



FIVE ESTUARIES OFFSHORE WIND FARM ENVIRONMENTAL STATEMENT

VOLUME 6, PART 6, ANNEX 6.1: GROUND WATER RISK ASSESSMENT

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Volume 6, Part 6, Annex 6.1: Groundwater Risk Assessment

Five Estuaries Offshore Wind Farm

Five Estuaries Offshore Wind Farm Ltd

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Basis of Report

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1.0 Introduction

SLR Consulting Ltd (SLR) has been appointed by GoBe Consultants Ltd (the client) to complete a preliminary groundwater risk assessment for the proposed Five Estuaries Offshore Wind farm (VE) onshore export cable corridor (ECC) and onshore substation (OnSS) area. The assessment also includes the North Falls Offshore Wind Farm (NF) OnSS area adjacent to the VE OnSS. VE and NF will share the same onshore ECC.

1.1 Project Overview

Both VE and NF are developing cable routes running from a landfall between Frinton-on-Sea and Holland-on-Sea to connections points at the proposed National Grid (NG) substation between Ardleigh and Little Bromley.

Consultation with stakeholders has identified a number of private water supplies (PWS) and licenced groundwater abstractions within the vicinity of the proposed onshore ECC, but further assessment is required to identify potential hydraulic connection between the various elements of the permanent and temporary construction works and the identified water supplies.

Although not formally requested within the scope of works this groundwater risk assessment has also reviewed the locations of other potential groundwater receptors including groundwater dependent ecological sites.

Due to the generally shallow nature of the works the assessment has reviewed potential groundwater receptors within a 500m radius of the onshore ECC, and has considered a worst-case potential radius of influence for any dewatering which could be required.

1.2 Scope of Works

A preliminary groundwater risk assessment has been completed for the entire cable route from landfall to the connection to the NG substation.

A baseline review of the geology, hydrogeology and hydrology has initially been undertaken and used to develop a Conceptual Site Model (CSM). This CSM is subsequently used to identify where a hydraulic connection exists between the proposed development and identified groundwater receptors.

A more detailed assessment of each receptor is subsequently completed to further refine the risk assessment and to identify where additional investigation is required, whether due to a lack of available information or due to an identified risk from the development.

1.3 Methodology

This risk assessment has been developed in accordance with relevant Environment Agency (EA) guidance on completion of groundwater risk assessments¹ and Hydrogeological Impact Appraisals (HIA)² and includes the following stages:

- Section 2 provides a baseline assessment of the onshore ECC and OnSS area. This includes a summary of the site geology and hydrogeology including information on ground conditions, groundwater levels and flows, groundwater quality and the

¹ Groundwater risk assessment for your environmental permit - GOV.UK (www.gov.uk), published Feb 2016, updated Apr 2018 [Accessed November 2023]

² Hydrogeological Impact Appraisal for Dewatering Abstractions, Science Report – SC040020/SR1 Environment Agency, May 2007



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 3 provides an assessment of the potential impact that the works could have upon the identified receptors and regional hydrogeology and hydrology. Appropriate mitigation measures or requirements for additional investigation or monitoring are outlined where required; and
- Section 4 provides a summary of the overall impact that the works could have upon the local hydrogeology and any identified receptors.

A qualitative risk assessment methodology has been used to assess the potential significance of impacts 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 receptors.



2.0 Baseline Conditions

The geological and hydrogeological regime along the onshore ECC 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. This provides an overview of the regional hydrogeology and is assessed further on a local scale, based on the location of identified infrastructure which could influence groundwater receptors.

2.1 Location and Topography

The onshore cable route extends for some 21 km from landfall at National Grid Reference (NGR) TM 22681 18005, approximately 1.25 km to the south-west of the town of Frinton-on-Sea in the south-east, to the proposed NG substation approximately 1.5 km west of the village of Little Bromley at NGR TM 08208 28709.

The route consists predominantly of agricultural land with several watercourse crossings, skirting towns, villages and some small woodlands. From landfall the route crosses several B-roads and the train line between Kirby Cross and Thorpe-le-Soken.

Ground levels begin at sea level rising to c.18m Above Ordnance Datum (AOD) within 300m of the coast. The route maintains a steady elevation of between 18m AOD and 25m AOD until a dog leg approximately 1 km north of Tendring. From there it climbs to 30m AOD and remains between 30m AOD and 35m AOD for the rest of the route except at the crossing of shallow valley north of Horsley Cross where it dips to a minimum of 25m AOD.

For the purposes of this report the onshore ECC is considered in two approximate halves. The first half being Sections 1 – 4A (as defined in the Environmental Statement at Volume 6, Part 3, Chapter 1: Onshore Project Description) at an approximate length of 11.6 km. The second half being Sections 4B – 7 at an approximate length of 9.5 km. The route layout is presented on Drawing 1.

2.2 Geology

2.2.1 Soils

The Cranfield Soilscales online soil map viewer indicates that the soils across the route consist of:

- Soilscape 21: 'Loamy and clayey soils of coastal flats with natural high groundwater' present at landfall south of Frinton-on-Sea;
- Soilscape 18: 'Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils' along the majority of the route; and
- Soilscape 8: 'Slightly acid loamy and clayey soils with impeded drainage' the predominate soil in the final third of the route.

2.2.2 Superficial Geology

A geological map showing the regional superficial geology as plotted on the British Geological Survey (BGS) online mapping service Geoindex Onshore is provided as Drawing 2.1 and Drawing 2.2.

The BGS Geoindex indicates that superficial deposits crossed by the route consist mainly of cover sand underlain by the Kesgrave Catchment Subgroup with a band of alluvium, consisting of clay and silt, at landfall and crossed twice along the course of the route, associated with major watercourses. The Kesgrave Catchments deposits typically comprise sands and gravels.



Superficial deposits are limited in the first half (southern half) of the route where bedrock is present at or close to surface and superfcials are fragmented but dominate the land surface along the latter half (northern half) of the route.

BGS logs indicate that the superficial sands and gravels typically range in thickness between 4m and 12m.

Ground investigation completed across the proposed VE and NF substation areas^{3,4} included the digging of 18 trial pits (11 across the VE OnSS site and 7 across the NF OnSS site) to depth of between 2.40m and 3.30m below ground level (bgl). All trial pits record Kesgrave catchment sands and gravels at or close to the surface, with several of the more northerly trial pits recording a thin (0.30m – 0.50m) horizon of Head deposits overlying the sands and gravels at surface, described as “*slightly gravelly slightly clayey fine to coarse SAND*”. The Kesgrave Catchment deposits are typically described as a “*gravelly coarse SAND*”.

Kesgrave Catchment sands and gravels were recorded to the base of all trial pits. Nearby BGS logs indicate that the sands and gravels are around 8.5m in thickness locally.

2.2.3 Bedrock Geology

BGS Geindex indicates that the geological sequence in the area consists of the following sequence as outlined in Table 2-1.

Table 2-1: Geological Sequence within vicinity of Onshore Cable Route

Age	Formation	Description	Thickness (m)
Neogene	Red Crag	Coarse-grained, poorly sorted, cross-bedded shelly sands	0 – 28m
Paleogene	Thames Group	Mainly silty clays, some sandy or gravelly	30 – 60m
	Thanet Formation & Lambeth Group	Clay, sand and silt with subsidiary flint, mudstone and sandstone	10 – 20m
Cretaceous	Newhaven Chalk	Soft to medium hard, smooth white chalks with numerous marl seams	35 – 130m
	Culver Chalk	Soft white chalk, relatively marl free with flint seams	120m+

The red crag forms an extensive sheet across much of Suffolk but is absent along the onshore ECC, although there is one small outcrop approximately 500m to the north of the route. The Thames Group deposits are present across the entirety of the onshore ECC where it directly overlies the Thanet Formation and Chalks.

Bedrock geology, based on BGS Geindex mapping, is provided in map format in Drawing 3.

³ Five Estuaries and North Falls Onshore Substations Trial Pits Phase 2: Ground Investigation Report (Factual Account of Fieldwork and Laboratory Testing), Report No: D3046-23, SOCOTEC, Nov 2023

⁴ Five Estuaries and North Falls Onshore Substations Trial Pits Phase 2: Ground Investigation Report (Factual Account of Fieldwork and Laboratory Testing), Report No: D3026-23, SOCOTEC, July 2023



2.3 Hydrogeology

2.3.1 Recharge Mechanisms

The Met Office climate summary (1991 – 2020) for Walton-on-the-Naze (51.854, 1.283), located c.19 km south-east of the substation areas and c.5 km from landfall, indicates that the average annual rainfall for the cable route is 556mm.

Climate averages for Walton-on-the-Naze are provided below in Table 2-2.

Table 2-2: Met-Office Climate Averages for Walton-on-the-Naze (1991 – 2020)

Month	Max. Temp. (°C)	Min. Temp. (°C)	Rainfall (mm)
January	6.98	2.08	48.2
February	7.89	2.62	45.94
March	10.07	3.76	35.26
April	12.11	6.05	33.32
May	15.69	9.07	30.6
June	18.76	11.99	36.91
July	21.53	15.01	48.74
August	21.01	14.61	58.54
September	18.8	12.29	49.38
October	15.01	9.54	54.64
November	10.9	5.81	60.39
December	7.9	2.92	53.86
Annual	13.92	8.01	555.78

Recharge regionally will be variable depending upon the localised superficial geology. Where cover sand is present across the western and northern part of the route recharge will be significant due to the porous nature of the deposits, however in the east and south of the route where the Thames Group is present at or near the surface, infiltration rates are likely to be inconsequential relative to run-off.

2.3.2 Aquifer Characteristics and Groundwater Vulnerability

The aquifer characteristics and EA aquifer designation of the strata along the length of the route are summarised in Table 2-3.

Table 2-3: Aquifer Designations

Deposit Type	Age	Formation	Aquifer Designation
Superficial	Quaternary	Cover Sand – clay, silt and sand	Secondary B
		Kesgrave Catchment Sands and Gravels	Secondary A
		Alluvium	
Bedrock	Paleogene	Thames Group	Unproductive Strata
		Thanet Formation & Lambeth Group	Secondary A



Deposit Type	Age	Formation	Aquifer Designation
	Cretaceous	Newhaven Chalk	Principal
		Culver Chalk	

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.*

Given the variable geological conditions along the cable route there are likely to be two primary aquifers present beneath the cable route:

- Shallow aquifers associated with the cover sand and underlying Kesgrave Catchment Subgroup, where these are underlain by Thames Group deposits these will form a perched aquifer, none are directly underlain by the Chalk. It is highly unlikely that the small outcrop of Red Crag Formation will be affected by temporary or permanent works;
- The chalk aquifer present at depth beneath the Thames Group forms an extensive aquifer across south-east England however it is considered that there will be no hydraulic continuity with the superficial deposits as the Thames Group clays running the length of the route will act as an aquitard between the shallow and deep aquifers. The presence of the extensive thickness of the Thames Group deposits mean that the Chalk aquifer can be scoped out as a potential receptor.

2.3.3 Groundwater Levels and Flow

A review of the 1981 Hydrogeological map of Southern East Anglia, sourced from the BGS website indicates that the potentiometric surface of groundwater within the superficial sands and gravels is in a broadly south-easterly direction, where it is present in the northern half of the route. Along the majority of the southern half of the route superficial deposits are absent with the Thames Group at the surface not holding any groundwater or allowing flow.

Examination of borehole records with water levels, available on the BGS website, indicate that groundwater levels within the superficial deposits are typically less than 5m bgl with a range of between 2m and 5m bgl.

The local flow within the superficiales will largely follow the local topography and potentially be influenced by any watercourses present along the route.

The ground investigations (GI)^{3,4} indicate groundwater seepages in the base of most trial pits around the proposed OnSS locations, indicating that these have potentially been extended until groundwater has been hit. This GI data indicates groundwater levels typically between 2.3m and 3.3m below ground level (32m – 33m AOD), although it should be noted that the



GI were completed in mid May and mid October respectively and therefore winter peak water levels will potentially be higher.

