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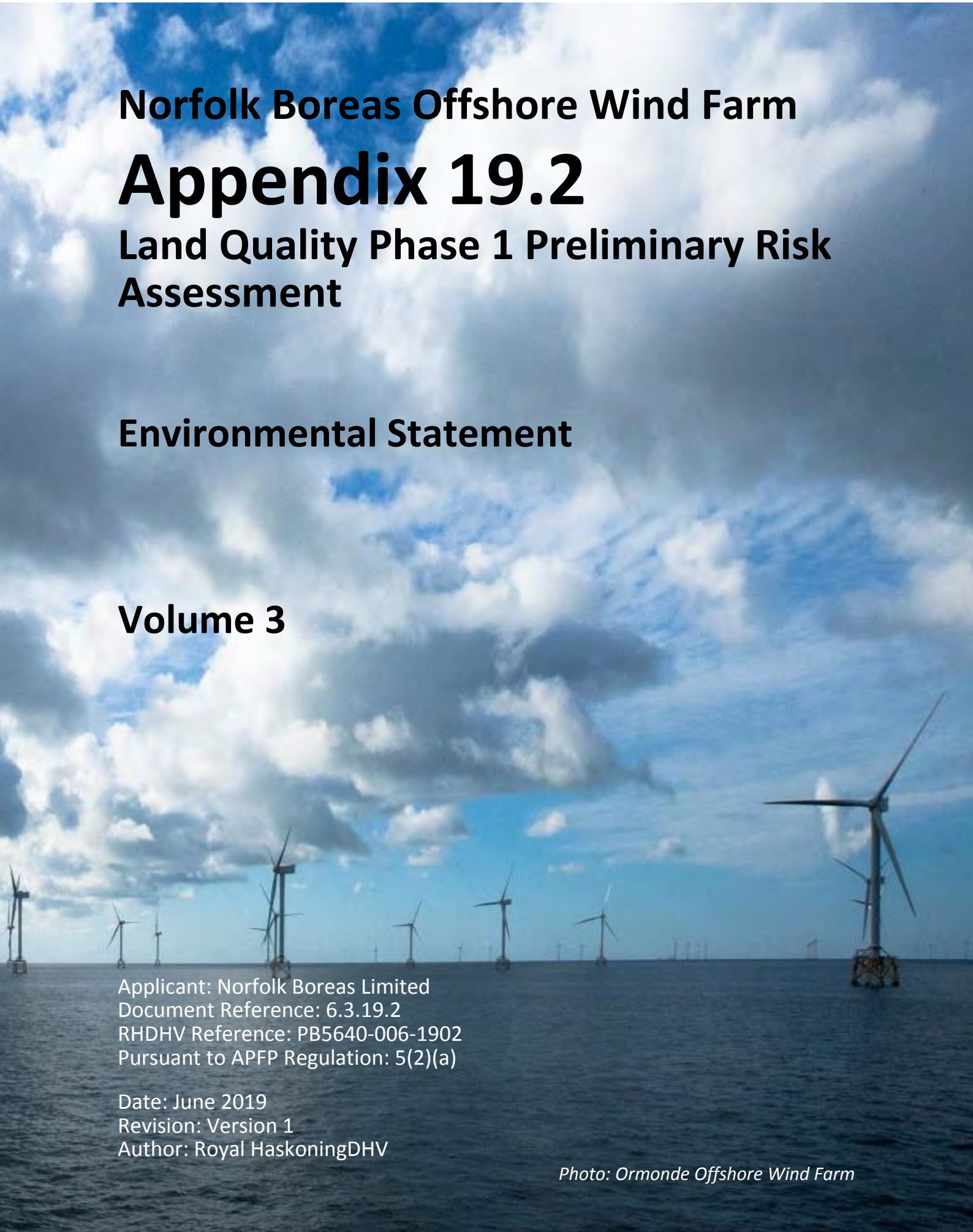
Norfolk Boreas Offshore Wind Farm

Appendix 19.2

Land Quality Phase 1 Preliminary Risk Assessment

Environmental Statement

Volume 3



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Glossary of Acronyms

BGS	British Geological Survey
Bqm^{-3}	Becquerel
CDM	Construction, Design and Management
CIRIA	Construction Industry Research and Information Association
CSM	Conceptual Site Model
EMP	Environmental Management Plan
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IPC	Integrated Pollution Control
kV	Kilovolts
LNR	Local Nature Reserve
MAFF	Ministry of Agriculture, Fisheries and Food
MMP	Materials Management Plan
MSA	Mineral Safeguarding Area
MTBE	Methyl Tert-Butyl Ether
NGR	National Grid Reference
OS	Ordnance Survey
PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated biphenyls
PCOC	Potential contaminants of concern
PEIR	Preliminary Environmental Information Report
PHE	Public Health England
PPE	Personal Protective Equipment
PPG	Pollution Prevention Guidance
PRA	Preliminary Risk Assessment
RAF	Royal Air Force
RPE	Respiratory Protective Equipment
SAC	Special Area of Conservation
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SVOC	Semi-volatile Organic Compounds
VOC	Volatile Organic Compounds

Glossary of Terminology

Landfall	Where the offshore cables come ashore at Happisburgh South.
National Grid substation extension	The permanent footprint of the National Grid substation extension.
Necton National Grid substation	The grid connection location for Norfolk Boreas and Norfolk Vanguard
Onshore cable route	The up to 35m working width within a 45m wide corridor which will contain the buried export cables as well as the temporary running track, topsoil

	storage and excavated material during construction.
Onshore project area	The area of the onshore infrastructure (landfall, onshore cable route, accesses, trenchless crossing zones and mobilisation areas; onshore project substation and extension to the Necton National Grid substation and overhead line modifications).
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, with a step up to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
The project	Norfolk Boreas Wind Farm including the onshore and offshore infrastructure.

1 Introduction

1.1 Scope

1. Royal HaskoningDHV has been commissioned by Norfolk Boreas Limited to carry out a Phase 1 Land Quality Preliminary Risk Assessment (PRA) in support of the Environmental Statement for the onshore project area and infrastructure associated with the Norfolk Boreas Offshore Wind Farm Project (herein 'the project').

2. A detailed description of the project can be found in Chapter 5 Project Description.

1.2 Key Objectives

3. The objectives of the PRA are, in the context of this project, to:

- Identify (as far as reasonably possible) any potential sources of contamination within the study area that may represent an unacceptable risk to construction workers, site users and/or the environment; and
- Conclude whether further investigation or assessment is needed to understand and mitigate the identified risks.

1.3 Methodology

4. The PRA has been completed in general accordance with the approach recommended in Contaminated Land Report 11 (Defra and Environment Agency, 2004).

5. The PRA is a desk-based study and forms the initial step in the assessment of potentially contaminated land. It proceeds, if required, intrusive investigation, risk assessment, options appraisal, remedial design, implementation planning and completion reporting.

6. The main purpose of the PRA is to identify whether there are potentially unacceptable risks to human health or the environment posed by the site and the immediate surroundings, which warrant further investigation.

7. The following desk-based information sources have been reviewed:

- Envirocheck Report compromising identified potential contaminative land uses from historical maps, environmental sensitivity data and permitting records.
- British Geological Survey (BGS) Onshore GeoIndex web portal.
- Environment Agency 'What's in my Backyard' web portal.

8. A site walkover survey of the study area (as defined in section 1.4) was also undertaken concurrently with the Phase 1 habitat survey to verify current conditions

in February 2017 and consulted on as part of Norfolk Vanguard PEIR (Norfolk Vanguard Limited, 2017).

1.4 Study Area

9. The study area for the PRA is based on the Norfolk Boreas onshore project area as defined in Preliminary Environmental Information Report (PEIR) (Norfolk Boreas Limited, 2018) which comprises the following areas:

- Landfall;
- Onshore cable route, accesses, trenchless crossing (e.g. HDD) zones and compounds, mobilisation zones and areas;
- Onshore project substation; and
- Extension to the Necton National Grid substation.

10. Collectively these form the Norfolk Boreas onshore project area presented Figures 19.2.1 to 19.2.6. It should be noted that the onshore project area has been further refined since this assessment was undertaken. The data collected and presented as part of this assessment for the PEIR is still considered to be valid as it covers a wider area that has since been refined.

11. Norfolk Boreas Limited has reviewed consultation received from the Norfolk Vanguard PEIR, the Norfolk Boreas Scoping Opinion (The Planning Inspectorate, 2017) and through the Evidence Plan Process (see Chapter 7 Technical Consultation for further information on this) and in light of the feedback, has made a number of decisions in relation to the project design in order to deliver an environmentally sustainable project generating climate smart, low cost green electricity. One of those decisions is to deploy High Voltage Direct Current (HVDC) cable technology to the UK's National Grid and this removes the need for a Cable Relay Station from the project. This allowed for the 100m onshore cable corridor, as presented in the Scoping report, to be refined to an onshore cable route of up to 35m working width within a 45m wide corridor.

12. The study area consists of the onshore project area plus a 250m buffer from the landfall and along the cable route and a 1000m buffer around the onshore project substation and Necton National Grid extension. This is shown on Figure 19.2.1.

1.5 Report Format

13. This report presents the findings of the PRA and compromises the following principal sections:

- Section 2: Site Location and Land Use;
- Section 3: Environmental Setting;
- Section 4: Preliminary Conceptual Site Model;

- Section 5: Conclusions; and
- Section 6: Recommendations and Next Steps.

2 Site Location and Land Use

2.1 Current Land Use

14. The majority of the study area is agricultural.

15. Settlements within the study area include the towns of North Walsham, Dereham and Reepham, and both roads and railway lines cross though this area.

16. No major contamination sources were identified during the walkover, with the exception of the fly tipping area (TF884098) in the onshore project substation search zone.

17. A detailed description of the current land use can be found in Chapter 21 Land Use and Agriculture.

2.2 Historical Land Use

18. The site history was established from a review of historical maps dating from 1890 to 2017. It must be noted that this is a broad-scale review of the search area to determine its history with respect to potential contaminative use. Only information relevant to land quality has been used in the completion of this PRA. A summary of identified land uses which are considered relevant to the PRA is provided in Table 2.1 and presented on Figure 19.2.1.

