Brown "	6	-	30	-
	Soft Craig	1	-	31	-
	Hard Brown Craig	2	-	33	-
RA					
	DATA BANK				

BGS BOREHOLE REFERENCE: TM24NW261

Easting: 621050
Northing: 247960
Date: 1993
Length: 100.00m

Eastern L.S.
Anglian NRA

NN 920164
TM 24/91B

Ref: S-92-13-AW

29.06.93

207

TM 24 NW 261

SMITH-WYATT LTD

Record of 915mm nominal dia. x 100m deep
Water Abstraction Borehole Drilled For Anglian Water Services, Histon
at Playford, Near Ipswich, Suffolk NGR TM 2105 4796

	STRATA	Thickness M.	Depth M.
	Top soil	0.50	0.50
	Sand	3.50	4.00
	Soft sand	1.30	5.30
	Grey blue clay	4.70	10.00
	Mudstone	0.50	10.50
THAM	Grey clay	2.50	13.00
	Mudstone	0.50	13.50
	Clay	1.50	15.00
	Tough grey clay and mudstone	2.50	17.50
	Gravel	1.00	18.50
	Sand and gravel	0.50	19.00
	Sand (grey)	3.00	22.00
READING	Grey clay (sandy)	1.50	23.50
? THANET	Grey clay	2.50	26.00
	Grey sand	1.00	27.00
	Grey sand and clay	1.00	28.00
	Grey sand and yellow clay	1.00	29.00
	Chalk and flints	1.00	30.00
CHLK	White chalk	45.00	75.00
	Chalk, some soft seams	8.00	83.00
	Chalk with soft marl seams	15.00	98.00
	Chalk and marl	2.00	100.00

WATER

R.W.L. 14m bgl; reading taken 4 February 1993.

LINING TUBE

a) 40.00m x 915mm OD plain mild steel lining tube installed to 39.50m bgl, the top being left 0.50m agl and fitted with a weld-on flange drilled NP16.

cont'd.../2

APPENDIX 3 WAVENEY AND EAST SUFFOLK CHALK & CRAG WATER BODY CLASSIFICATION CRITERIA

Waveney and East Suffolk Chalk & Crag Water Body: Poor overall status
Water Body ID GB40501G400600
Classifications

Classification Item	2013	2014	2015	2016	2019
Overall Water Body	Poor	Poor	Poor	Poor	Poor
Quantitative	Poor	Poor	Poor	Poor	Poor
Quantitative Status element	Poor	Poor	Poor	Poor	Poor
Quantitative Dependent Surface Water Body Status	Good	Good	Good	Good	Poor
Quantitative GWDTEs test	Good	Good	Good	Good	Good
Quantitative Saline Intrusion	Good	Good	Good	Good	Good
Quantitative Water Balance	Poor	Poor	Poor	Poor	Good
Chemical (GW)	Poor	Poor	Poor	Poor	Poor
Chemical Status element	Poor	Poor	Poor	Poor	Poor
Chemical Dependent Surface Water Body Status	Good	Good	Good	Good	Good
Chemical Drinking Water Protected Area	Poor	Poor	Poor	Poor	Poor
Chemical GWDTEs test	Good	Good	Good	Good	Good
Chemical Saline Intrusion	Good	Good	Good	Good	Good
General Chemical Test	Poor	Poor	Poor	Poor	Poor
Supporting elements (Groundwater)					
Prevent and Limit Objective	Active				Active
Trend Assessment	Upward trend	Upward trend	Upward trend	Upward trend	Upward trend

APPENDIX 4 LARK WATER BODY CLASSIFICATION CRITERIA & FYNN WATER BODY CLASSIFICATION CRITERIA

Fynn Water Body: Poor ecological status
Water Body ID GB105035040330
Classifications