Particle Size Distribution (PSD) analysis was completed as part of the GI, this data can be used to estimate the hydraulic conductivity of the sands and gravels. Data from the samples close to the base of trial pits (i.e. close to the saturated level of the deposit) has been used for the analysis. The Beyer formula had been used to assess the hydraulic conductivity where:

$$K_H = C_B \frac{g}{\nu} \ln \left(\frac{500}{\frac{D_{60}}{D_{10}}} \right) D_{10}^2$$

- K_h = Hydraulic conductivity (m/sec)
- C_B = empirical coefficient equal to 6×10^{-4}
- g = gravitational acceleration (9.8 m/s^2)
- ν = Kinematic viscosity of water ($1.2 \times 10^{-6} \text{ m}^2/\text{s}$)
- D_{10} = grain diameter for which 10% passes (mm)
- D_{60} = grain diameter for which 60% passes (mm)

The predicted hydraulic conductivities are summarised in Table 2-4 which indicates hydraulic conductivity of the sands and gravels of between 7.09×10^{-4} and $2.95 \times 10^{-3} \text{ m/s}$.

Table 2-4: Estimated Hydraulic Conductivity of Superficial Sands and Gravels

Trial Pit ID	Sample Depth (mBGL)	D10 (mm)	D60 (mm)	Hydraulic Conductivity (m/sec)
TP01	3.0 – 3.1	0.170	0.570	7.09×10^{-4}
TP04	2.0 – 2.2	0.310	3.000	1.86×10^{-3}
TP05	2.9 – 3.0	0.371	2.337	2.95×10^{-3}
TP08	2.8 – 2.9	0.168	0.383	7.45×10^{-4}
TP10	2.0 – 2.2	0.327	1.122	2.61×10^{-3}
TP11	2.0 – 2.1	0.300	6.300	N/A*
TP16	2.0 – 2.2	0.181	1.000	7.23×10^{-4}
TP19	2.9 – 3.0	0.312	4.060	1.74×10^{-3}
TP22	2.0 – 2.2	0.300	1.875	1.93×10^{-3}
TP28	2.0 – 2.2	0.187	0.521	8.89×10^{-4}

Note: * Formula only appropriate where D10 between 0.06 and 0.6mm and D60 <6.0mm

2.3.4 Source Protection Zones

Defra’s Magic Map website indicates that the majority of the northern half of the route (from the OnSS to Section 4B) is located within a Zone III (total catchment) groundwater Source Protection Zone (SPZ) which is likely to be associated with the extent of the underlying Chalk aquifer.

No part of the route is located within either an SPZ 1 (Inner) or an SPZ 2 (outer) zone. The nearest SPZ1 associated with major abstractions from the Chalk aquifer is approximately 3 km from the OnSS at the northwestern extent of the onshore ECC route.

There are no Source Protection Zones on the southern half of the route, c.12km, from the landward end of Section 4B to landfall.



The extent of groundwater SPZ is shown in Drawing 4.

2.3.5 Groundwater Abstractions

There are a total of 33 licenced abstractions and 25 private water supplies (PWS) within a 500m radius of the Development Consent Order (DCO) Limits of the route. However, the majority of these are located in excess of 100m from any elements of the onshore cable route, with only 12 licenced abstractions and 5 PWS within this buffer. The locations of all licenced abstractions and PWS are presented on Drawing 5.1 and Drawing 6.1.

Of the 58 features within 500m, the majority are in the sands and gravels of the northern half of the route: 26 of 33 licenced abstractions and 17 of 25 PWS.

Licenced abstractions and PWS within 500m of the route are listed in Table 2-5 and Table 2-6 respectively.

Table 2-5 Licensed Abstraction Details

Licence No.	Holder	Address	Use	Source Type and Unit
8/37/25/*G/0191	Dedham Vale Farms	Badley Hall, Ardleigh, Co7 7nf	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/25/*G/0191	Dedham Vale Farms	Badley Hall, Ardleigh, Co7 7nf	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/25/*G/0064	Dedham Vale Farms	Badley Hall, Ardleigh, Co7 7nf	General Farming & Domestic	Groundwater From Sands And Gravels
8/37/25/*G/0064	Dedham Vale Farms	Badley Hall, Ardleigh, Co7 7nf	General Farming & Domestic	Groundwater From Sands And Gravels
8/37/25/*G/0064	Dedham Vale Farms	Badley Hall, Ardleigh, Co7 7nf	General Farming & Domestic	Groundwater From Sands And Gravels
8/37/26/*G/0037	Parkers Nurseries Limited	C/O Parkers Garden Company, Frinton Road, Kirby Cross, Co13 0pd	General Farming & Domestic	Groundwater From Sands And Gravels
8/37/26/*G/0037	Parkers Nurseries Limited	C/O Parkers Garden Company, Frinton Road, Kirby Cross, Co13 0pd	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/26/*S/0074	A H Brown Farms	Dairy House Farm, Great Holland, Co13 0ex	Spray Irrigation - Storage	Surface Water Source
8/37/26/*S/0067	T & R Fairley Farms Partnership	Abbotts Hall, Mistley, Co11 2nx	Spray Irrigation - Storage	Surface Water Source
An/037/0026/006	T & R Fairley Farms Partnership	Abbotts Hall, Mistley, Co11 2nx	Spray Irrigation - Storage	Surface Water Source
8/37/26/*G/0080	T W Salmon & Co	Slough Farm, Slough Lane, Ardleigh, Co7 7rx	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/26/*G/0091	A H Brown Farms	Dairy House Farm, Great Holland, Co13 0ex	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/26/*G/0091	A H Brown Farms	Dairy House Farm, Great Holland, Co13 0ex	Spray Irrigation - Direct	Groundwater From Sands And Gravels



8/37/25/*G/0172	T & R Fairley Farms Partnership	Abbotts Hall, Mistley, Co11 2nx	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/25/*G/0172	T & R Fairley Farms Partnership	Abbotts Hall, Mistley, Co11 2nx	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/25/*G/0143	D C Williamson Ltd	Barn Farm Freezer Store, Barn Farm, Wix Road, Bradfield, Co11 2ux	Spray Irrigation - Anti Frost	Groundwater From Sands And Gravels
8/37/25/*G/0143	D C Williamson Ltd	Barn Farm Freezer Store, Barn Farm, Wix Road, Bradfield, Co11 2ux	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/25/*G/0143	D C Williamson Ltd	Barn Farm Freezer Store, Barn Farm, Wix Road, Bradfield, Co11 2ux	Spray Irrigation - Anti Frost	Groundwater From Sands And Gravels
8/37/25/*G/0143	D C Williamson Ltd	Barn Farm Freezer Store, Barn Farm, Wix Road, Bradfield, Co11 2ux	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/26/*G/0092	John Jiggins Limited	Hempstalls Farm, Clacton Road, Wix, Co11 2nz	Spray Irrigation - Storage	Groundwater From Sands And Gravels
An/037/0025/035	T W Salmon & Co	Slough Farm, Slough Lane, Ardleigh, Co7 7rx	Spray Irrigation - Storage	Surface Water Source
8/37/26/*S/0054	James Fairley & Sons (Farms) Ltd	Wolves Hall, Wolves Hall Lane, Tendring, Co16 0dg	Spray Irrigation - Direct	Surface Water Source
8/37/26/*S/0054	James Fairley & Sons (Farms) Ltd	Wolves Hall, Wolves Hall Lane, Tendring, Co16 0dg	Spray Irrigation - Direct	Surface Water Source
8/37/26/*S/0083	Jiggins	Hempstalls Farm, Horsley Cross, Co11 2nz	Spray Irrigation - Storage	Surface Water Source
8/37/26/*S/0088	A Lawrence & Sons	Reedlands Farm, Holland Road, Little Clacton, Co16 9rx	Spray Irrigation - Storage	Surface Water Source
8/37/26/*S/0090	James Fairley & Sons (Farms) Ltd	Wolves Hall, Wolves Hall Lane, Tendring, Co16 0dg	Spray Irrigation - Storage	Surface Water Source
An/037/0026/010	Strutt & Parker (Farms) Ltd	1 Whitbreads Business Centre, Whitbreads Farm Lane, Chatham Green, Cm3 3fe	Spray Irrigation - Storage	Surface Water Source
8/37/25/*G/0236	Tabor Farms Ltd	Sutton Hall Farm, Ss4 1lq	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/25/*G/0236	Tabor Farms Ltd	Sutton Hall Farm, Ss4 1lq	Spray Irrigation - Direct	Groundwater From Sands And Gravels
8/37/25/*G/0236	Tabor Farms Ltd	Sutton Hall Farm, Ss4 1lq	Spray Irrigation - Direct	Groundwater From Sands And Gravels



8/37/26/*S/0069	James Fairley & Sons (Farms) Ltd	Wolves Hall, Wolves Hall Lane, Tendring, Co16 0dg	Spray Irrigation - Storage	Surface Water Source
An/037/0026/015	James Fairley & Sons (Farms) Ltd	Wolves Hall, Wolves Hall Lane, Tendring, Co16 0dg	Spray Irrigation - Storage	Surface Water Source
8/37/26/*S/0011	Day	Glebe Farm, Beaumont Cum Moze, Co16 0au	Spray Irrigation - Direct	Surface Water Source

Table 2-6 Private Water Supply Details

Site Name	Supply Type	Source Type	Use
1 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
2 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
3 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
4 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
Barlon House	Reg 10 (SD)	BHW	DOMS
Crabtrees	Reg 10 (SD)	BHW	DOMS
Craigus	Reg 10 (Shared England)	BHW	DOMS
Dypaca	Reg 10 (SD)	WEL	DOMS
Grove Cottage	Reg 10 (SD)	BHW	DOMS
Jennings Farm House	Reg 10 (SD)	BHW	DOMS
Little Bromley Hall	Reg 10 (SD)	BHW	DOMS
Mulberry Lodge	Reg 10 (SD)	BHW	DOMS
Mulleys Cottage	Reg 10 (SD)	WEL	DOMS
Mulleys Farm	Reg 10 (SD)	WEL	DOMS
Oakwood	Reg 10 (SD)	WEL	DOMS
Orchard Cottage	Reg 10 (SD)	WEL	DOMS
Paynes Cottage	Reg 10 (SD)	BHW	DOMS
The Coach House	Reg 10 (SD)	BHW	DOMS
The Haywain	Reg 9	BHW	COMM/PUB
The Old Rectory	Reg 10 (SD)	BHW	DOMS
Thorpe Park Cottage	Reg 10 (Shared England)	BHW	DOMS
Thorpe Park Farm, 5 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
Thorpe Park House	Reg 10 (Shared England)	BHW	DOMS
Welhams Farm	Reg 10 (Shared England)	BHW	DOMS
Woodside	Reg 10 (SD)	BHW	DOMS

2.3.6 Hydrology

The onshore ECC route predominantly passes through the Colne Essex catchment, following the boundary with Stour operational catchment and crossing entirely for a length of approximately 6 km between Kirby Cross and Thorpe Green. This length of the route is not associated with any of the 21 water bodies within the Stour operational catchment. Two



small sections of the northwest of the onshore ECC route cross into the Stour operational catchment into the area of Wrabness Brook and consists of 190m of access road north off Tendring Heath and 490m of DCO Limits approximately 700m northeast of Horsley Cross.

The cable route crosses two major watercourses:

- The Holland Brook which flows in a broadly south-easterly direction, draining from the relative high ground to the north-west of the cable route. This watercourse is underlain by superficial deposits in the northwest of the route and there is likely to be an element of groundwater baseflow in these features. The cable route crosses the watercourse approximately 800m north-west of Horsley Cross. At this location the superficial sands and gravels are absent and the watercourse is shown to be underlain by low permeability Alluvium and London Clay; and
- The Tendring brook, a tributary of the Holland Brook which rises to the north-east of the cable route. The watercourse is underlain by London Clay bedrock with a thin band of alluvium; clays and silts present immediately beneath the watercourse corridor. There are no superficial sands and gravels present beneath the watercourse, baseflow is therefore considered to be negligible. There are a number of licenced surface water abstractions associated with this watercourse, however given the lack of hydraulic continuity with groundwater, any impact on these can be scoped out of further assessment.

There are also numerous smaller minor watercourses and drains along the route, although given that these are typically shallow, they are unlikely to be significant groundwater receptors. The Holland Brook is designated as a Nitrate Vulnerable Zone (NVZ).