Table 2.1 Summary of historical map information relating to land within and surrounding the study area (items in bold are within the study area)

Historical map dates	Land use	Location
Onshore cable route		
1890	Cemetery or Graveyard	Within 250m south (NGR TG285315)
1890	Quarrying of sand & clay, operation of sand & gravel pits	Within 250m south (NGR TG274315)
1890-1983	**Unknown Filled Ground (Pit, quarry etc.)**	**Intersects (NGR TG275317)**
1891	Quarrying of sand & clay, operation of sand & gravel pits	Within 250m north (NGR TG072212)
1891	Quarrying of sand & clay, operation of sand & gravel pits	Within 250m east (NGR TG061189)

Historical map dates	Land use	Location
1891	Quarrying of sand & clay, operation of sand & gravel pits	Within 250m east (NGR TG037167)
1892	Quarrying of sand & clay, operation of sand & gravel pits	Within 250m south (NGR TF974149)
1907	Unknown Filled Ground (Pond, marsh, river, stream, dock etc.)	Within 250 m west (NGR TF940123)
1907	**Clay bricks & tiles [manufacture]**	**Intersects (NGR TG243308)**
1907	Unknown Filled Ground (Pond, marsh, river, stream, dock etc.)	Within 250m west (NGR TF939124)
1907	Clay bricks & tiles [manufacture]	Within 250m south (NGR TF984151)
1907	Cement, lime & plaster products [manufacture]	Within 250m east (NGR TG060190)
1950	Railways	Within 250m east
1951	Quarrying of sand & clay, operation of sand & gravel pits	Within 250 south (NGR TG056182)
1958	**Unknown Filled Ground (Pond, marsh, river, stream, dock etc.)**	**Intersects (NGR TF993152)**
1958	Unknown Filled Ground (Pond, marsh, river, stream, dock etc.)	Within 250m north (NGR TF996153)
1958	Unknown Filled Ground (Pond, marsh, river, stream, dock etc.)	Within 250m west (NGR TG067205)
1958	Unknown Filled Ground (Pond, marsh, river, stream, dock etc.)	Within 250m west (NGR TG064201)
1972	Unknown Filled Ground (Pit, quarry etc.)	Within 250m south (NGR TG307317)
1975	Electricity Industry Facilities	Within 250m south (NGR TG105236)
1985	Potential tanks	Within 250m south (NGR TG105236)
1978	Tanks	Within 250m west (NGR TG064200)
1982	Unknown Filled Ground (Pit, quarry etc.)	Within 250m west (NGR TG048180)
1982	Unknown Filled Ground (Pit, quarry etc.)	Within 250m north (NGR TG053186)
1982	Unknown Filled Ground (Pit, quarry etc.)	Within 250m west (NGR TG056188)
1982	Unknown Filled Ground (Pit, quarry etc.)	Within 250m west (NGR TG054190)
1982	Unknown Filled Ground (Pit, quarry etc.)	Within 250m east (NGR TG060189)

Historical map dates	Land use	Location
1982	Unknown Filled Ground (Pit, quarry etc.)	Within 250m west (NGR TG061199)
1983	**Unknown Filled Ground (Pit, quarry etc.)**	**Intersects (NGR TG098238)**
1983	Unknown Filled Ground (Pit, quarry etc.)	Within 250m west (NGR TG062200)
1984	Road haulage	Within 250m south (NGR TG106236)
1984	Unknown Filled Ground (Pit, quarry etc.)	Within 250m south (NGR TF981152)
1984	Unknown Filled Ground (Pit, quarry etc.)	Within 250m north (NGR TF987155)
1984	**Unknown Filled Ground (Pit, quarry etc.)**	**Intersects (NGR TG134249)**
1984	Electricity production & distribution [ink large transformers]	Within 250m south (NGR TG126241)
1990	Unknown Filled Ground (Pit, quarry etc.)	Within 250m north (NGR TG184278)
1990	Sawmilling, planning & impregnation [i.e. treatment of timber]	Within 250m north (NGR TG174279)
Onshore project substation		
1887	Quarrying of sand & clay, operation of sand & gravel pits	within north250m (NGR TF877101)
1906	Clay bricks & tiles [manufacture]	Within 250m north-west (NGR TF884109)
1958	**Unknown Filled Ground (Pond, marsh, river, stream, dock etc.)**	**Intersects (NGR TF920109)**
1958	**Unknown Filled Ground (Pond, marsh, river, stream, dock etc.)**	**Intersects (NGR TF919098)**
Landfall (Happisburgh South)		
1970	Electrical Sub Station Facilities	Within 250m to the north(NGR TG386307
1970	Tanks	Within 250m to the north (NGR TG386307
1972	Electricity production & distribution [including large transformers]	Within 250m to the north (NGR TG386307)

19. Note that historical Ordnance Survey (OS) mapping often contains omissions for national security purposes. The east of England has been heavily used for military installations (such as airfields) which are often missing from the historical OS maps (see Chapter 28 Onshore Archaeology and Cultural Heritage for further information).

3 Environmental Setting

3.1 Permitting and Industrial Land Use

3.1.1 Discharge consents

20. Discharge consents within the study area are shown in Figure 19.2.2. There is one discharge consent within the onshore project area (Map 5 of Figure 19.2.2). This is located to the north of North Walsham and is associated with sewage discharges.

3.1.2 Pollution incidents

21. There was only one minor pollution incident within the onshore project area (Figure 19.2.2). This occurred in 1993. According to the Environment Agency, the pollution incident was associated with miscellaneous pollutants. There have been no other recorded pollution incidents within the onshore project area. However, there has been a number of pollution incidences recorded within 250m the study area. These are all presented on Figure 19.2.2.

22. In addition, a military jet crash occurred in December 1996 in one of the fields in proximity to the onshore 400kV cable route. According to the environmental assessment report from the Royal Air Force (RAF) (RAF Institute of Health and Medical Training, 2017) the contaminates associated with plane crash included carbon fibre, hydrazine, oil products and fuel. The crash site was remediated including the removal of hydrazine tank from the site by specialists along with other parts of the aircraft. The hydrazine was neutralised using solution of calcium hypochlorite. Both soil, gas and water samples were taken from the site to identify any contaminated soils. The pollution monitoring team returned to the site in January 1997 to confirm the amount of contaminated soil to be removed from the site.

23. An initial report from the National Rivers Authority on the crash references that the Environment Agency Integrated Pollution Control (IPC) team advised the Ministry of Agriculture, Fisheries and Food (MAFF) of a risk of radioactive substances at the crash, however there was no mention of radioactive substances in the RAF environmental report (RAF Institute of Health and Medical Training, 2017)

3.1.3 Waste management sites

24. No waste management facilities or areas of current or historical landfilling have been identified within the onshore project area. Waste management facilities and areas of landfilling (current and historical) within the study area are shown in Table 3.1 and presented on Figure 19.2.2.

Table 3.1 Waste management facilities within the study area

Description	Location
Scrapyard - No known restriction on source of waste	200m south
Licensed Waste Facility	200m south
Household, Commercial and Industrial transfer stations	250m south
Recorded Landfill Site - Cesspool Disposal Tip (closed)	60m south
Historic Landfill. Deposited Waste included Liquid Sludge	20m south

3.1.4 Contemporary trade activities

25. There are no contemporary trade entries within the onshore project area. There are 97 contemporary trade entries within the study area (Figure 19.2.2). These are operational businesses which may include potentially contaminative activities. These include:

- Electronic component manufacture & distribution;
- Machine shop;
- Car body repairs;
- Clothing and fabric manufacture;
- Mechanical engineers;
- Car breakers and dismantlers;
- Oil and gas extraction (Bacton Gas Terminal area);
- Screen processes;
- Bus and coach operators and stations;
- Scrap metal merchants;
- Brewers;
- Medical equipment manufacture;
- Road haulage services;
- Garage services;
- Waste disposal services;
- Commercial cleaning services;
- Car dealers;
- Petrol filling station;
- Pest & vermin control;
- Recycling centre;
- Spraying – paint and coatings; and
- Gunsmith.

3.2 Environmental Setting

3.2.1 Geological conditions

26. The geological conditions within the study area have been collated from the Envirocheck report and the BGS online viewer. The indicated geological sequence is outlined in Table 3.2 and presented on Figure 19.2.3.

Table 3.2 Geology

Stratum	Unit Name	Description
Superficial Deposits	Till - Diamicton	Variable lithology, usually sandy, silty clay with pebbles, but can contain gravel-rich, or laminated sand layers; varied colour and consistency.
	Glacial Sand and Gravel	Sand and gravel with rare clay interbeds; often cross-bedded; of glacial origin.
	Alluvium	Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel.
Bedrock	Crag	Neogene And Quaternary Rocks (undifferentiated) - Gravel, Sand, Silt and Clay.
	White Chalk	Chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout.

3.2.2 Mining and mineral extraction

27. The site is not located in an area that might be affected by coal mining activity.

28. The onshore project area contains significant sand and gravel resources, associated with the glaciofluvial deposits. A Mineral Safeguarding Area (MSA) is an area designated by the Mineral Planning Authority to protect known deposits of mineral resources from unnecessary sterilisation by non-mineral development. The onshore cable route crosses several MSAs, as shown on Figure 19.2.4.

29. There are 23 mineral sites recorded by the BGS that are crossed by the onshore project area. They consist of sites that were formerly used for the extraction of common clay, shale, gravel and sand, and all have now ceased operations.

30. The presence of these mineral workings is only likely to impact on the risk from contaminants where the workings have been subsequently backfilled. The impact of the proposed project on the mineral resources of the area is discussed in Chapter 19 Ground Conditions and Contamination.

3.2.3 Radon gas

31. The presence of radon gas is assessed in the UK according to the number of homes likely to be above the Action Level (200 becquerels per cubic metre (Bqm^{-3})). Under

building regulations the requirement for protection measures (described in BRE, 2015) in the construction of new buildings, conversions or extensions is dependent on Radon Potential.

32. The Radon Potential dataset is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland, created jointly by Public Health England (PHE) and the BGS using long-term radon measurements made in over 479 000 homes across Great Britain and 23,000 homes across Northern Ireland (without affecting householders' confidentiality), combined with geological map data.

33. PHE recommends that radon levels should be reduced in homes where the annual average is at or above 200Bq m^{-3}. This is termed the Radon Action Level.

34. BGS data indicate that the study area is located within a lower probability radon area (less than 1% of homes above the Action Level) therefore no protective measures are required.

3.2.4 Groundwater

3.2.4.1 Hydrogeology

35. Hydrogeological information has been collated from the Envirocheck data. Superficial and bedrock strata are classified by the Environment Agency according to their resource value and vulnerability as shown in

36. Table 3.3 and shown on Figure 19.2.5.

37. The Environment Agency's groundwater vulnerability maps indicate the study area is located within an area of high groundwater vulnerability (overlying a permeable aquifer). This indicates soils which may be able to transmit a wide range of pollutants into any groundwater stored in strata beneath them. This designation is based on limited information and so a worst case groundwater vulnerability classification is assigned. However, the superficial deposits classified as unproductive strata and are likely to minimise the flow of contamination and therefore provide a degree of protection to underlying water resources.

Table 3.3 Environment Agency groundwater classifications

Criteria	Location	Class	Class
Aquifer Classification	Superficial Deposits	Secondary Aquifer - Undifferentiated	*Principal* aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. *Secondary A* aquifers contain permeable layers capable of supporting water supplies at a local rather
		Secondary Aquifer - A	
		Secondary Aquifer - B	

Criteria	Location	Class	Class
		Unproductive Strata	than strategic scale, and in some cases forming an important source of base flow to rivers. *Secondary B* aquifers may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. *Secondary Undifferentiated* aquifers have not been categorised as A or B due to their variable characteristics.
	Bedrock	Principal (chalk)	

38. BGS flood risk information indicates that most of the study area is located within areas with limited potential for groundwater flooding. However, there are some areas with potential for groundwater flooding at the surface and of property situated below ground level within the study area. These are located in the area of Scarning, Bushy Common, Dillington, Wensum River, Cawston, River Bure, North Walsham, Walcott, Witton and Fox Hill, as shown on Figure 19.2.6.

3.2.5 Groundwater abstractions

39. There are a number of licenced groundwater abstractions within the onshore project area.

40. Note that the data search has not included identification of unlicensed water supplies withdrawing less than 20m^3 water per day.