Classification Item	2013	2014	2015	2016	2019
Ecological	Moderate	Moderate	Moderate	Moderate	Poor
Biological quality elements	Moderate	Moderate	Moderate	Moderate	Poor
Fish	Moderate	Moderate	Moderate	Moderate	Poor
Invertebrates	Good	Good	High	High	High
Macrophytes and Phytobenthos Combined				Moderate	Moderate
Physico-chemical quality elements			Moderate	Moderate	Moderate
Ammonia (Phys-Chem)			High	High	High
Dissolved oxygen			Moderate	Moderate	Moderate
Phosphate			Poor	Poor	Poor
Temperature			High	High	High
pH			High	High	High
Hydromorphological Supporting Elements	Supports good	Supports good	Supports good	Supports good	Supports good
Hydrological Regime	Supports good	Does not support good	Does not support good	Supports good	Does not support good
Morphology	Supports good	Supports good	Supports good	Supports good	Supports good
Specific pollutants	High	High			
Copper	High	High			
Triclosan	High	High			
Zinc	High	High			
Chemical	Good	Good	Good	Good	Fail
Priority hazardous substances	Good	Good	Does not require assessment	Does not require assessment	Fail
Benzo(a)pyrene					Good
Cadmium and Its Compounds	Good	Good			
Di(2-ethylhexyl)phthalate (Priority hazardous)	Good	Good			
Dioxins and dioxin-like compounds					Good
Heptachlor and cis-Heptachlor epoxide					Good
Hexabromocyclododecane (HBCDD)					Good
Hexachlorobenzene					Good
Hexachlorobutadiene					Good
Mercury and Its Compounds					Fail
Nonylphenol	Good	Good			
Perfluorooctane sulphonate (PFOS)					Good
Polybrominated diphenyl ethers (PBDE)					Fail
Tributyltin Compounds	Good	Good			
Priority substances	Good	Good	Does not require assessment	Does not require assessment	Good

Fynn Water Body: Poor ecological status
Water Body ID GB105035040330
Classifications

Classification Item	2013	2014	2015	2016	2019
Cypermethrin (Priority hazardous)					Good
Fluoranthene					Good
Lead and Its Compounds	Good	Good			
Nickel and Its Compounds	Good	Good			
Other Pollutants	Does not require assessment	Does not require assessment	Does not require assessment	Does not require assessment	Does not require assessment

Lark Water Body: Moderate ecological status
Water Body ID GB105035040360
Classifications

Classification Item	2013	2014	2015	2016	2019
Ecological	Moderate	Moderate	Moderate	Moderate	Moderate
Biological quality elements	Moderate	Moderate	Moderate	Moderate	Moderate
Fish	Moderate	Moderate	Moderate	Moderate	Moderate
Invertebrates		High	High	High	High
Macrophytes and Phytobenthos Combined		Good	Good	Good	Good
Physico-chemical quality elements			Moderate	Moderate	Moderate
Ammonia (Phys-Chem)			High	High	High
Dissolved oxygen			Moderate	Moderate	Moderate
Phosphate			Poor	Poor	Poor
Temperature			High	High	High
pH			High	High	High
Hydromorphological Supporting Elements	Supports good	Supports good	Supports good	Supports good	Supports good
Hydrological Regime	Supports good	Supports good	Supports good	Supports good	Supports good
Morphology	Supports good	Supports good	Supports good	Supports good	Supports good
Specific pollutants	High	High			High
Copper	High	High			
Iron					High
Triclosan	High	High			
Zinc	High	High			
Chemical	Good	Good	Good	Good	Fail
Priority hazardous substances	Good	Good	Does not require assessment	Does not require assessment	Fail
Benzo(a)pyrene					Good
Cadmium and Its Compounds	Good	Good			
Di(2-ethylhexyl)phthalate (Priority hazardous)	Good	Good			
Dioxins and dioxin-like compounds					Good
Heptachlor and cis-Heptachlor epoxide					Good
Hexabromocyclododecane (HBCDD)					Good
Hexachlorobenzene					Good
Hexachlorobutadiene					Good
Mercury and Its Compounds					Fail
Nonylphenol	Good	Good			
Perfluorooctane sulphonate (PFOS)					Good
Polybrominated diphenyl ethers (PBDE)					Fail
Tributyltin Compounds	Good	Good			
Priority substances	Good	Good	Does not require assessment	Does not require assessment	Good