2.3.7 Groundwater Dependent Ecological Sites

A review of the Defra Magic Map webpage indicates that the only designated ecological sites within a 500m radius of the Order Limits is the Holland Haven Marshes Site of Special Scientific Interest (SSSI). The route crosses the SSSI at landfall. The SSSI is designated for its mixture of estuarine saltmarsh and freshwater marsh and grasslands, including an area of amenity grassland on Frinton golf course.

Although the first 300m – 700m of the route from landfall does cross the SSSI, the majority of that is across Frinton Golf Club and two parcels of agricultural land to the northwest. The area of marshland covered by the DCO is equivalent to 0.05 km².

The SSSI is entirely underlain by alluvial silts and clays with little or no groundwater. The marshes will therefore be fed by surface run-off associated with poor drainage from the loamy, clayey soils and silty clay superfcials, where present.



3.0 Conceptual Site Model

The assessment of the baseline conditions of the cable route indicates that it is underlain by superficial aquifers in the Cover Sand and the Kesgrave Catchment Subgroup. The Thames Group underlying these superficial deposits is considered an aquitard providing no hydraulic continuity between them and the principal Chalk aquifer beneath. The southern half of the route crosses a total of 3 km of superficial deposits over 11.6 km of onshore ECC length. The northern half of the route crosses 8.5 km of superficial deposits over 9.5 km of onshore ECC length.

Regional groundwater contours suggest groundwater levels are potentially in continuity with the Holland Brook in its headwaters, however there are no sands and gravels present beneath the majority of the watercourse length or beneath its associated tributaries. At the point of the watercourse crossings of the Holland Brook and Tendring Brook there are no sands and gravels present. Licenced surface water abstractions along these watercourses have therefore been scoped out of further assessment.

From this and BGS borehole data it is understood that depths to groundwater within the superficial sands and gravels are typically shallow (2-5m bgl).

33 licenced abstractions and 25 PWS have been identified within a 500m radius of the onshore ECC and OnSS.

The assessment indicates that all of the groundwater sourced licenced abstractions and PWS are located on superficial sands and gravels. Based on a typical permeability for medium sand of 7.09×10^{-4} and 2.95×10^{-3} m/s from PSD analysis of samples collected during the GI and a drawdown of up to 1m (based on a typical trench excavation depth of 1.8m) a worst case radius of influence can be ascertained based using the Sichardt equation, whereby:

$$R_0 = C_s \sqrt{K}$$

Based on a maximum feasible drawdown of 1m this would result in a radius of influence between 80m and 163m. As a conservative approach the maximum area for assessment has been set at 250m from any potential below ground level development. This conservative approach also allows for the potentially fast travel times for any pollution incidents to impact abstractions.

It is acknowledged that Horizontal Directional Drilling (HDD) is a technique proposed at a number of locations where open trenching is not viable, this will typically extend to depths of between 5m-10m below ground level however these do not require extended periods of dewatering. There will be some displacement or removal of water associated with the use of drilling fluids during this process, however given the limited dewatering which would occur it is considered that the 250m radius for assessment is applicable for the HDD locations. Similarly, any pollution risk would be limited to drilling fluids used within the process entering the aquifer system in the immediate vicinity of the HDD for which a 250m radius is highly conservative.

It is also noted that given the thickness of the superficials (up to 10m) and Thames Group deposits (30-60m) the risk of encountering the underlying chalk aquifer is very low, however all HDD locations should be reviewed prior to drilling to ensure that there is no risk of penetrating through the base of the Thames Group bedrock.

3.1 Groundwater Abstractions

Of the 33 licenced abstractions recorded within 500m of the DCO Limits 13 are from surface water sources and can be excluded from this report. Based on the relatively shallow



workings proposed the potential radius of influence from any below working proposed is likely to be small, therefore only abstractions located within a 250m radius of the DCO have been assessed further, consisting of 13 abstractions. Eleven licenced abstractions are located in the northern half of the route, all but one of which are clustered around the proposed OnSS location. Two are found in the south of the route, near the middle of Section 1. Licenced abstractions suitable for further investigation and listed in Table 3-1.

All of the 13 licenced abstractions are registered as being from the sands and gravels and are within 250m of the DCO boundary and will therefore potentially be in hydraulic continuity with the onshore ECC or OnSS.

Table 3-1 Details of Licensed Abstractions Suitable for Further Investigation

Location ID	Licence Number	Licence ID	Use description
A1	8/37/25/*G/0064	Dedham Vale Farms	General Farming & Domestic
A2	8/37/25/*G/0064	Dedham Vale Farms	General Farming & Domestic
A3	8/37/25/*G/0064	Dedham Vale Farms	General Farming & Domestic
A4	8/37/26/*G/0080	T W Salmon & Co	Spray Irrigation - Direct
A5	8/37/25/*G/0191	Dedham Vale Farms	Spray Irrigation - Direct
A6	8/37/25/*G/0191	Dedham Vale Farms	Spray Irrigation - Direct
A7	8/37/25/*G/0172	T & R Fairley Farms Partnership	Spray Irrigation - Direct
A8	8/37/25/*G/0172	T & R Fairley Farms Partnership	Spray Irrigation - Direct
A9	8/37/26/*G/0091	A H Brown Farms	Spray Irrigation - Direct
A10	8/37/26/*G/0091	A H Brown Farms	Spray Irrigation - Direct
A11	8/37/26/*G/0092	John Jiggins Limited	Spray Irrigation - Storage
A12	8/37/25/*G/0236	Tabor Farms Ltd	Spray Irrigation - Direct
A13	8/37/25/*G/0236	Tabor Farms Ltd	Spray Irrigation - Direct

3.2 Groundwater PWS

19 PWS are recorded within a 250m radius of the DCO Limits, of these 8 are grouped together in the southern half of the route, in proximity to Sections 2 & 3, seven of these are from a single point source. The remaining 11 PWS are focused around the northern extent of the onshore ECC and the OnSS, in proximity to Sections 5, 6 & 7.

PWS data does not inform the source of the water. Of the PWS within 250m of the DCO boundary, four are from wells which will most likely be in the superficial deposits but the remaining are from boreholes and possibly using the chalk bedrock as their source. Further investigation is required to ascertain the source for each PWS. All PWS within 250m have therefore been scoped into the assessment for further investigation.

Table 3-2 Details of Private Water Supplies Suitable for Further Investigation

Location ID	Site Name	Supply type	Source type	Use
PWS 1	Mulberry Lodge	Reg 10 (SD)	BHW	DOMS
PWS 2	Little Bromley Hall	Reg 10 (SD)	BHW	DOMS
PWS 3	The Old Rectory	Reg 10 (SD)	BHW	DOMS
PWS 4	Crabtrees	Reg 10 (SD)	BHW	DOMS



PWS 5	Paynes Cottage	Reg 10 (SD)	BHW	DOMS
PWS 6	The Coach House	Reg 10 (SD)	BHW	DOMS
PWS 7	Welhams Farm	Reg 10 (Shared England)	BHW	DOMS
PWS 8	Craigus	Reg 10 (Shared England)	BHW	DOMS
PWS 9	Oakwood	Reg 10 (SD)	WEL	DOMS
PWS 10	Orchard Cottage	Reg 10 (SD)	WEL	DOMS
PWS 11	Dypaca	Reg 10 (SD)	WEL	DOMS
PWS 12	Thorpe Park Farm, 5 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
PWS 13	1 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
PWS 14	2 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
PWS 15	3 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
PWS 16	4 Thorpe Park Cottages	Reg 10 (Shared England)	BHW	DOMS
PWS 17	Thorpe Park Cottage	Reg 10 (Shared England)	BHW	DOMS
PWS 18	Thorpe Park House	Reg 10 (Shared England)	BHW	DOMS
PWS 19	Mulleys Farm	Reg 10 (SD)	WEL	DOMS
PWS 20	Jennings Farm House	Reg 10 (SD)	BHW	DOMS

The locations of all licenced abstractions and PWS assessed above are presented in Drawing 5.2 and Drawing 5.3 for licenced abstractions and Drawing 6.2 and Drawing 6.3 for PWS.



4.0 Hydrogeological Impact Assessment

4.1 Proposed Development

The onshore cable route will include the following works:

- 1 up to 12 temporary construction compounds (TCC). Assumed to be no below ground development;
- 2 49 No. Jointing bays – 15m x 4m with a depth of approximately 2m;
- 3 Trenched cable route to a maximum depth of 2m below ground level;
- 4 Trenchless or Horizontal Directional Drilling (HDD) points at typical depths of 5m to 10m;
- 5 Associated HDD compounds, assumed to be no below ground development; and
- 6 Two OnSS, located adjacent to each other for VE and NF with dimensions of approximately 250 x 180m. The piling solution for the OnSS will be determined post consent, following ground investigations.

4.2 Location Specific CSM

Based on the regional CSM the development areas have been broken down into separate areas to allow for further assessment of local hydrogeological conditions and identify the extent of any hydraulic connection between the onshore ECC and OnSS and the water supplies identified in Section 3.0.

Where licenced abstractions or PWS are located in close proximity these have been grouped and assessed cumulatively. The identified locations have therefore been assessed as eleven separate areas.

4.2.1 Licenced Abstractions A1, A2, A3, A5 & A6

Licensed abstractions A1, A2, A3, A5 and A6 are located to the west of the OnSS between 14m and 210m to the west of the DOL at an elevation of c.35m AOD. All five abstractions extract from the superficial sands and gravels which extend across the OnSS area of the site.

Nearby BGS logs⁵ indicate that the sands and gravels are c.9m in thickness and are underlain by London Clay. Groundwater levels were struck at relatively shallow depth in all three boreholes between 1.6m and 4m below ground level at an elevation of approximately 32m - 33m AOD, indicating that there is the potential for any excavations required for construction of the OnSS to encounter groundwater.

The abstractions are located between 500m and 750m from the OnSS and are therefore considered to be well beyond any potential radius of influence from any dewatering associated with construction of the OnSS. It is however noted that these are all adjacent to the NG substation zone. Currently no details as to the exact location of infrastructure in this area is available however works are limited to connection works through buried cables and some mechanical and electrical surface works. As the routing of cable connections is unknown, assessment of any impact from this aspect of the development is not possible. However, based on the general layout it is likely the cable routes will be at least 250m from

⁵ [BGS ID: 557819](#) : BGS Reference: TM02NE9, [BGS ID: 557999](#) : BGS Reference: TM02NE184, [BGS ID: 558000](#) : BGS Reference: TM02NE185



these licenced abstractions. These locations should be further reviewed once details of the NG substation have been provided.

4.2.2 A12 & A13

Licensed abstractions A12 & A13 are located to the north of the OnSS, between 160m and 200m to the north east of the DCO Limits at the NG substation zone, at an elevation of approximately 36m AOD. Both abstractions are licenced to abstract from the superficial sands and gravels which extend across the OnSS area of the site.

Nearby BGS logs⁶ indicate that the superficial sands and gravels are between 9m and 13m in thickness, underlain by London Clay, recorded at 51.8m thickness in BGS borehole TM02NE104, with Chalk present at depth.

BGS borehole TM02NE13 recorded groundwater in the sands and gravels 6.2m below ground level (30.4m AOD) indicating a relatively thick unsaturated zone, although this is only one water strike. Therefore a potential hydraulic connection between any below ground works undertaken within the DCO Limits cannot be ruled out. Further assessment of groundwater elevations would be required if it is confirmed that there are any proposed excavations within 250m of the abstractions.

The abstractions are located between 350m and 500m to the north of the OnSS boundary indicating that these are both well beyond any potential radius of influence from any dewatering required from this element of the proposals. Both are however located within 250m of the NG substation zone (although are likely to be more than 250m from the cable routes), as discussed in Section 4.2.1 the risk posed to these abstractions should be reviewed once details of the NG substation are available.

4.2.3 Licenced Abstractions A7 & A8

Licensed abstractions A7 and A8 are located to the south-west of the proposed OnSS and immediately south-east of the existing Lawford NG substation at an elevation of approximately 35m AOD. Both abstractions are from the superficial sands and gravels.

Borehole records are available on the BGS Geindex for two boreholes located in the vicinity of these abstractions; TM02NE174 and TM02NE175⁷.

Both locations are described as brick lined wells with a resting water level of 112.25ft (34.2m AOD) and pumping water level of 109.5ft (33.4m AOD). The logs both record 6.25ft (1.905m) of pleistocene drift, although it is noted that both are recorded at 30ft (9.144m) deep and TM02NE175 is recorded as slotted from 5.79m to 7.62m suggesting that the sands and gravels are likely to be at least 9m in thickness.