3.2.6 Groundwater Source Protection Zones

41. Groundwater Source Protection Zones (SPZs) are defined around abstraction boreholes used for potable water supply, to delineate the area where release of a contaminant into the aquifer could impact on the abstraction. There are three types of SPZ:

- The Inner Zone (Zone 1) is the most sensitive and some activities with potential to pollute groundwater are restricted in this area;
- The Outer Zone (Zone 2) is less sensitive, and there are fewer restrictions; and
- Outside Zone 2 is the Total Catchment (Zone 3), which indicates the recharge area that contributes to that water supply.

42. The Environment Agency has published SPZs for public water supplies and other significant sources. For potable abstractions without published SPZs there is a default Inner Zone of 50m radius and, an Outer Zone of 250m or 500m radius (depending on the size of the abstraction).

43. The onshore project area would cross several SPZ as shown on Figure 19.2.5.

3.3 Surface Water

3.3.1 Hydrology and drainage

44. The project is located within four main surface water catchments:

- The River Bure and several of its tributaries (most notably King's Beck) would be crossed by the proposed cable route. The river rises near Briston, from where it flows in an easterly direction until it reaches Aylsham. From here, it continues to flow to the south east until it enters the sea at Great Yarmouth. The downstream reaches of the river include a wide range of wetland features, including Hoveton Great broad and Marshes, Woodbastwick Fens and Marshes, Bure Marshes and the Norfolk Broads.
- The River Wensum and several of its tributaries (most notably Wendling Beck and the Blackwater Drain) would be crossed by the onshore cable route. The river rises near Whissonsett, from where it flows north towards Fakenham before continuing in a broadly south easterly direction towards Norwich.
- The River Wissey, the headwaters of which would include the proposed grid connection at the Necton National Grid substation. The Wissey rises to the south of Dereham, from where it drains in a westerly direction towards Necton before eventually joining the River Great Ouse at Denver Sluice, near Downham Market.
- The North Walsham and Dilham Canal would be crossed by the onshore cable route at North Walsham. The canal commences at Antingham, from where it flows in an easterly direction towards Swafield. The canal is joined by several natural watercourses, including Fox's Beck. The watercourse then continues south-east through North Walsham, to Wayford Bridge, near Dilham, where it joins the tidal River Ant. The River Ant continues to flow in a southerly direction until it joins the River Bure at Horning.

3.3.2 Surface water abstractions

45. There are currently no knowns licenced surface water abstractions within the onshore project area. However, the data search has not included identification of unlicensed water supplies withdrawing less than $20m^3$ water per day.

3.4 Sensitive Land Use

46. There are four environmentally Sensitive Areas located within the study area:

- River Wensum Site of Special Scientific Interest (SSSI);
- River Wensum Special Area of Conservation (SAC); and
- Pigney's Wood Local Nature Reserve (LNR).

4 Preliminary Conceptual Site Model and Qualitative Risk Assessment

4.1 Conceptual Site Model

4.1.1 Preliminary conceptual site model terminology

47. For contamination within soil or water to pose a risk, a pollutant linkage must be established. A pollutant linkage consists of three parts:

- A source of contamination in or on the land;
- A pathway by which the contaminant can cause harm (or which presents a significant possibility of such harm being caused); and
- A receptor that is sensitive to impact from the contamination.

48. Where all three of these parts are present, a pollutant linkage exists. Current guidance recommends that a Conceptual Site Model (CSM) is formulated based on the information available. As more information becomes available the conceptual model may be updated. The CSM is limited at this stage to the identification and assessment of potential sources, potential receptors, and the anticipated pathways to those receptors identified as result of the documentary research.

4.1.2 Potential sources of ground contamination

49. Contamination sources can include neighbouring land uses and historical activities within the study area and in its surrounding. From the desk based information and the findings of the site walkover, potential sources of contamination within the onshore project area are considered to be:

- Agricultural land can be associated with some contaminative activities including use/storage of pesticides and herbicides and burial of wastes (including asbestos);
- The dismantled railway lines south east Themelthorpe, south east of Oulton, are largely Made Ground and have the potential to contain elevated concentrations of contaminants such as petroleum and diesel hydrocarbons, heavy metals and polyaromatic hydrocarbons (PAHs);
- A number of historical common clay and shale pits and sand and gravel pits present in various locations within the study area have been infilled, and may contain unknown and potentially contaminated fill material;
- Historical clay bricks and tiles manufactures north and north east of North Walsham, which could be associated with heavy metals (e.g. hexavalent chromium) and inorganic compounds (arsenic compounds);
- Graveyard north of North Walsham, which may be source of contaminants, such as metals, nutrients and pathogens;

- Historic tanks in Happisburgh, which may be associated with very wide range of contaminants including hydrocarbons and other organic compounds like PCBs. It is understood that these are connected with the lighthouse and
- Potential residual contamination associated with a historic military jet crash.

50. The following potential sources of contamination within the study area have been identified:

- Road haulage centre north of Reepham, which might be associated with hydrocarbons, Volatile Organic Compounds (VOCs) such as Methyl Tert-Butyl Ether (MTBE) and chlorinated hydrocarbons, Semi Volatile Organic Compounds (SVOCs), heavy metals (zinc, copper, chromium and lead) and Polycyclic Aromatic Hydrocarbons (PAHs);
- Electricity Industry Facilities north of Reepham; associated with very wide range of contaminants including hydrocarbons and other organic compounds such as PCBs;
- Timber treatment works in Silvergate, which may be associated with contaminants such heavy metals, inorganic elements and compounds such as chlorates and sulphates and PAHs;
- Petroleum Storage Facilities near Walcott, which may be associated with a very wide range of contaminants including hydrocarbons and other organic compounds such as PCBs; and
- Historical landfill south west of Witton may be associated with a very wide range of contaminants, including VOCs, SVOCs, heavy metals, cyanides, ammonium, chlorides, sulphates and PAHs.

4.1.3 Identified receptors

51. Based on the current and proposed use of the site, it is considered that the likely receptors will be:

- Future end users of the site during operational phase of Norfolk Boreas when land is largely returned to its former use (farm workers) through dermal contact, ingestion and inhalation (with the exception of the substation site, the end use of the land will not change as a result of the development);
- Construction and maintenance personnel involved in excavation (e.g. cable installation, substation construction and reinstatement of services) through dermal contact, ingestion and inhalation;
- Shallow groundwater (Secondary A or B aquifers where present), the quality of the water may be affected by the leaching and disturbance of soil borne contaminants;
- Deep groundwater (Principal aquifer) is present beneath superficial deposits beneath the study area. It might be affected by direct disturbance or leaching

and groundwater migration where connectivity to the localised shallow aquifers exists;

- Surface freshwater bodies (various rivers, streams, ditches, ponds, lakes and a canal) through leaching of any soil borne contaminants, inflow of contaminated groundwater or direct entry by runoff; and
- The Environmentally Sensitive Areas Sites, for example River Wensum SSSI and SAC, through leaching, groundwater inflow or runoff.

4.2 Qualitative Risk Assessment

Table 4.1 Preliminary Conceptual Site Model and Qualitative Risk Assessment

Land Use	Pathway	Receptor	Qualitative Assessment Discussion of Pollutant Linkage & Risk Management
Sources within the onshore project area			
Made Ground and infill material. Historical Works and tanks. Dismantled railway line. Agricultural land. Graveyard. Historic military jet crash.	Dermal Exposure, Inhalation, Ingestion	Human Health (Construction Workers)	Made Ground may be encountered within the onshore project area in areas such as former pits, historical works, dismantled railways. Further investigation should be conducted to ensure the nature of the material is understood prior to construction. The majority of the survey area crosses agricultural land, where significant contamination is not expected, there is a small risk of encountering buried asbestos or agrochemical waste. There is a potential risk of encountering residual contamination associated with the military jet crash, with potential associated contaminates including carbon fibre, hydrazine, oil products and fuel. Where contaminated materials are encountered these should be segregated and assessed for their suitability for re-use or disposal off site. Where practical, trenchless crossing techniques (e.g. Horizontal Directional Drilling (HDD)) could be used to avoid significantly contaminated areas. Short term exposure will be mitigated by the use of appropriate personal protective equipment and appropriate methods of working. **Potential contaminants of concern (PCOC) could be present in the study area and could represent an unacceptable risk to construction workers. However, it is likely that short term risks associated with construction could be managed through the use of personal protective equipment and appropriate working practices.**
	Leaching, Groundwater migration	Principal, Secondary A Aquifer	Land within study area is largely in agricultural use. Significant leachable contamination is not anticipated.

Land Use	Pathway	Receptor	Qualitative Assessment Discussion of Pollutant Linkage & Risk Management
		Secondary Undifferentiated Aquifer	Where encountered made ground materials should be assessed for their suitability prior to re-use. Land within study area is largely in agricultural use. Significant leachable contamination is not anticipated. The underlying geology comprises mainly of sands and gravels, which are highly permeable materials The Secondary aquifers are considered to be linked to the underlying Principal aquifer. There is the potential for contaminants of concern such as hydrocarbons and metals to leach from the Made Ground and migrate in groundwater and impact groundwater resources. Leaching/migration of contaminants can result in impacts to sensitive water resources. Several SPZs will be crossed by or lie adjacent to the onshore project area. The abstractions related to these zones are not considered to be at risk from the general cable construction works. However, where deeper trenchless crossing techniques (e.g. HDD) are to be undertaken the risk to the SPZs should be considered further. Trenchless crossing techniques (e.g. HDD) are proposed in Zone 3 in the area of Scarning, in Zones 1 and 2 north of Dereham and North Walsham, in Zone 3 under the River Wensum, in Zone 3 under the Cromer Road and in Zone 3 south of Edingthorpe (Figure 19.2.5). Investigation should be carried out to ensure there is a sufficient thickness of impermeable deposits to protect the underlying aquifer. Where the trenchless crossing techniques (e.g. HDD) exceed the depth of drift deposits, or comes close to the base, mitigation measures should be set in place to protect the aquifer, prevent the creation of a temporary or permanent pathway for groundwater migration (and prevent a pollution incident from the disturbance of sediments or accidental spillage or leakage of drilling fluids. This is discussed in Chapter 19 Ground Conditions and Contamination.