Lark Water Body: Moderate ecological status
Water Body ID GB105035040360
Classifications

Classification Item	2013	2014	2015	2016	2019
Cypermethrin (Priority hazardous)					Good
Fluoranthene					Good
Lead and Its Compounds	Good	Good			
Nickel and Its Compounds	Good	Good			
Other Pollutants	Does not require assessment	Does not require assessment	Does not require assessment	Does not require assessment	Does not require assessment

621000 622000 623000

249000 248000

Access AP-X
Playford Corner SCCS
Crossing Point CR-9
Jointing Bay 12
Access AP-W
TM24NW2
TM24NW8
TM24NW13
TM24NW14
TM24NW41
TM24NW60
TM24NW59
TM24NW261
Boot Street
LOWER STREET
HOLLY LANE
MOUNT DRIVE
SANDY LANE
THE STREET
SPRING MEADOW
HILL FARM ROAD
BROOK LANE
THE
Track
Path (um)
GP
ROAD
Post
Tk

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

EA THREE DCO Corridor
Secondary Construction Consolidation Site
Jointing Bay Compound
Access Track
Haul Road
Top Soil
EA THREE Existing Cable Ducts
Historic BGS Geological Logs

Superficial Geology
Alluvium - Clay and Silt
Head - Diamicton
Kesgrave Catchment Subgrouo - Sand and Gravel
Lowestoft Formation - Diamiction
Lowestoft Formation - Sand and Gravel