Although located within 250m of the DCO Limits the closest below ground development are the trenchless crossing beneath Ardleigh road (c.350m north-east of A8) and the OnSS (c.250m north of A7) both of which are considered to be beyond the potential radius of influence of any dewatering required. These locations have therefore been scoped out of any further assessment.

4.2.4 PWS1 & PWS20

PWS 1 and PWS 20 are located at Jennings Farm to the south-east of the proposed OnSS at an elevation of approximately 35m AOD.

⁶ [BGS ID: 557823](#) : BGS Reference: [TM02NE13](#), [BGS ID: 557918](#) : BGS Reference: [TM02NE104](#)

⁷ [BGS ID: 557989](#) : BGS Reference: [TM02NE174](#), [BGS ID: 557990](#) : BGS Reference: [TM02NE175](#)



BGS mapping confirms that the supply is located on superficial sands and gravels, underlain by London Clay. Nearby borehole log TM02NE15⁸ located approximately 300m to the west indicates that the local geology comprises 2.7m of loam (brown sandy clay) overlying 9.1m of sands and gravels with the London Clay recorded at 0.9m thickness. A water strike was recorded approximately 2.7m below ground level, suggesting that groundwater is potentially relatively shallow.

A second BGS borehole record in the area (TM02NE159⁹) records an abstraction well installed at Jennings Farm, although this does not record geology it indicates that the borehole was drilled to 10m, confirming the abstraction from the sands and gravels.

The PWS is however located in excess of 380m from the closest below ground development (380m east of the trenchless crossing beneath Ardleigh Road and 450m south-east of the North-Falls substation. PWS1 therefore been scoped out of any further assessment.

4.2.5 A4, PWS2, PWS3 & PWS6

Licensed abstraction A4 and PWS2, PWS3 and PWS6 are located in the vicinity of Church Road, to the north-east of the proposed onshore ECC, located between 32.5m AOD and 33.5m AOD.

BGS log TM02NE21¹⁰, located just west of PWS2, indicates that the local geology comprises 1.2m of sandy clay overlying 4.3m sands and gravels and London Clay beneath. A water strike is recorded at 30.8m AOD, approximately 2.4m below ground level, suggesting a potentially shallow groundwater.

Two further BGS records are recorded in the vicinity of PWS8 and PWS11¹¹ confirm that these abstract from the sands and gravels, although no details as to the thickness of the sands and gravels or water levels are provided.

Although located within 250m of the DCO Limits all four abstractions are located 250m or greater from the proposed onshore ECC. PWS3 is approximately 250m to the north-east of the cable route alignment, on the edge of the specified limit, however given the relatively shallow depth of excavation proposed it is considered unlikely that the excavations will extend significantly below groundwater level and therefore the potential impact on this abstraction is considered to be very low. Other potential works within the DCO Limits, away from the cable trenches, will not involve below ground working and will have no influence on groundwater resources. All four locations have therefore been screened out of further assessment.

4.2.6 PWS4, PWS5 & PWS19

PWS4, PWS5 and PWS19 are located off Paynes Lane to the north of the proposed onshore ECC. PWS5 is located approximately 45m north of the crossing beneath Paynes Lane whilst PWS4 and PWS19 are located 320m and 430m to the north of the ECC alignment, respectively.

Both PWS4 and PWS19 are located within 250m of the access into TCC9 and TCC10, however as these do not require below ground development, both of these supplies can be scoped out of further assessment.

⁸ [BGS ID: 557827](#) : BGS Reference: [TM02NE15](#)

⁹ [BGS ID: 15936422](#) : BGS Reference: [TM02NE193](#)

¹⁰ [BGS ID: 557833](#) : BGS Reference: [TM02NE21](#)

¹¹ [BGS ID: 557979](#) : BGS Reference: [TM02NE164](#), [BGS ID: 557980](#) : BGS Reference: [TM02NE165](#)



PWS5 is underlain by superficial sands and gravels overlying London Clay and is considered likely to abstract from the sands and gravels (although no information is available on the source of supply). These superfcials extend across the cable route.

The nearest BGS logs are in excess of 750m to the south of this supply therefore detailed information on the local geology is unavailable, however these logs indicate that the sands and gravels are in excess of 4m in thickness with water strike close to the base of the deposit (4.9m below ground level)¹². Further assessment will however be required to determine the groundwater levels in the vicinity of this water supply and whether any excavation will potentially require dewatering.

Given the close proximity of PWS5 to the route it is considered that further assessment is required.

4.2.7 PWS7, PWS8, PWS9 & PWS10

PWS7 to PWS10 are located adjacent to Bentley Road to the south of the proposed onshore ECC. Although located within 250m of the DCO Limits this is entirely related to widening works along Bentley Road for access to the A120 (to the south-east) and TCC11, approximately 215m north-west of PWS9.

None of the water supplies are located within 250m of any below ground development related to the ECC alignment, however the widening works will involve excavations to a depth of around 650mm, with some potentially deeper excavations for utility diversions. .

Given the close proximity of PWS7, PWS8, PWS9 & PWS10 to the route it is considered that further assessment is required.

4.2.8 A11

Licensed abstraction A11 is located south of the A120 and immediately north-west of TCC6. The abstraction is however located in excess of 600m from the proposed onshore ECC and as there is no below ground development associated with the temporary construction compound the abstraction can be scoped out from further assessment.

4.2.9 PWS11

PWS11 is located near Golden Lane to the north west of Thorpe-le-Soken approximately 218m south-west of the DCO Limits on Golden Land and over 260m from the nearest section of proposed onshore ECC alignment, at an elevation of 23m AOD – 24m AOD.

BGS mapping shows A11 to be approximately 100m north-west from a small area of superficial deposits and is entirely within the London Clay. The nearest borehole log data available is 1.8km to the south-east, it is therefore not possible to determine using available data where the private water supply abstracts. Further investigation would be needed to determine the source of this supply.

PWS11 is not located within 250m of any below ground development and has therefore been scoped out of any further assessment.

4.2.10 PWS12, PWS13, PWS14, PWS15, PWS16, PWS17 & PWS18

PWS12 to PWS18 are all shown to be located in the same location and serve a number of properties at Thorpe Park Cottages. Whilst included within a 250m radius of the DCO Limits this is associated with the access track and are located in excess of 800m from the proposed onshore ECC. The access track will be for operation and maintenance use and

¹² <https://api.bgs.ac.uk/sobi-scans/v1/borehole/scans/items/557834>



does not require below ground development. These locations have therefore been scoped out of further assessment.

4.2.11 A9 & A10

Licensed abstractions A9 and A10 are located close to the southern extent of the proposed onshore ECC to the south-west of Great Holland. Both abstractions are located within 130m of the onshore ECC with A10 located within construction compound TCC2. The exact location will need to be confirmed prior to any development of this compound.

Both abstractions are located close to the southern edge of an isolated area of superficial sands and gravels. These are underlain by London Clay bedrock. A10 is shown to be located on the bedrock with no overlying superfcials, however the records provided by the EA indicate that the abstraction is from glacial sands and gravels.

No nearby BGS logs are available and therefore there is no information on the thickness of the sands and gravels or depth to groundwater. Based on information from the wider area it is likely that groundwater will be relatively shallow and impact on groundwater levels from trenching cannot be ruled out. Further assessment is therefore required.

As both abstractions are located within 130m of the proposed onshore ECC, further assessment is required to assess risk to these abstractions.

4.3 Further Assessment

The above assessment has identified a number of water supplies which could theoretically be impacted by any dewatering required for excavations for the proposed onshore ECC, the crossings of roads or watercourses, road widening or the OnSS.

Further information should be obtained as to the proposed final layout and the project team responsible for undertaking the work packages in proximity to the respective water supply points (i.e. VE, NF or NG). The project team undertaking the works in proximity to water supply points will be responsible for subsequent further assessment, surveys and monitoring.

Further information will be required on the construction type of the NG substation to allow for an updated assessment of the risk to licenced abstractions A1 to A6 and A12 to A13.

To allow for further assessment of the potential impact of the construction works on licenced abstractions A9 and A10 or PWS5 and PWS7 to PWS10 (in addition to any of the abstractions around the NG substation which require assessment) the following additional works and assessment are recommended.

4.3.1 Water Features Survey

A water features survey will be required to obtain additional information on the location, construction, source and use of the abstractions identified as requiring further assessment. This will include the following:

- Obtaining a copy of abstraction licences from the EA for licenced abstractions A9 and A10;
- Walkover survey to identify and confirm the location, source and type of abstractions and PWS sources (i.e. borehole, well, spring etc);
- Confirm from owner whether the supplies are still used and obtain details of volumes abstracted (if available);
- Record dips of resting groundwater levels and depth to base (subject to owner agreement).



4.3.2 Ground Investigation

Where the water features survey indicates that supplies are still in use and confirms a potential hydraulic connection with the onshore ECC or OnSS, or other aspect of the proposed development which requires excavation below ground level, further ground investigation will be required to confirm the geological sequence and groundwater levels. It is recommended that these investigatory boreholes be installed to allow for ongoing monitoring prior to commencement of any works and throughout the construction phase.

4.3.3 Monitoring

Where a potential hydraulic connection between the proposed construction works and the water feature is determined to be possible, it is recommended that monitoring of the receptors is undertaken (assuming agreement with the supply owner is granted) along with monitoring of any monitoring boreholes installed during the ground investigation to allow for collection of baseline data on water levels prior to any construction activity. This baseline data will allow for assessment of effect during construction works.

5.0 Summary & Conclusion

A review of the geology and hydrogeology along the proposed VE onshore ECC and OnSS has been undertaken to identify any PWS or licenced abstractions which could be impacted by any construction activity or dewatering required for construction of the cable route trenches, trenchless crossings and the OnSS for VE or NF.

The review has indicated that although there are 33 licenced abstractions and 25 private water supplies within a 500m radius of the DCO Limits, only seven are located within a 250m radius of potential excavations to support the onshore ECC, road widening or VE OnSS Zone. A further 8 licenced abstractions are recorded within 250m of the NG substation zone and further details as to the exact location of the substation and associated cabling will be required to refine the assessment in this area.

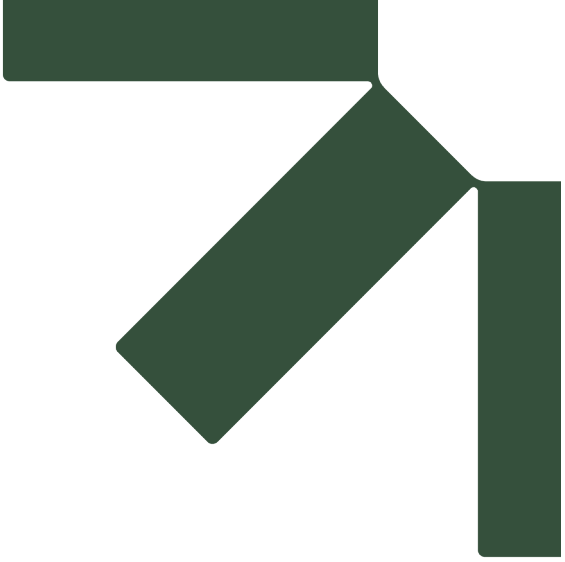
The following water supplies are considered to require further assessment.