Land Use	Pathway	Receptor	Qualitative Assessment Discussion of Pollutant Linkage & Risk Management
			Some parts of the study area are located in the area prone to fluvial flooding and with the potential for groundwater flooding. Flood events could potentially cause mobilisation of pollutants from the ground into surface waters. If any ad-hoc or unexpected contamination is encountered during trenching operations this should be further investigated. Protocols should be in place to ensure that unexpected contamination can be managed to prevent a pollution incident. **PCOC could therefore represent an unacceptable risk to controlled waters from leaching or groundwater transport.**
		Surface waters	The presence of the Till in many locations throughout the study area will significantly delay the potential migration of any contaminants encountered or disturbed. Watercourses crossed by Norfolk Boreas may be in close connection with groundwater, and where this groundwater supports potable abstractions, contamination entering the watercourse may be drawn to the abstraction points. **PCOC could therefore represent an unacceptable risk to controlled waters from leaching or groundwater transport.**
	Direct Entry	Surface Waters/ Marine Environment	The study area is largely comprised of agricultural land therefore significant areas of contamination are not expected. Appropriate control/mitigation measures should be put in place by the contractor during construction works to prevent migration of contaminated sediments to controlled waters. **The potential risk from this pollutant linkage is considered to be low.**

Land Use	Pathway	Receptor	Qualitative Assessment Discussion of Pollutant Linkage & Risk Management
Sources within the Study area			
Agricultural land. Road haulage centre. Electricity Industry Facilities. Historic works. Petroleum Storage Facilities. Historic landfill. Historic military jet crash.	Dermal Exposure, Inhalation, Ingestion	Human Health (Construction Workers)	Short term exposure will be mitigated by the use of appropriate personal protective equipment and appropriate methods of working. Areas of localised potential contamination lie adjacent to the study area as landfills and filled pits. There is the potential for contaminants within leachates or groundwater to migrate into the area of the cable route and therefore be encountered during construction works. **PCOC could be present in the study area and could represent an unacceptable risk to construction workers. However, it is likely that short term risks associated with construction could be managed through the use of personal protective equipment and appropriate working practices**.
	Gas migration through permeable strata	Human Health (Future Site Users)	There is the potential for gas generation and migration into the study area within the permeable strata. Any confined spaces, manholes or pits should be constructed away from potential contamination risk areas to prevent the risk of maintenance contractors entering an area subject to potential gas build up. **The potential risk from this pollutant linkage is considered to be low.**

4.3 Uncertainties in the Conceptual Site Model

52. At this stage in the process there are a number of uncertainties associated with the preliminary conceptual site model, specifically associated with defining the potential sources and the respective pathways as summarised below:

- The presence, magnitude and extent of the PCOC needs to be established to determine risks to human health, controlled waters and property;
- The mobility of contaminants needs to be established to determine risks to controlled waters; and
- The geology and hydrogeological regime at the site needs to be established to determine the potential for contaminant migration, including ground gas.

5 Conclusions

53. A desk-based assessment of contamination risks has been undertaken for Norfolk Boreas. A number of localised potential sources of contamination have been identified within or near the onshore project area. The potential risk posed by the off-site sources is only likely to be realised where the contamination sources co-exist with the more permeable Glaciofluvial Deposits. Therefore for the off-site sources, no further action would be required in areas where the potential sources and permeable strata do not co-exist.

54. Should the onshore cable route cross a zone of permeable material that co-exists with an area of potential contamination, there may be a risk of encountering impacted groundwater, or ground gas migration. Precautions should be taken to ensure that a further pathway for contaminant migration to controlled waters is not created and that the risk to future workers and construction workers is mitigated or managed by gas monitoring while working in confined spaces or siting jointing pits away from potential risk areas.

55. As part of the cable installation process, trenchless crossing techniques (e.g. HDD) would be required under Scenario 2 only to allow trenchless installation across a number of features (e.g. highway infrastructure, larger watercourses, railway line, etc.). Several trenchless crossing (e.g. HDD) locations will be conducted, under Scenario 2 above SPZs. Trenchless crossings (e.g. HDD) works in these locations should ensure that a sufficient thickness of glacial material is present to prevent migration of contaminants into the protected Principal aquifer beneath.

6 Recommendations and Next Steps

56. Given Norfolk Boreas' design and the findings of the PRA, a number of recommendations have been made. These are detailed below.

6.1 Soil investigation

57. It is recommended that ground investigations and further assessment of potential Made Ground in the on-site source areas at dismantled railway lines and historic military jet crash area are undertaken to establish the risk to construction and the suitability of soils for re-use.

58. It is recommended that the potential risk posed by the off-site sources is established. Further desk based assessment should be undertaken to establish the presence of this linkage. If this linkage is found to be present, an investigation to establish the risk to construction from leachates and gas migration would be recommended.

59. Protocols for dealing with unexpected contamination should be set in place prior to construction to ensure that procedures are known and agreed with the Regulators should contaminated materials be encountered.

60. Ground investigation and further assessment has been completed for the areas of the HDDs where they cross SPZs to ensure that drilling will not disturb the SPZs for the Principal aquifer beneath.

6.2 Soil movement/ reuse on-site

61. In terms of managing the movement and reuse of materials, reference should be made to the CL:AIRE Code of Practice (CL:AIRE, 2011). *The definition of waste: Development Industry Code of Practice.* The code is aligned with CLR11 (Defra and Environment Agency, 2004) where land is either contaminated or suspected of being contaminated. It must be noted that there is no similar published framework available for cases where land is not suspected of being contaminated. The code does, however adopt a similar approach for the latter scenario, whereby a Design Statement is required (where a remediation strategy would otherwise be necessary).

62. Firstly, it must be determined whether the soils to be excavated on-site are a waste material or not. This depends on a range of factors set out in Environment Agency and CL:AIRE guidance, principally:

- Suitability of material for use (without any further treatment);
- Certainty of use within the design; and
- Quantity of material.

63. To demonstrate that the criteria have been satisfied, a Materials Management Plan (MMP) must be prepared, which will ultimately form part of a wider design statement. The MMP will include an auditable tracking system and make allowance for contingency arrangements, e.g. discovery of unexpected soil materials on-site.

64. If it is envisaged that the use of materials will occur in excess of one year from being stockpiled or stored on-site a time limit must be agreed with the Environment Agency. The decision relating to the length of storage will be made within the context of the extant planning permission or agreed programme of works. It is likely that supporting information will be requested by the Environment Agency. Such information may include site plans, cross sections and information regarding stockpile management issues, such as control of dust, suspended solids and runoff.

6.3 Waste disposal/ imported material

65. Any material excavated and requiring disposal off site will need to be characterised and disposed of in accordance with the Landfill Regulations 2002 (as amended) and the Hazardous Waste Regulations 2005, where applicable. Any material classified as hazardous waste will require pre-treatment prior to disposal to either reduce the volume of hazardous waste requiring disposal or to reduce the hazardous nature of the material.

66. Any soils imported to the site will need to be tested and verified to ensure that they do not pose a risk to human health or controlled waters and that they are suitable for their intended use. They will also need to be accompanied by all relevant Duty of Care documentation.

6.4 Construction health & safety

67. Risks to construction workers may be controlled though good site practice and hygiene in addition to the use of appropriate Personal Protective Equipment (PPE) and Respiratory Protective Equipment (RPE), where necessary.

68. Method statements and risk assessments should be developed for all site works to aid identification of such risks and appropriate risk avoidance and reduction measures. The works should be undertaken in accordance with the requirements of the Construction (Design and Management) (CDM) Regulations 2015 where appropriate.

6.5 Pollution prevention

69. During the construction phase, contractors and designers should ensure that sound environmental practices are adopted and followed including relevant best practice guidance from the Environment Agency Pollution Prevention Guidance Note (PPG) series and construction best practice documents published by the Construction Industry Research and Information Association (CIRIA).

70. Care should be taken during construction to prevent uncontrolled run-off that may contain suspended solids or leaked fuels in order to mitigate pollution of adjacent surface waters. It is recommended that a site Environmental Management Plan

(EMP) is developed; this will include protocol for dealing with spillages and leaks of fuel and oils.

71. The storage of oils and fuels should be in a designated area, stored in bunds with 110% capacity, which will effectively capture any spills or leaks. Any temporary compounds should be located as far away from watercourses as possible.

72. Consideration should be given to the control and management of excavated sediments during any works in or around the various drains and dykes crossing the site. Control mechanisms and best practice should be detailed in an EMP for any works. Any excavated materials should be appropriately stored and segregated according to type to mitigate any potential pollution incidents.

6.6 Materials containing asbestos

73. Should any existing buildings or structures require removal as part of Norfolk Boreas, a Type 3 pre-demolition asbestos survey should be carried out, in accordance with the Control of Asbestos Regulations 2012. If asbestos containing materials are identified, they should then be removed and disposed of in an appropriate manner and to the satisfaction of the Regulating Authority.

7 References

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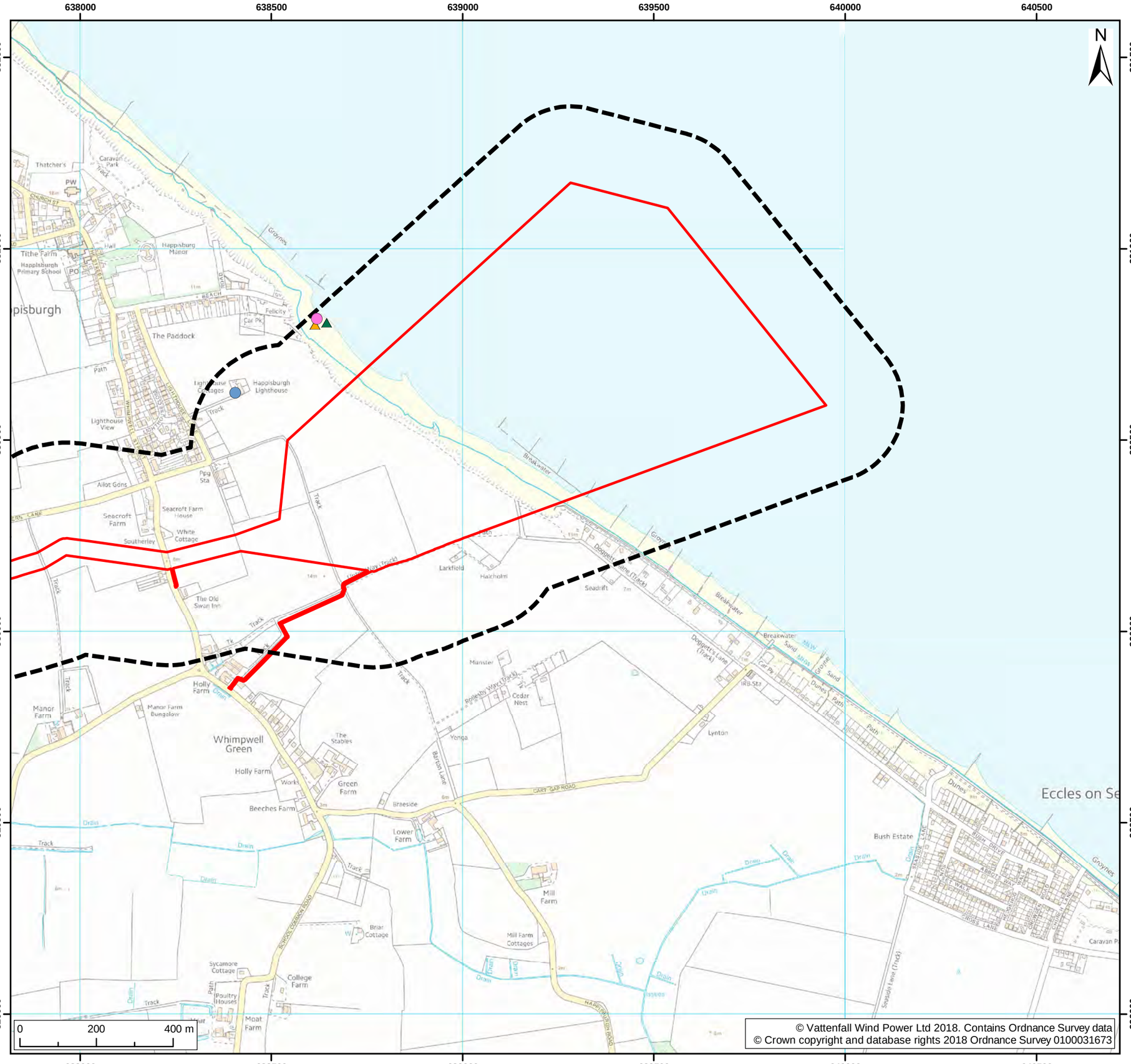
8 Annex 1 Figures