GoBe consultants

Rev	Date	By	Comment
B	14/04/2022	PW	Second Issue
A	13/01/2022	JRS	First Issue

Original A3 Plot Scale 1:7,500

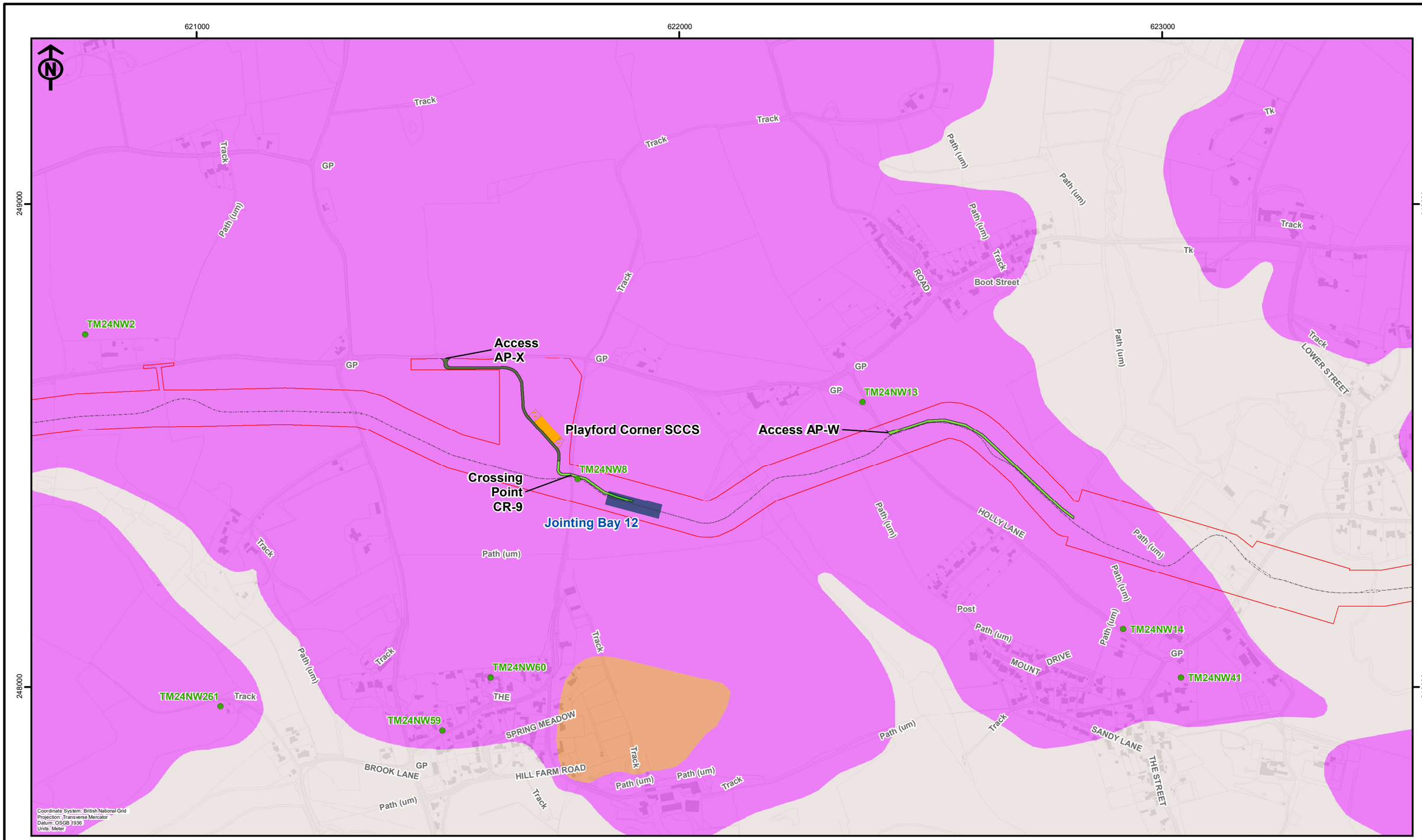
0 150 300 Metres

Playford Corner Works Stage

Figure 1: Superficial Geology

Drg No	05356.00006.12.0019.1 Superficial Geology
Rev	2
Date	14/04/2022
Layout	N/A

Document Path: P:\05356 - GoBe Consultants Ltd\00006 East Anglia Three\Tech\GIS\Dwgs\Wking\EA3\Onshore Substation\Doc Ref EA3-GRD-CON-PLN-IBR-000107\5356.00006.12.0019.1 Superficial Geology.mxd



EA THREE DCO Corridor
Secondary Construction Consolidation Site
Jointing Bay Compound
Access Track
Haul Road
Top Soil
EA THREE Existing Cable Ducts
Historic BGS Geological Logs

Bedrock Geology

Chillesford Church Sand Member - Sand (Quaternary)
Red Crag Formation - Sand (Quaternary)
Thames Group - Clay, Silt And Sand (Paleogene)

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Rev	Date	By	Comment
B	14/04/2022	PW	Second Issue
A	13/01/2022	JRS	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Playford Corner Works Stage