Table 5-1: Abstractions within 250m of the Onshore ECC Requiring Further Assessment

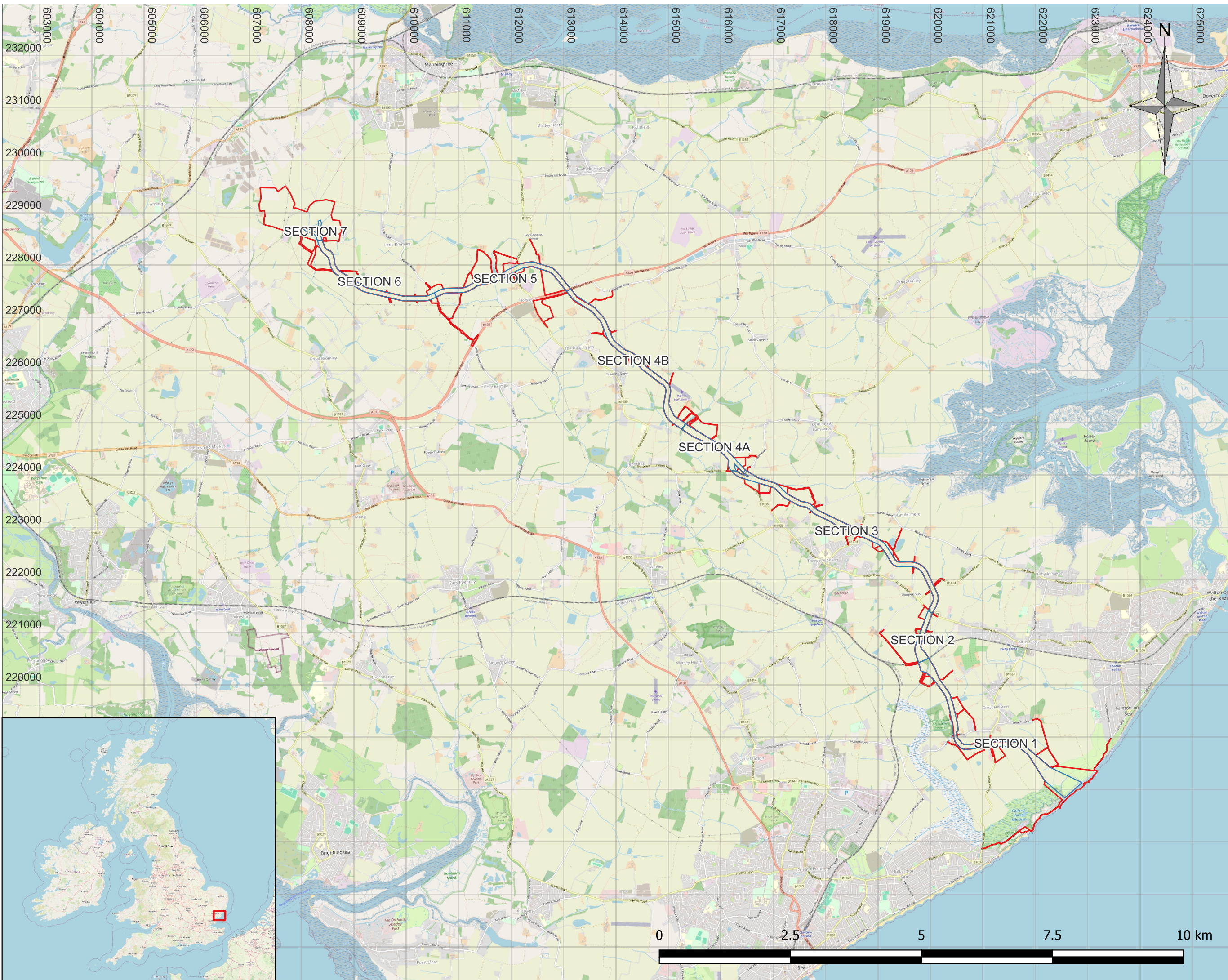
Location ID	Licence Number	Location	Use description
A9	8/37/26/*G/0091	A H Brown Farms	Spray Irrigation - Direct
A10	8/37/26/*G/0091	A H Brown Farms	Spray Irrigation - Direct
PWS5	-	Paynes Cottage	Reg 10 (SD)
PWS7		Welhams Farm	Reg 10 (Shared England)
PWS8		Craigus	Reg 10 (Shared England)
PWS9		Oakwood	Reg 10 (SD)
PWS10		Orchard Cottage	Reg 10 (SD)

Recommendations for further assessment, ground investigation and monitoring are proposed. Following collection of this information the risk assessment can be updated.



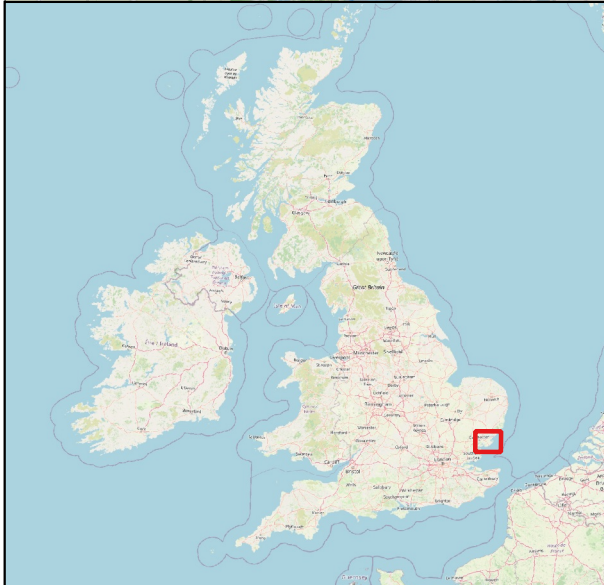
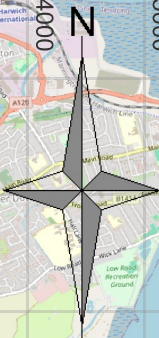


Drawings



Notes:

- Legend:
- Section Boundaries
 - DCO Boundary



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Rev	Amendments	Date	By	Chk	Auth

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Client
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Project
RWE 5E EIA

Drawing Title
Cable Route & Location

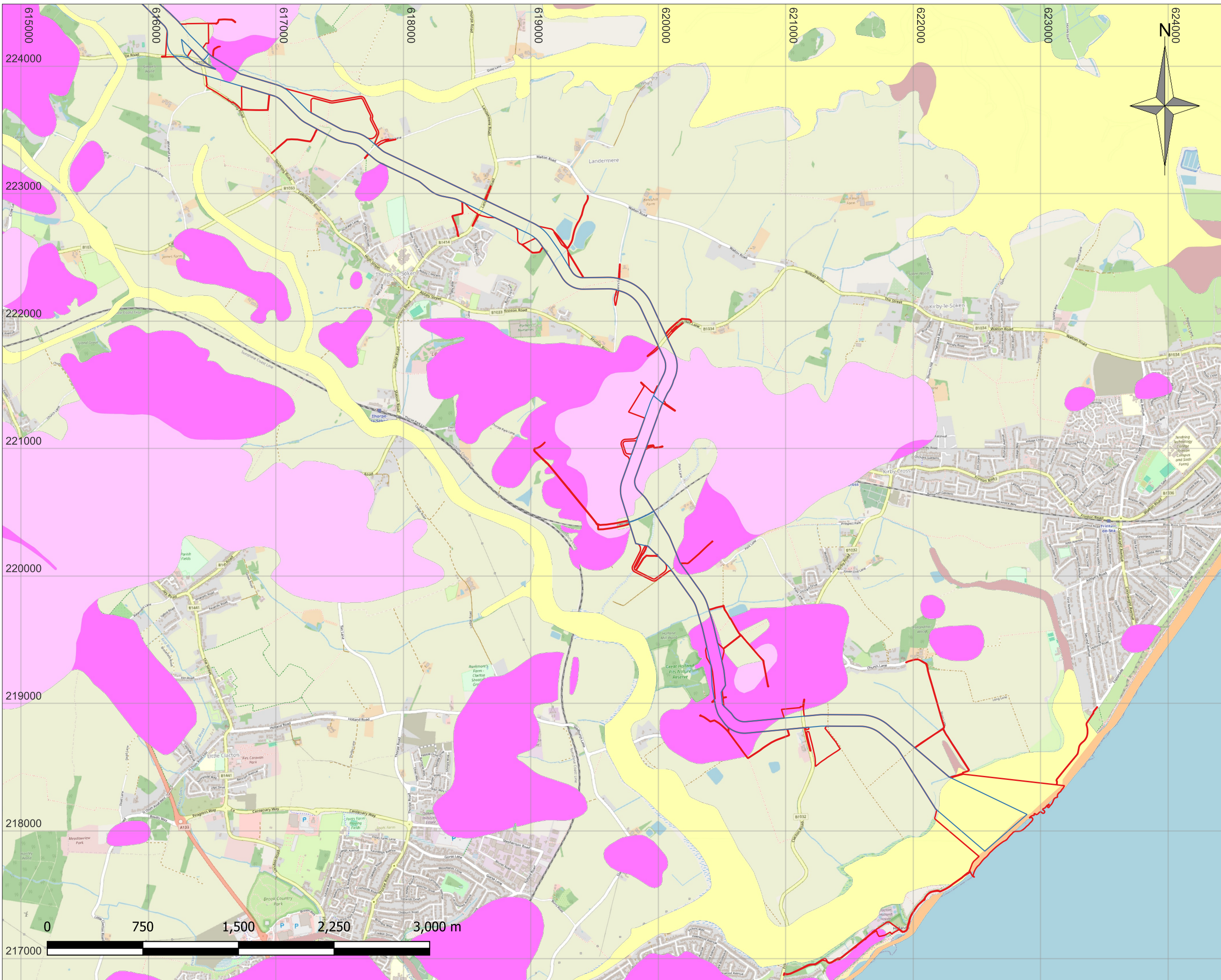
Scale 1:90,000 @ A3 SLR Project No. 404.V05356.00010

Designed	Drawn	Checked	Authorised
BC	BC	SM	MB

Date	Date	Date	Date
NOV 2023	NOV 2023	NOV 2023	NOV 2023

Drawing Number	Rev
1	0





Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
- Superficial Legend**
- Cover sand - clay, silt and sand
 - Kesgrave catchment subgroup - sand and gravel
 - Alluvium - clay and silt
 - Intertidal deposits (undifferentiated) - clay and silt
 - Head - Diamicton
 - Head - silt
 - Storm beach deposits - sand and gravel

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Rev	Amendments	Date	By	Chk	Auth



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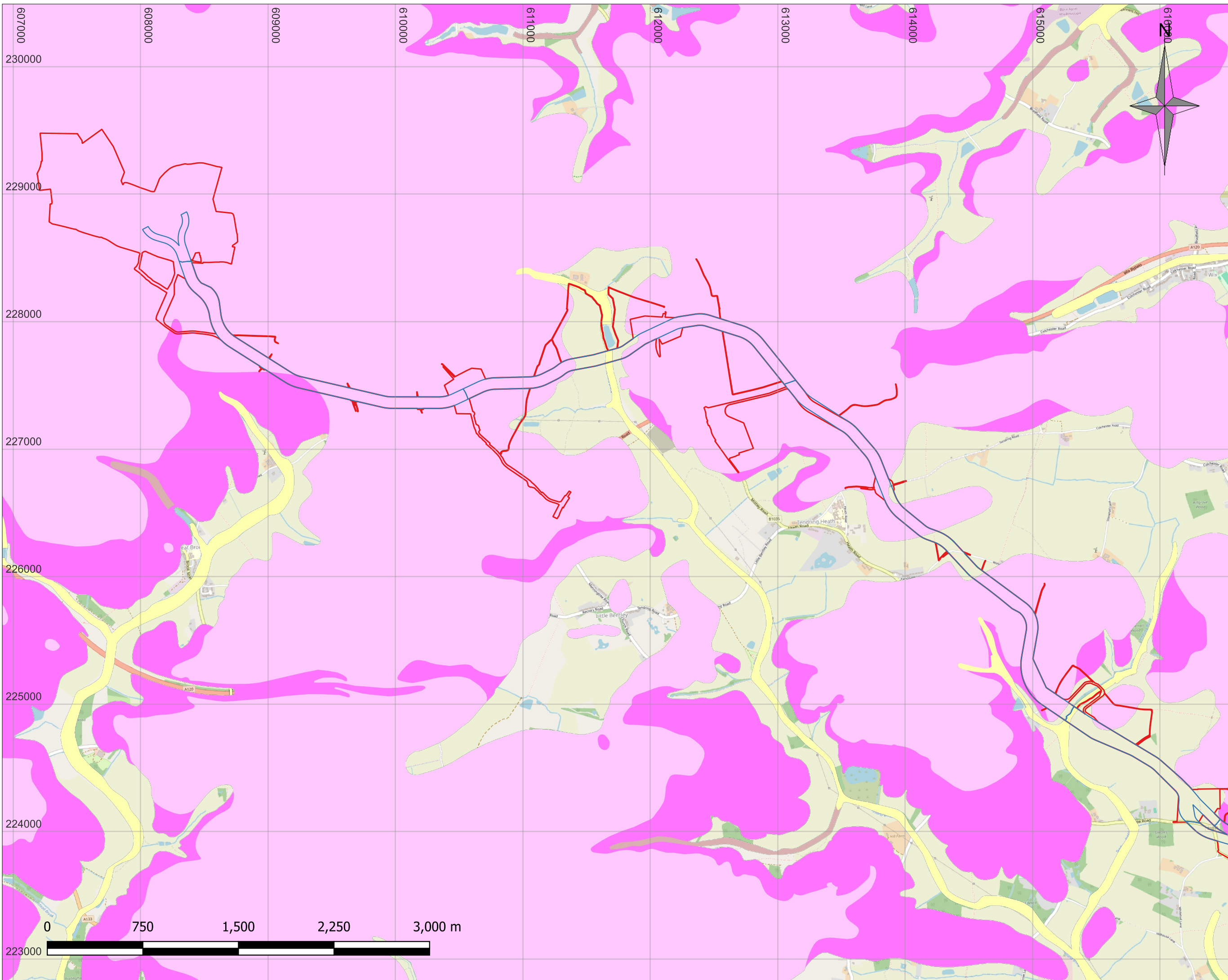
Client
GoBe Consultants Ltd