Legend:

- Norfolk Boreas red line boundary
- Study area

Historical Tanks and Energy Facilities[1]

- Electrical Sub Station Facilities
- Tanks

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Electricity production & distribution [inc large transformers]
- Oil, petroleum & gas refining & storage

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 1 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
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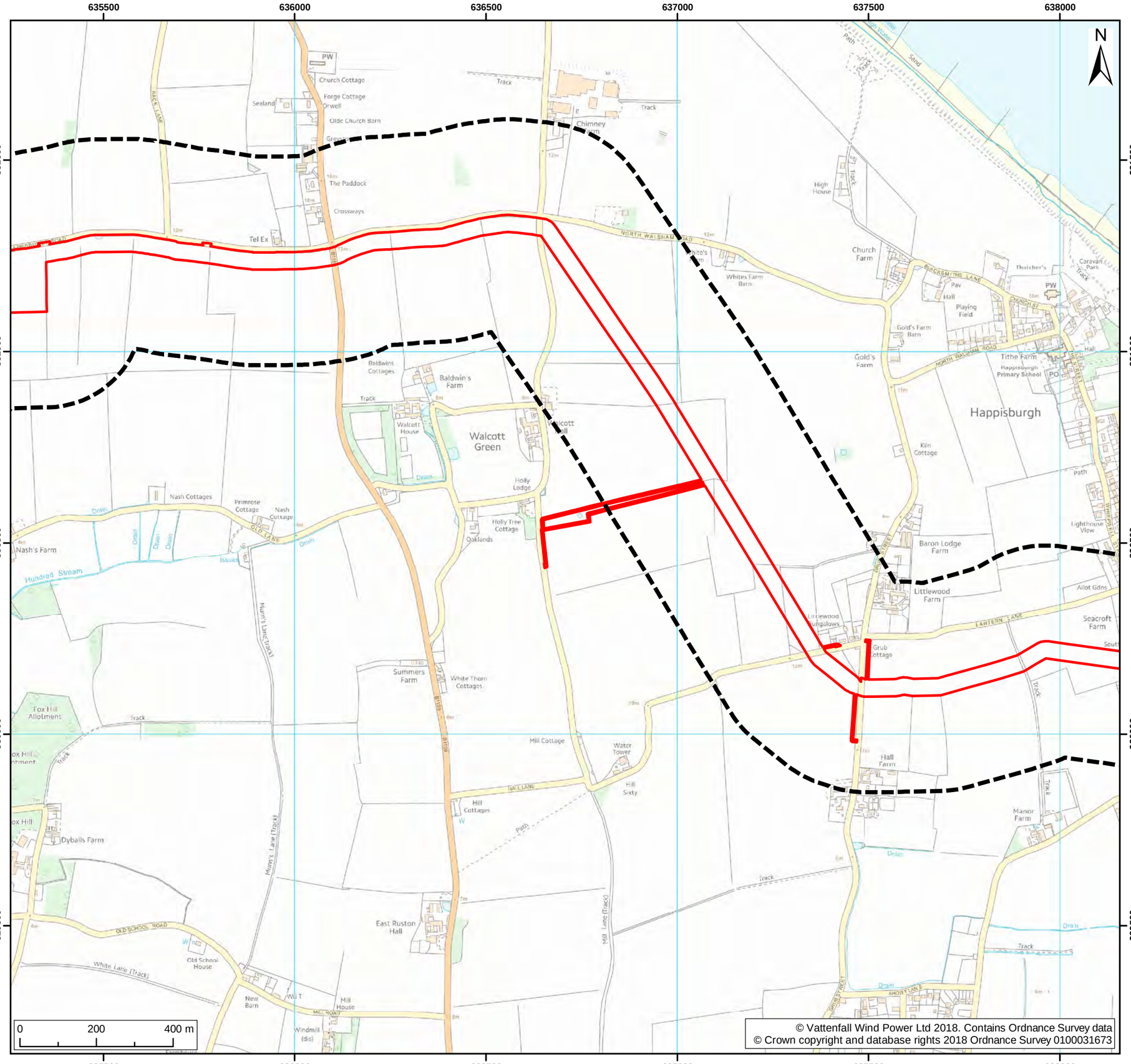

Legend:

- Norfolk Boreas red line boundary
- Study area

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 2 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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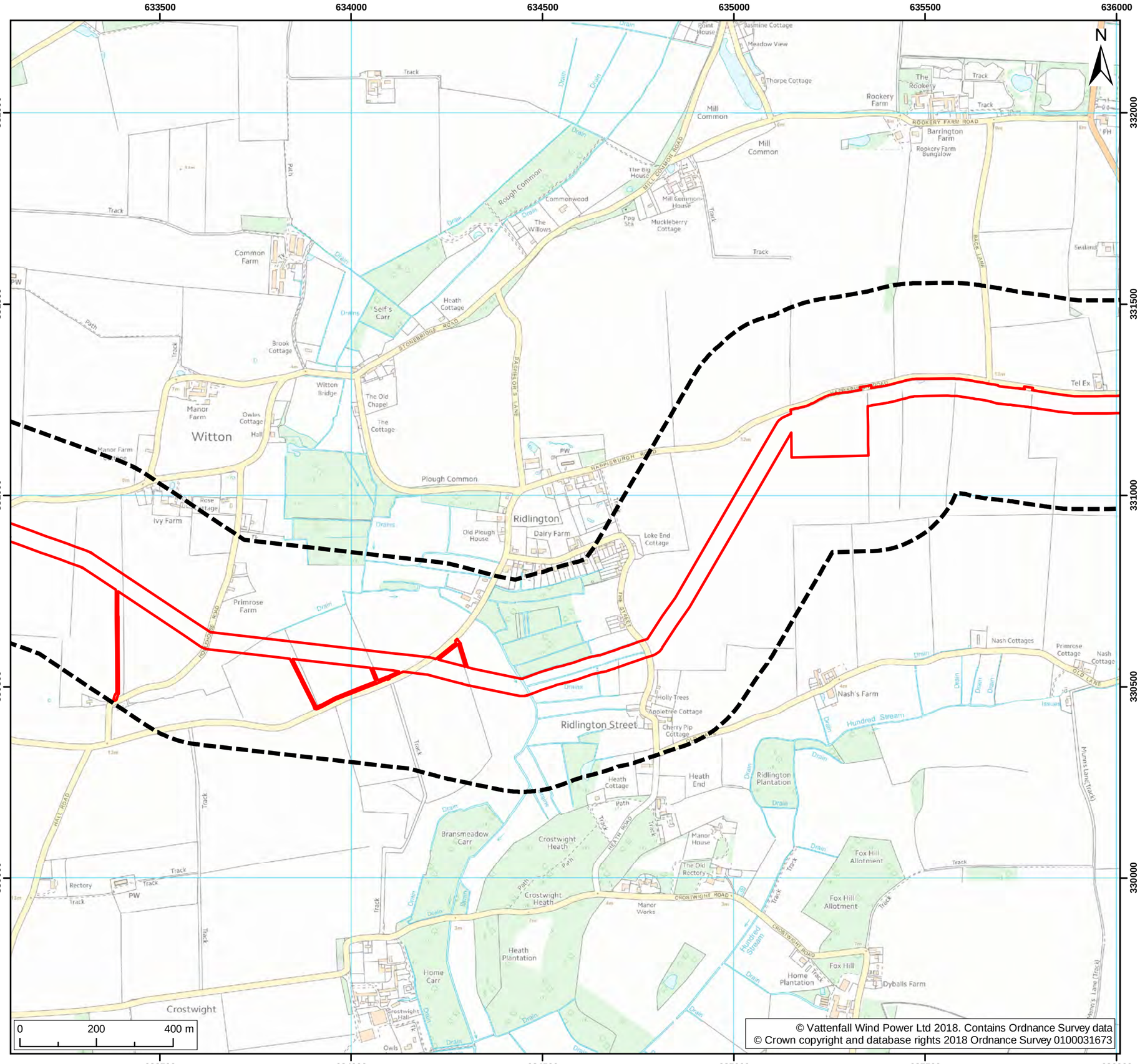

Legend:

- Norfolk Boreas red line boundary
- Study area

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 3 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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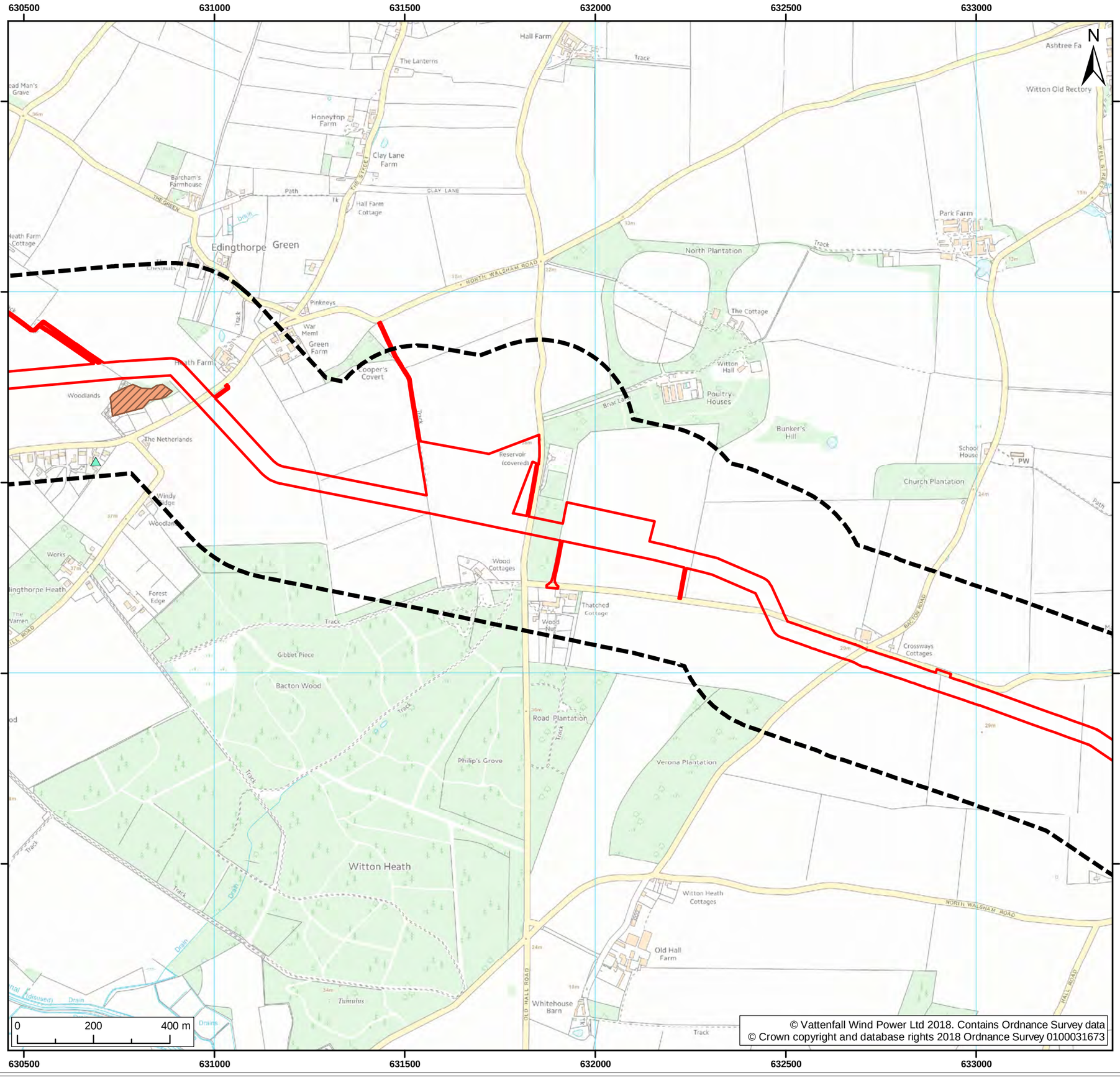

Legend:

- Norfolk Boreas red line boundary
- Study area

Historical Tanks and Energy Facilities[1]

- Potential Tanks

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Clay bricks & tiles [manufacture]

[1] Envirocheck, 2018.