Figure 2: Bedrock Geology

Drg No	05356.00006.12.0018.1 Bedrock Geology
Rev	2
Date	14/04/2022
Layout	N/A

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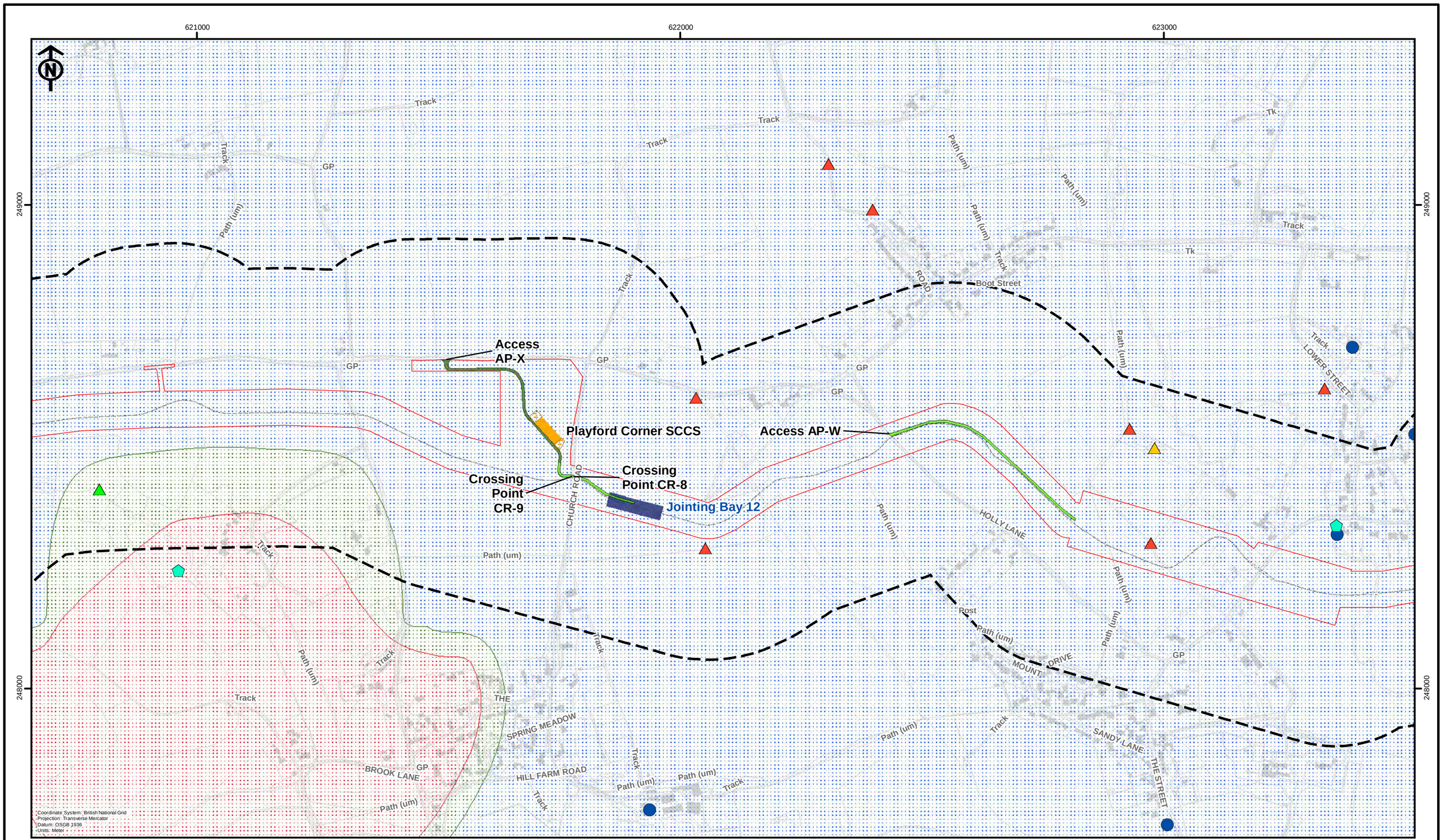

EA THREE DCO Corridor
Secondary Construction Consolidation Site
Jointing Bay Compound
Access Track
Haul Road
EA THREE Existing Cable Ducts
Top Soil
Commencement Works Area 250m Buffer
Private Abstractions
Licensed Ground Water Abstractions
Licensed Surface Water Abstractions

Springs
Water Issue (Potential Spring)
Drain (Potential Spring)
Depression Subject to Groundwater Inflow

Source Protection Zones
Zone I - Inner Protection Zone
Zone II - Outer Protection Zone
Zone III - Total Catchment

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Rev	Date	By	Comment
B	14/04/2022	PW	Second Issue
A	13/01/2022	PW	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Playford Corner Works Stage

Figure 4: Location of all Current Abstraction Licences, Private Abstractions and Source Protection Zones