Project
RWE 5E EIA

Drawing Title
Superficial Deposits South

Scale 1:45,000 @ A3 SLR Project No. 404.V05356.00010

Designed	Drawn	Checked	Authorised
BC	BC	SM	MB
Date	Date	Date	Date
NOV 2023	NOV 2023	NOV 2023	NOV 2023
Drawing Number	2.1		Rev 0



Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
- Superficial Legend**
- Cover Sand - clay, silt and sand
 - Kesgrave Catchment Subgroup - sand and gravel
 - Alluvium - clay and silt
 - Head - diamicton

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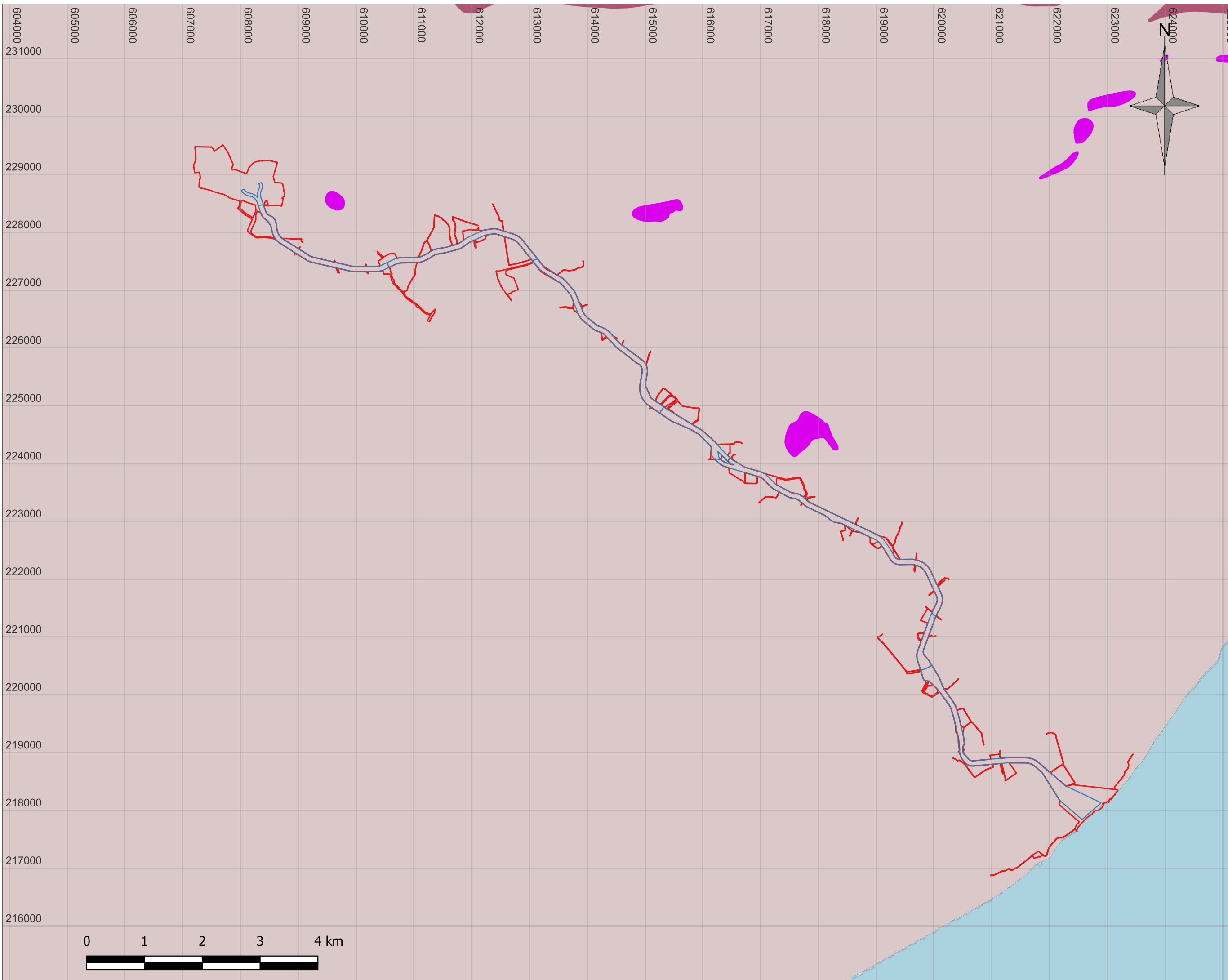
Project
RWE 5E EIA

Drawing Title
Superficial Deposits North

Scale 1:45,000 @ A3 SLR Project No. 404.V05356.00010

Designed	Drawn	Checked	Authorised
BC	BC	SM	MB
Date	Date	Date	Date
NOV 2023	NOV 2023	NOV 2023	NOV 2023

Drawing Number	2.2	Rev	0
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Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
- Bedrock Legend**
- Red Crag Formation - sand
 - Thames Group - clay, silt and sand

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RWE 5E EIA

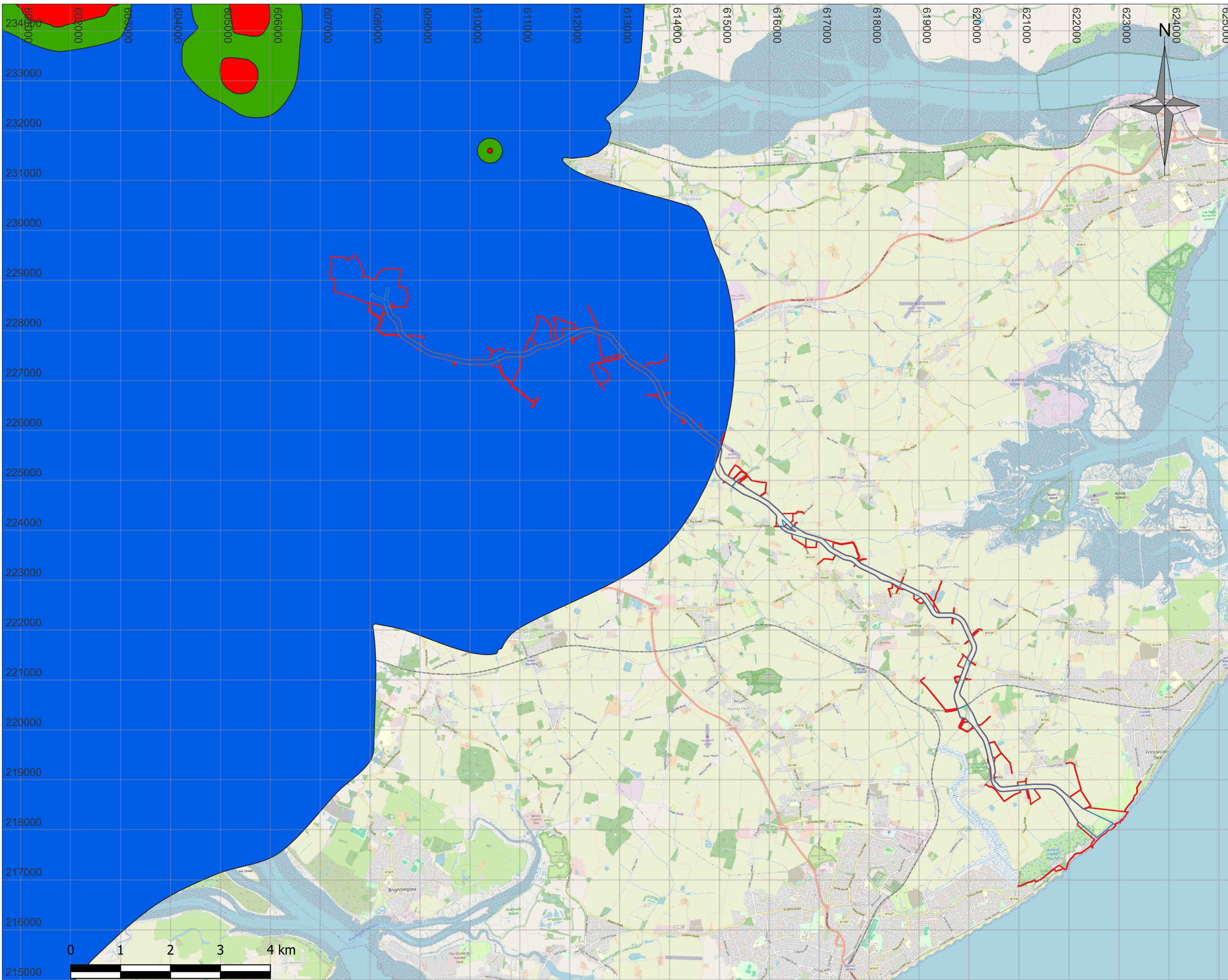
Drawing Title
Bedrock Geology

Scale 1:90,000 @ A3 SLR Project No. 404.V05356.00010

Designed BC	Drawn BC	Checked SM	Authorised MB
Date NOV 2023	Date NOV 2023	Date NOV 2023	Date NOV 2023

Drawing Number 3	Rev 0
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Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
 - SPZ**
 - Zone 1 - Inner Protection Zone
 - Zone 2 - Outer Protection Zone
 - Zone 3 - Total Catchment

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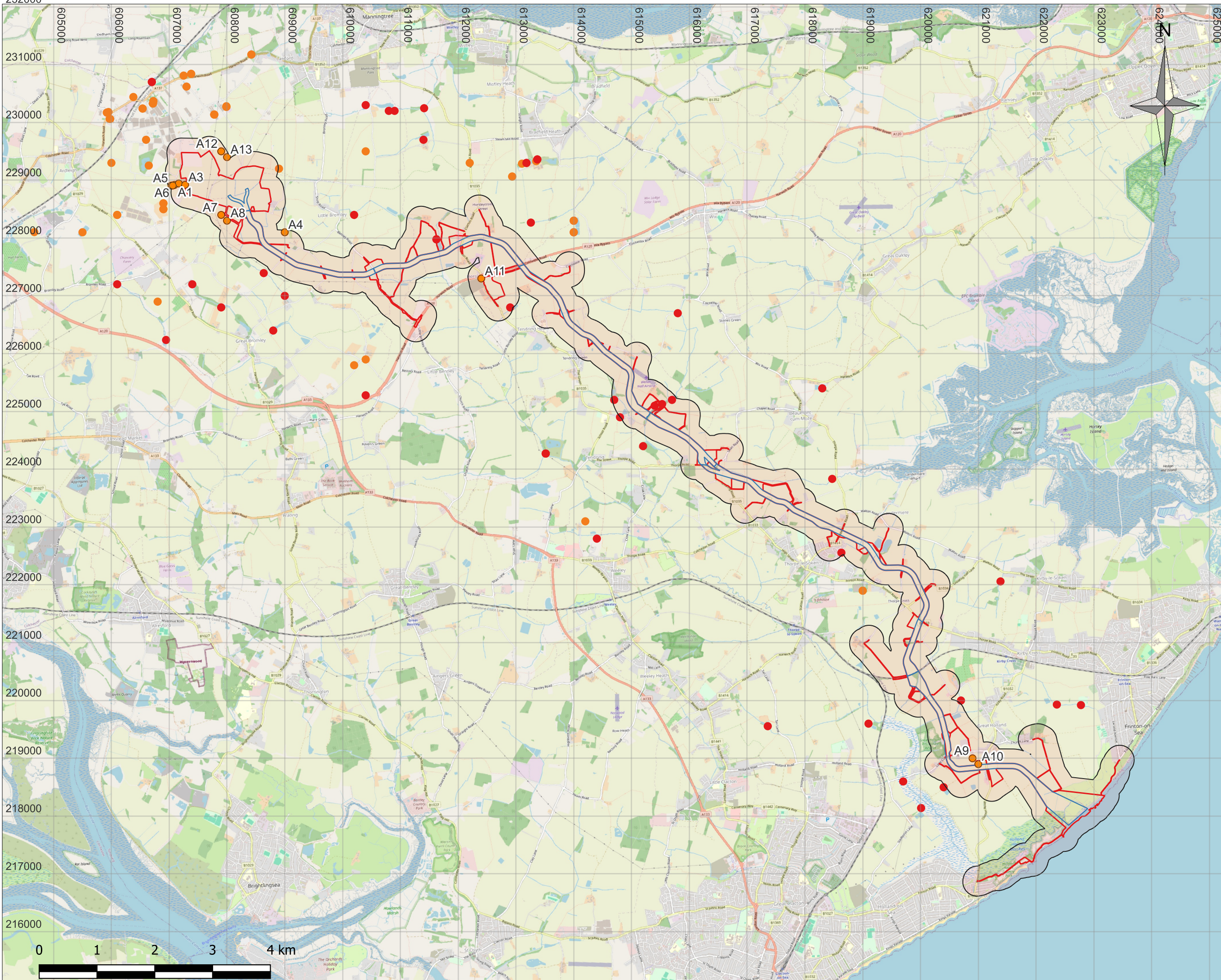
Client
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Project
RWE 5E EIA