Project:	Report:
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Title:

Historic Land Use
(Map 4 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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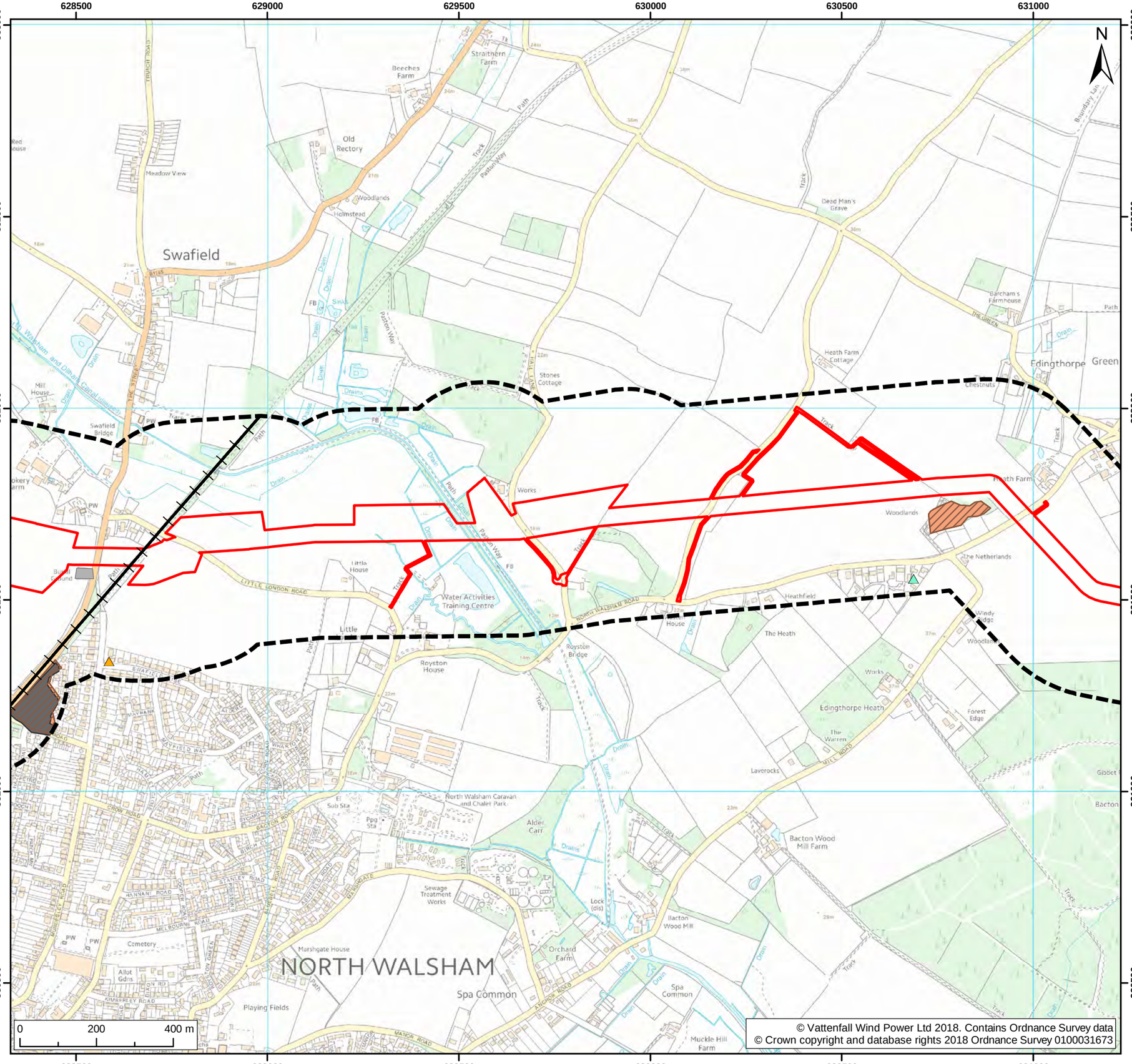

Legend:

- Norfolk Boreas red line boundary
- Study area

Historical Tanks and Energy Facilities[1]

- Electrical Sub Station Facilities
- Potential Tanks

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Cemetery or Graveyard
- Clay bricks & tiles [manufacture]
- Factory or works - use not specified
- Railways

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 5 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

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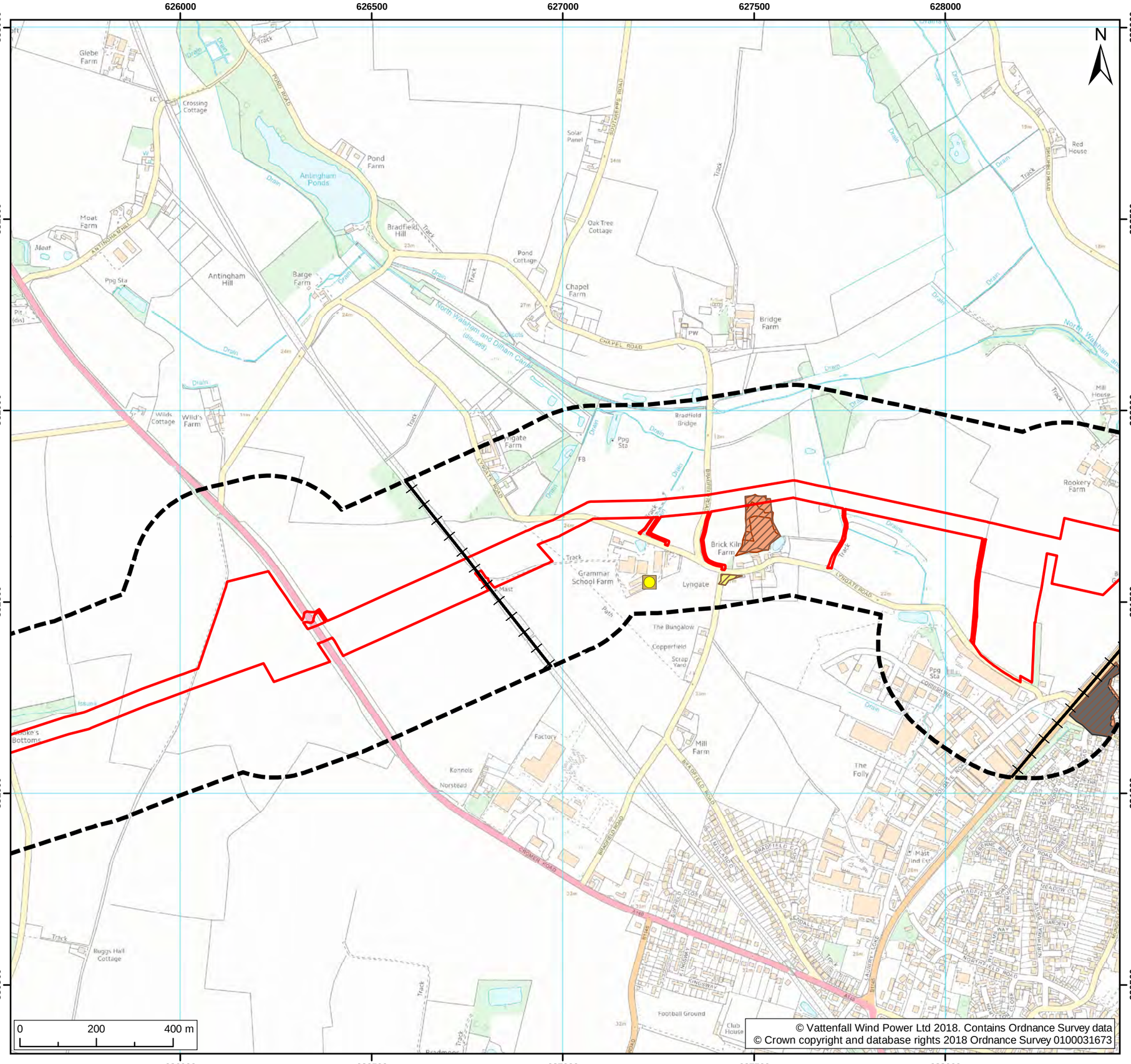

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)
- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Clay bricks & tiles [manufacture]
- Factory or works - use not specified
- Quarrying of sand & clay, operation of sand & gravel pits
- Railways
- Quarrying of sand & clay, operation of sand & gravel pits

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 6 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