Drg No	05356.00006.12.0009.1 SPZ and Abstractions
Rev	2
Date	14/04/2022
Layout	N/A

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621000 622000 623000

249000 248000

Access AP-X

Playford Corner SCCS

Access AP-W

Crossing Point CR-9

Crossing Point CR-8

Jointing Bay 12

Track Path (um) GP ROAD Boot Street Tk LOWER STREET CHURCH ROAD HOLLY LANE Post MOUNT DRIVE SANDY LANE THE STREET THE SPRING MEADOW BROOK LANE HILL FARM ROAD

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

EA THREE DCO Corridor
Secondary Construction Consolidation Site
Jointing Bay Compound
Access Track
Haul Road
Top Soil
EA THREE Existing Cable Ducts
Commencement Works Area 500m Buffer

Note: There are no Ecological Sites within the displayed area

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Rev	Date	By	Comment
B	14/04/2022	PW	Second Issue
A	13/01/2022	PW	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Playford Corner Works Stage

Figure 5: Ecological Sites

Drg No	05356.00006.12.0012.1 Ecological Sites
Rev	2
Date	14/04/2022
Layout	N/A

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621500 622000 622500 623000

249000 248500 248000

Access AP-X

Playford Corner SCCS

Crossing Point CR-8

Crossing Point CR-9

Jointing Bay 12

Access AP-W

Track

GP

ROAD

Boot Street

Path (um)

CHURCH ROAD

HOLLY LANE

THE

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

Works No.s Overview

Abbey Farm
Culpho
Hill Farm
Great Bealings
Boot Street
39
40
Farrows End
Clematis Cottage
Holly Lane
Playford
Little Bealings

EA THREE DCO Corridor
Secondary Construction Consolidation Site
Jointing Bay Compound
Top Soil
Access Track
Haul Road
EA THREE Existing Cable Ducts
EA ONE Existing Cable Ducts

Works No.s
39
40

Rev	Date	By	Comment
B	05/04/2022	PW	Second Issue
A	31/03/2022	JRS	First Issue

Original A3 Plot Scale 1:5,000

0 100 200 Metres

Playford Corner Works Stage

Figure 1: Site Context Plan

Drg No	05356.00006.12.0021.1 Site Context Plan
Rev	2
Date	05/04/2022
Layout	N/A

Document Path: P:\05356 - GoBe Consultants Ltd\00006 East Anglia Three\Tech\GIS\Dwgs\Wking\EA3\Onshore Substation\ONCS and Commencement Master\5356.00006.12.0021.1 Works Site Context.mxd

621000 622000 623000

249000 248000

N

Access AP-X

Playford Corner SCCS

Crossing Point CR-8

Crossing Point CR-9

Jointing Bay 12

Access AP-W

Track Path (um) GP ROAD Boot Street Tk LOWER STREET CHURCH ROAD HOLLY LANE Post MOUNT DRIVE SPRING MEADOW HILL FARM ROAD BROOK LANE SANDY LANE THE STREET THE

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

EA THREE DCO Corridor
Secondary Construction Consolidation Site
Jointing Bay Compound
Access Track
Haul Road
EA THREE Existing Cable Ducts
Commencement Works Area 250m Buffer
Top Soil
Private Abstractions
Licensed Surface Water Abstractions

Spring
Depression Subject to Groundwater Inflow
Drain ((Potential Spring)
Spring

Source Protection Zones
Zone I - Inner Protection Zone
Zone II - Outer Protection Zone
Zone III - Total Catchment

Surface Water Area
Statutory Main River

GoBe consultants

Rev	Date	By	Comment
B	19/04/2022	PW	Second Issue
A	11/01/2022	PW	First Issue

Original A3 Plot Scale 1:7,500

0 150 300 Metres

Playford Corner Works Stage

Figure 2: Hydrological and Hydrogeological Features

Drg No	05356.00006.12.00063.1 SPZ and Abstractions
Rev	2
Date	19/04/2022
Layout	N/A

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