Drawing Title
Source Protection Zones

Scale 1:110,000 @ A3 SLR Project No. 404.V05356.00010

Designed BC	Drawn BC	Checked SM	Authorised MB
Date NOV 2023	Date NOV 2023	Date NOV 2023	Date NOV 2023
Drawing Number 4			Rev 0



Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
 - 250m Buffer
- Abstraction Licence**
- Groundwater Abstraction Licence
 - Surface Water Abstraction Licence
 - Groundwater Abstraction Licence of Interest

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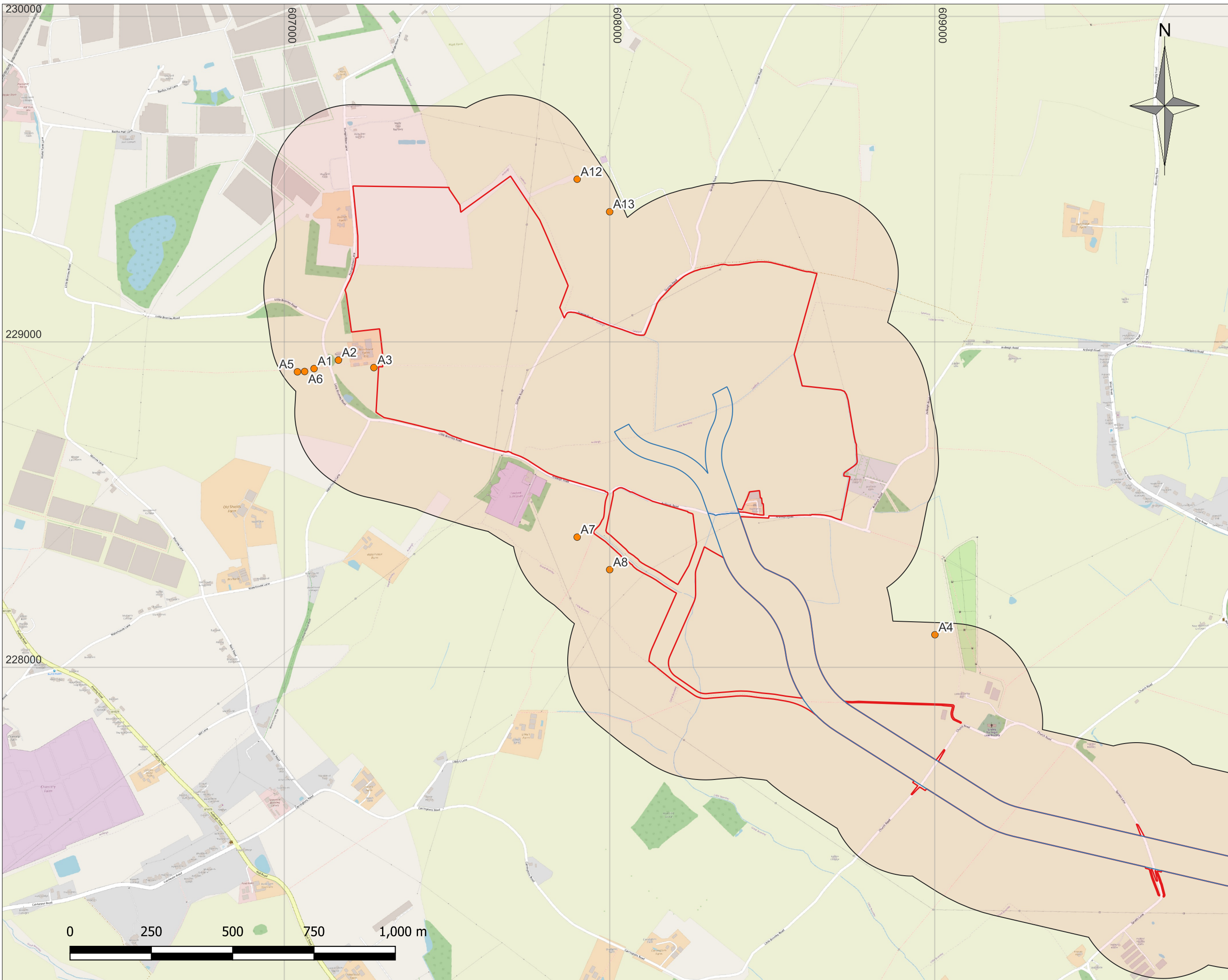
Project
RWE 5E EIA

Drawing Title
Licensed Abstractions

Scale	1:60,000 @ A3	SLR Project No.	404.V05356.00010
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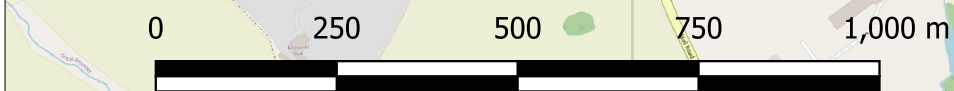
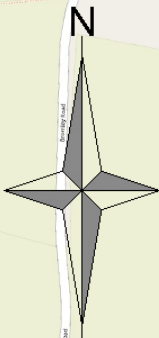
Designed	Drawn	Checked	Authorised
BC	BC	SM	MB
Date	Date	Date	Date
NOV 2023	NOV 2023	NOV 2023	NOV 2023

Drawing Number	5.1	Rev	0
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Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
 - 250m Buffer
 - Groundwater Abstraction Licenses



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Project
RWE 5E EIA

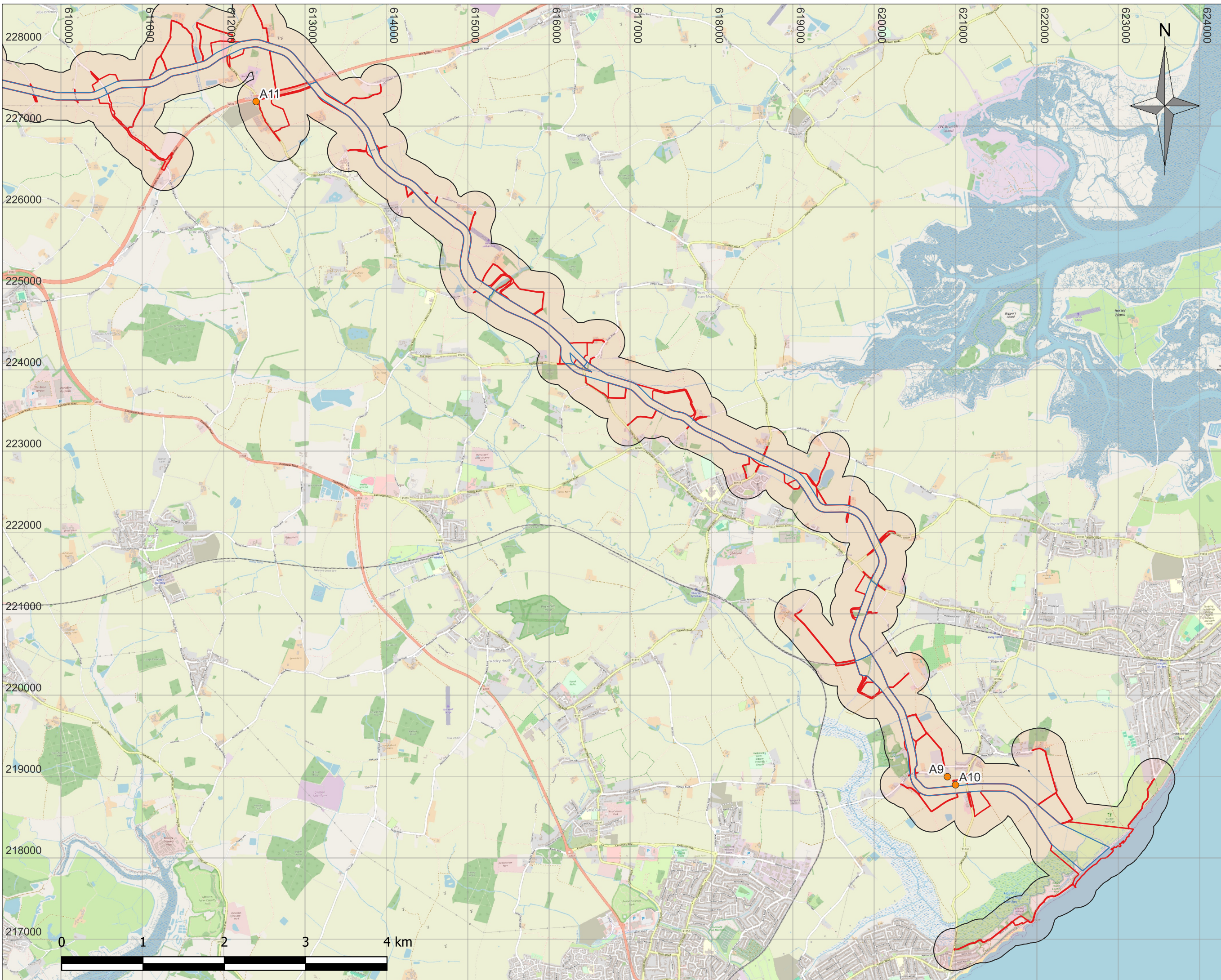
Drawing Title
Licensed Abstractions of Interest North

Scale 1:12,500 @ A3 SLR Project No. 404.V05356.00010

Designed	Drawn	Checked	Authorised
BC	BC	SM	MB

Date	Date	Date	Date
NOV 2023	NOV 2023	NOV 2023	NOV 2023

Drawing Number 5.2 Rev 0



Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
 - 250m Buffer
 - Groundwater Abstraction Licenses

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Rev	Amendments	Date	By	Chk	Auth