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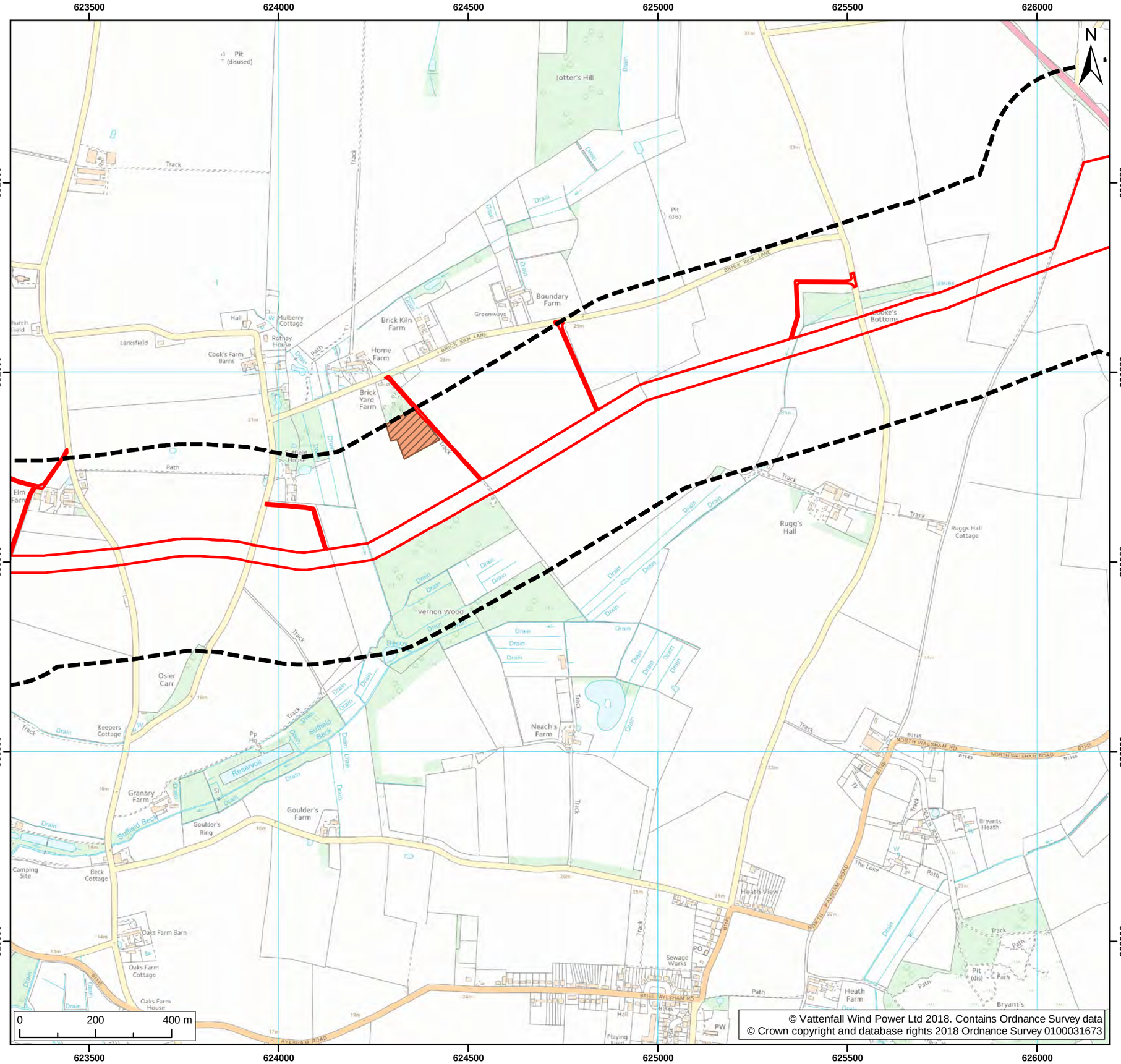

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Clay bricks & tiles [manufacture]

[1] Envirocheck, 2018.

Project:	Report:
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Title:

Historic Land Use
(Map 7 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

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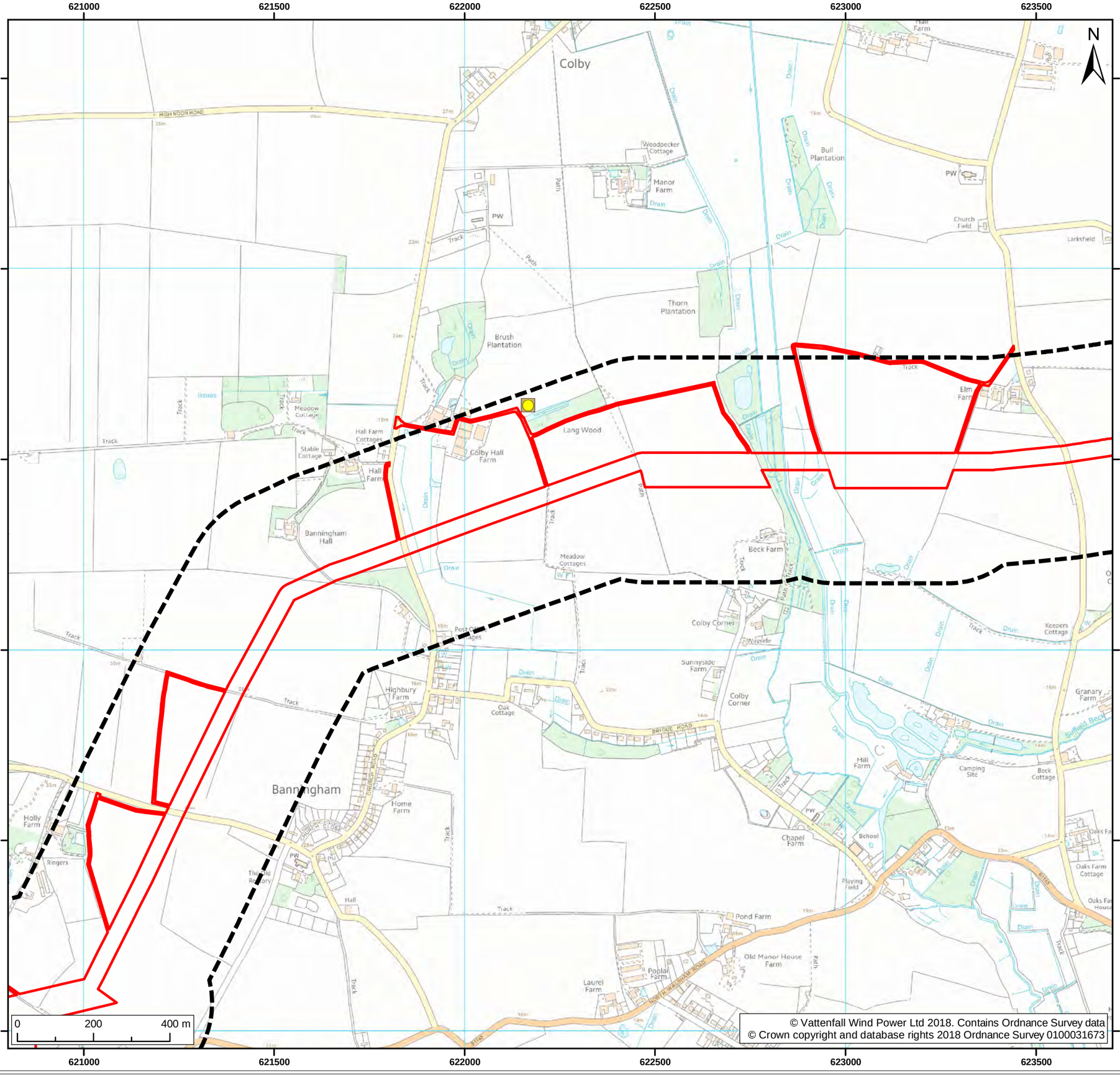

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Quarrying of sand & clay, operation of sand & gravel pits

[1] Envirocheck, 2018.

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Title:

Historic Land Use
(Map 8 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

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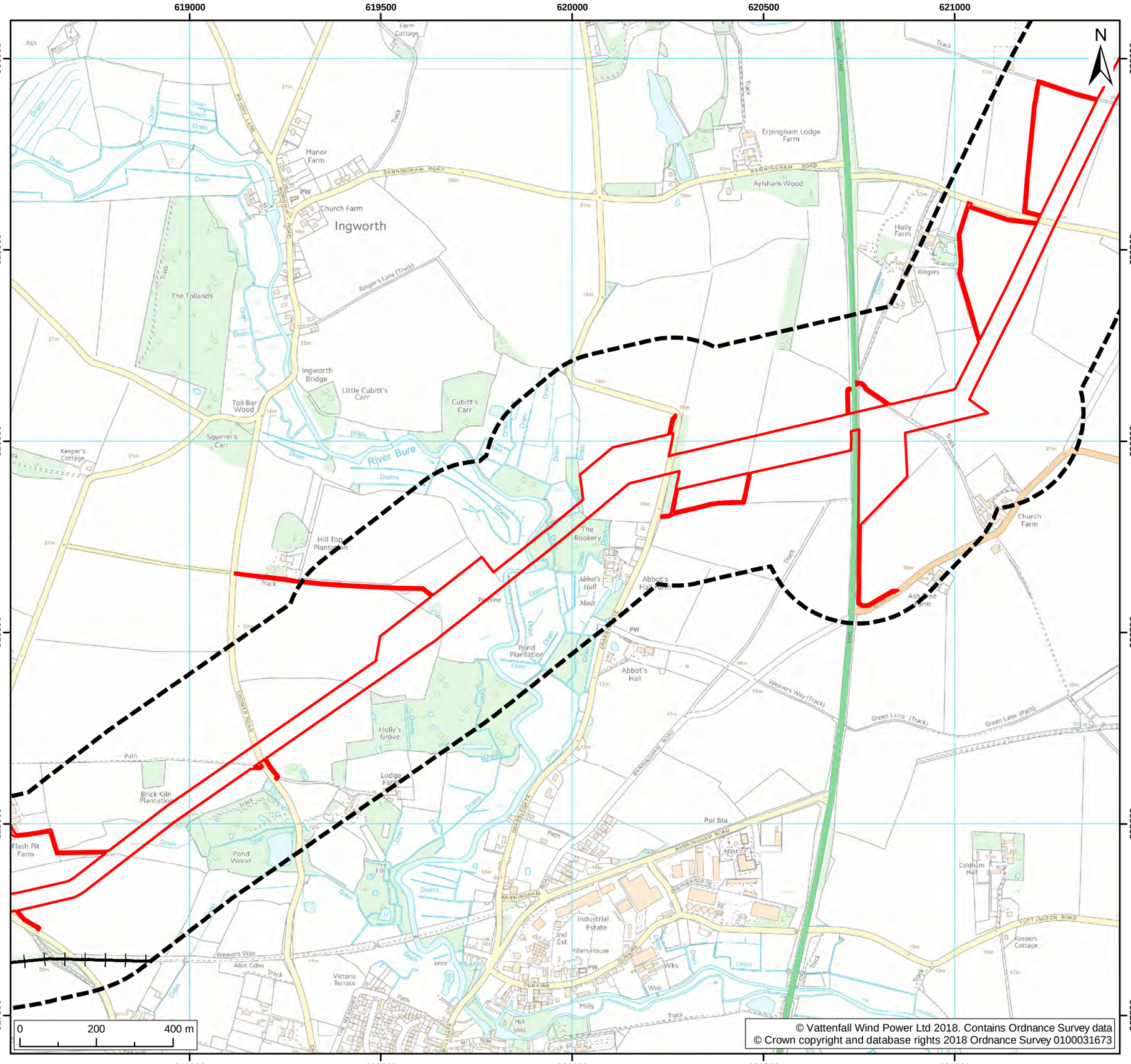

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Railways

[1] Envirocheck, 2018.