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Project
RWE 5E EIA

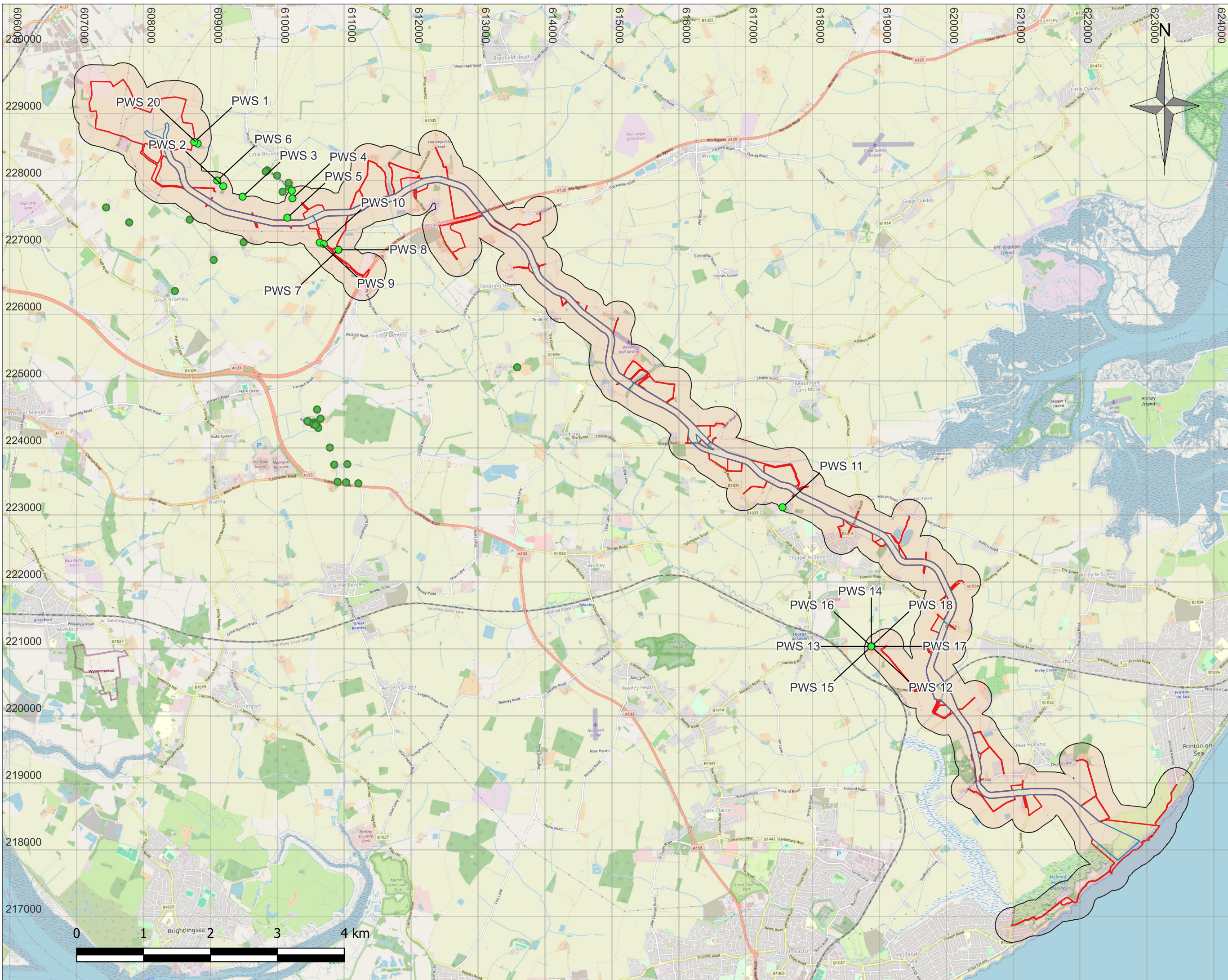
Drawing Title
Licensed Abstractions of Interest South

Scale 1:50,000 @ A3 SLR Project No. 404.V05356.00010

Designed BC	Drawn BC	Checked SM	Authorised MB
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Date NOV 2023	Date NOV 2023	Date NOV 2023	Date NOV 2023
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Drawing Number	5.3	Rev	0
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Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
 - Private Water Supply
 - Private Water Supplies of Interest

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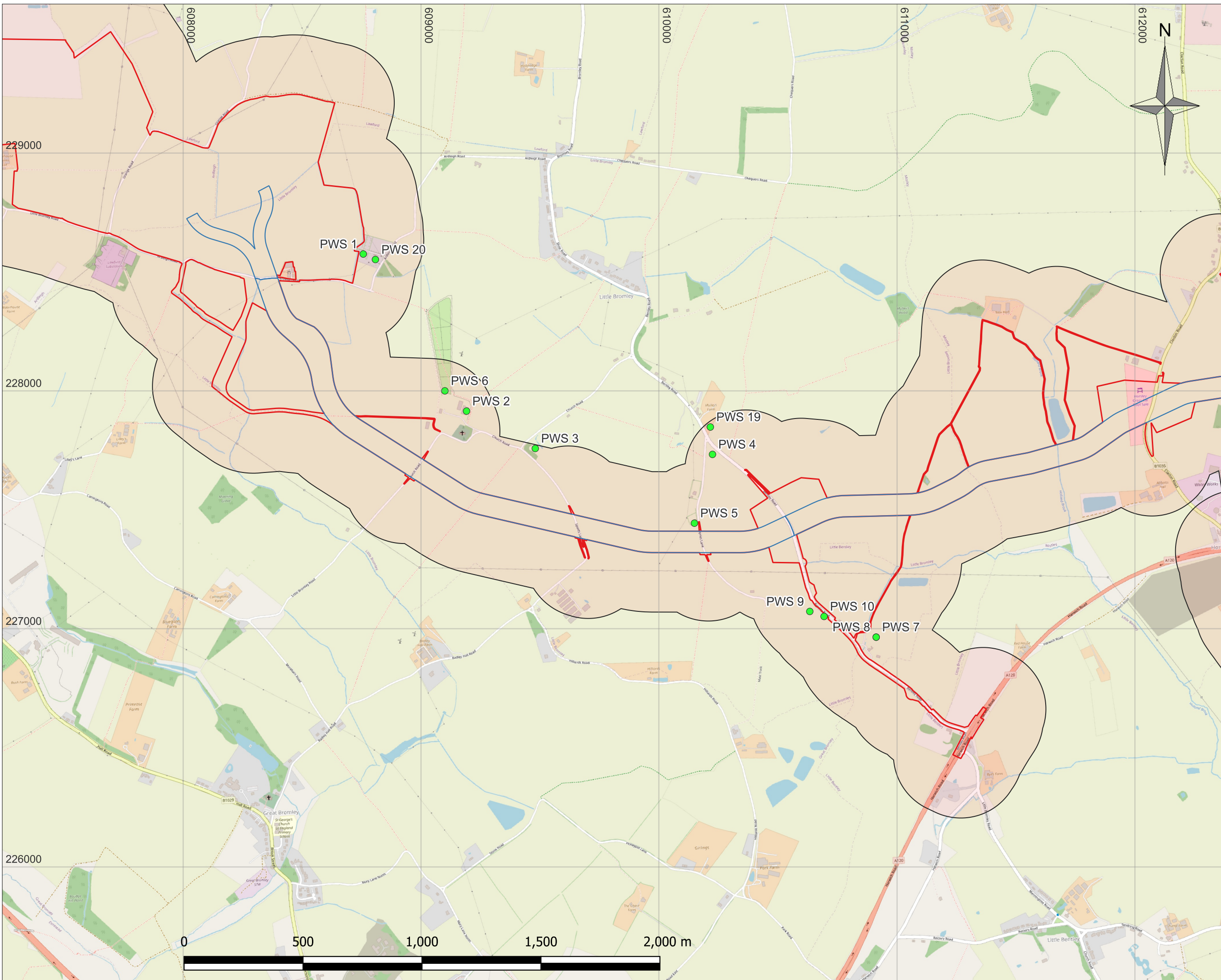
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Project
RWE 5E EIA

Drawing Title
Private Water Supplies

Scale 1:60,000 @ A3		SLR Project No. 404.V05356.00010	
Designed BC	Drawn BC	Checked SM	Authorised MB
Date NOV 2023	Date NOV 2023	Date NOV 2023	Date NOV 2023
Drawing Number 6.1			Rev 0



Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
 - 250m Buffer
 - Private Water Supplies of Interest

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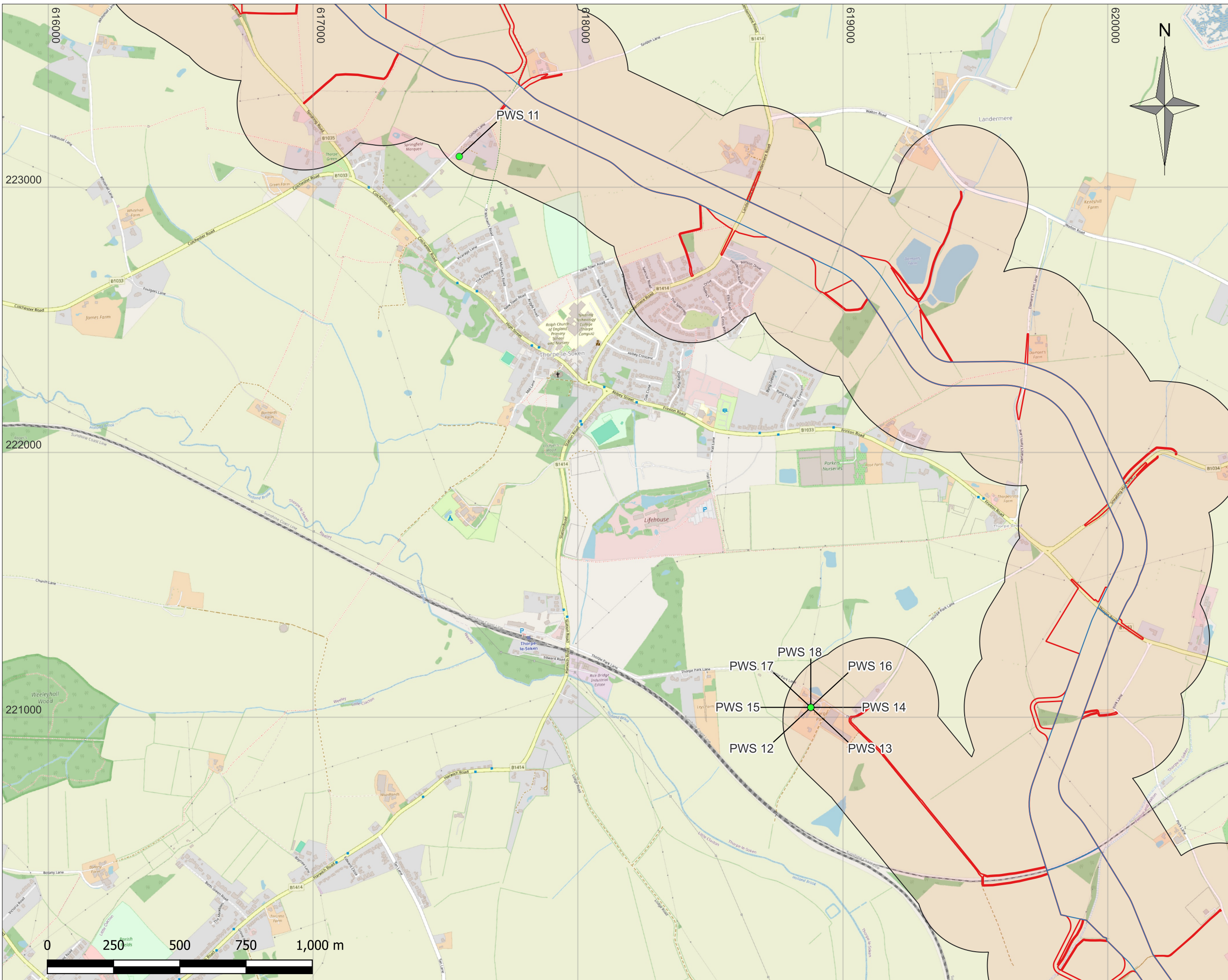
Project
RWE 5E EIA

Drawing Title
PWS of Interest North

Scale 1:15,000 @ A3 SLR Project No. 404.V05356.00010

Designed	Drawn	Checked	Authorised
BC	BC	SM	MB
Date	Date	Date	Date
NOV 2023	NOV 2023	NOV 2023	NOV 2023

Drawing Number	6.2	Rev	0
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Notes:

- Legend:
- Section Boundaries
 - DCO Boundary
 - 250m Buffer
 - Private Water Supplies of Interest

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Drawing Title
PWS of Interest South

Scale 1:15,000 @ A3		SLR Project No. 404.V05356.00010	
Designed BC	Drawn BC	Checked SM	Authorised MB
Date NOV 2023	Date NOV 2023	Date NOV 2023	Date NOV 2023
Drawing Number 6.3			Rev 0



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