Project:	Report:
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Title:

Historic Land Use
(Map 9 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

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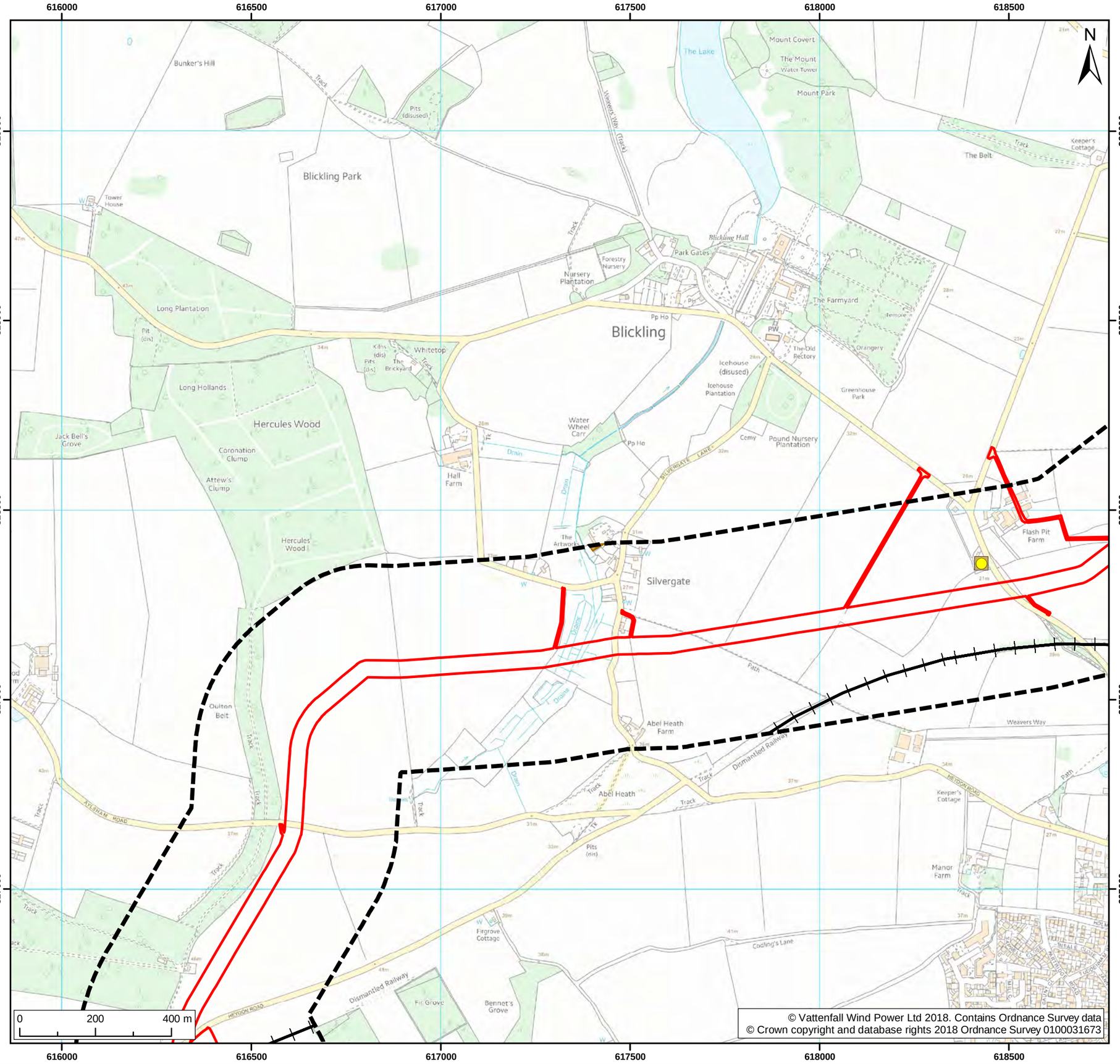

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Sawmilling, planing & impregnation [i.e. treatment of timber]
- Quarrying of sand & clay, operation of sand & gravel pits
- Railways

[1] Envirocheck, 2018.

Project:	Report:
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Title:

Historic Land Use
(Map 10 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

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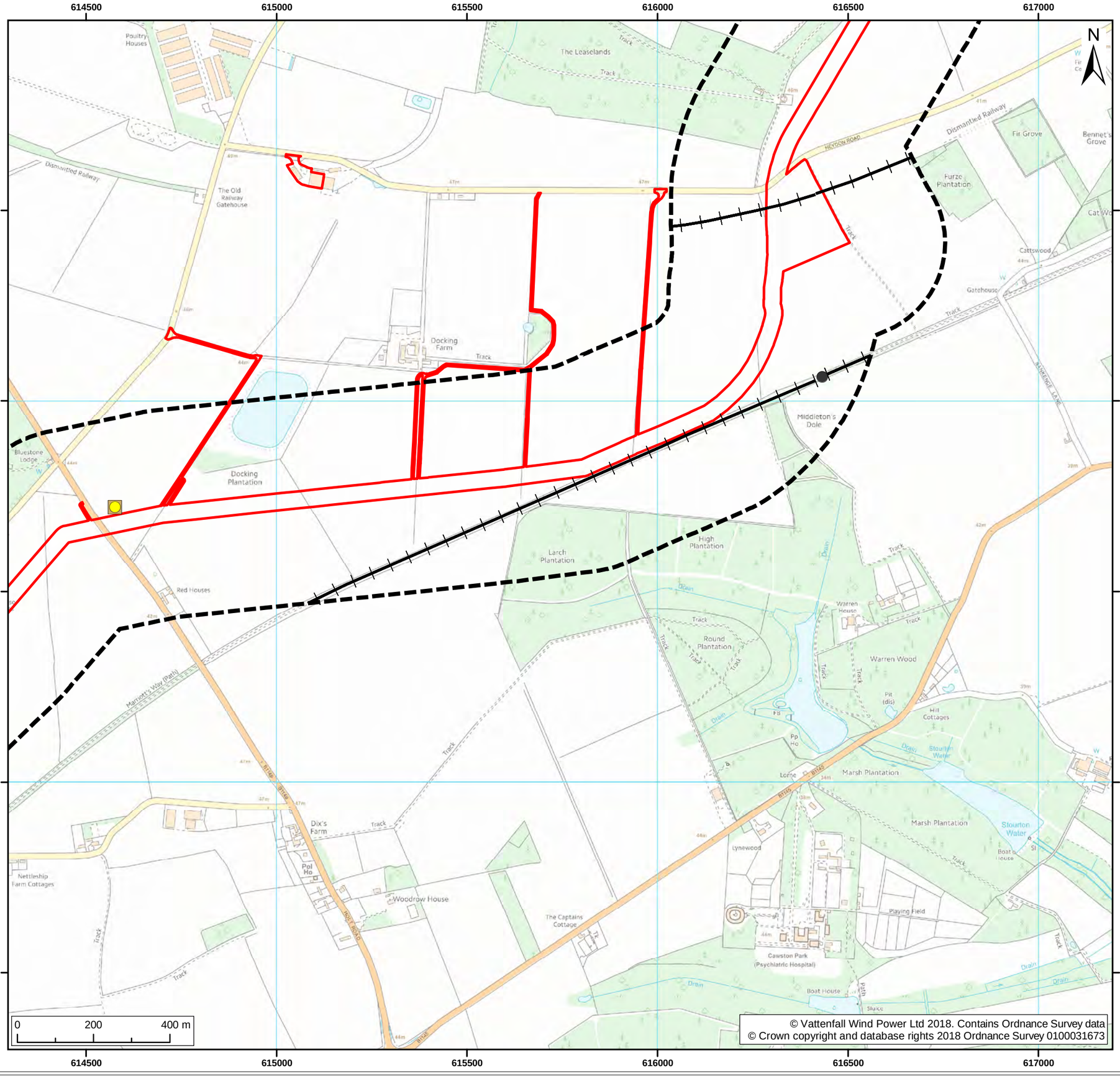

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Quarrying of sand & clay, operation of sand & gravel pits
- Railways
- Railways

[1] Envirocheck, 2018.

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Title:

Historic Land Use
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Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

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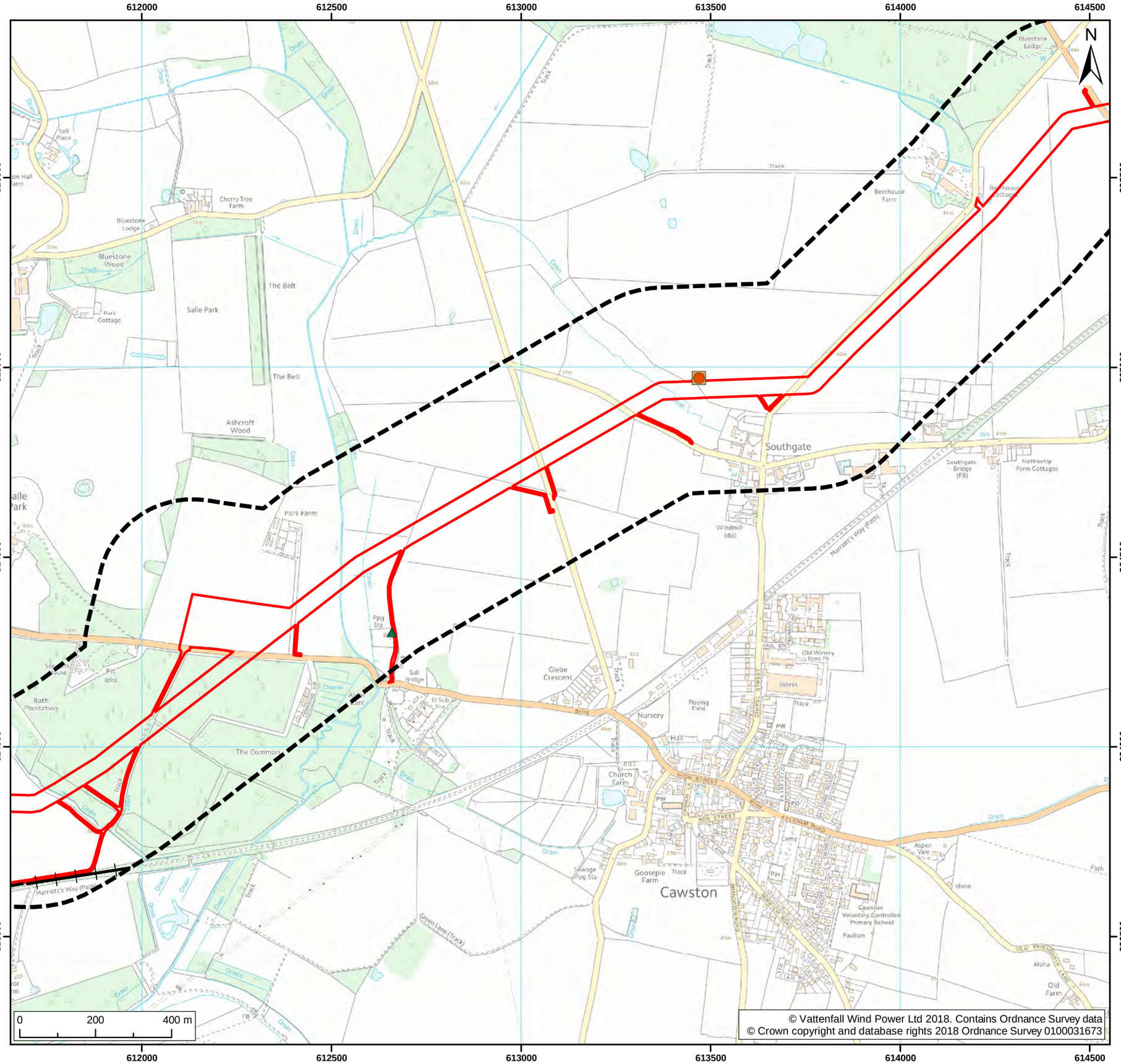

Legend:

- Norfolk Boreas red line boundary
- Study area

Historical Tanks and Energy Facilities[1]

- Tanks

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Clay bricks & tiles [manufacture]
- Railways

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 12 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

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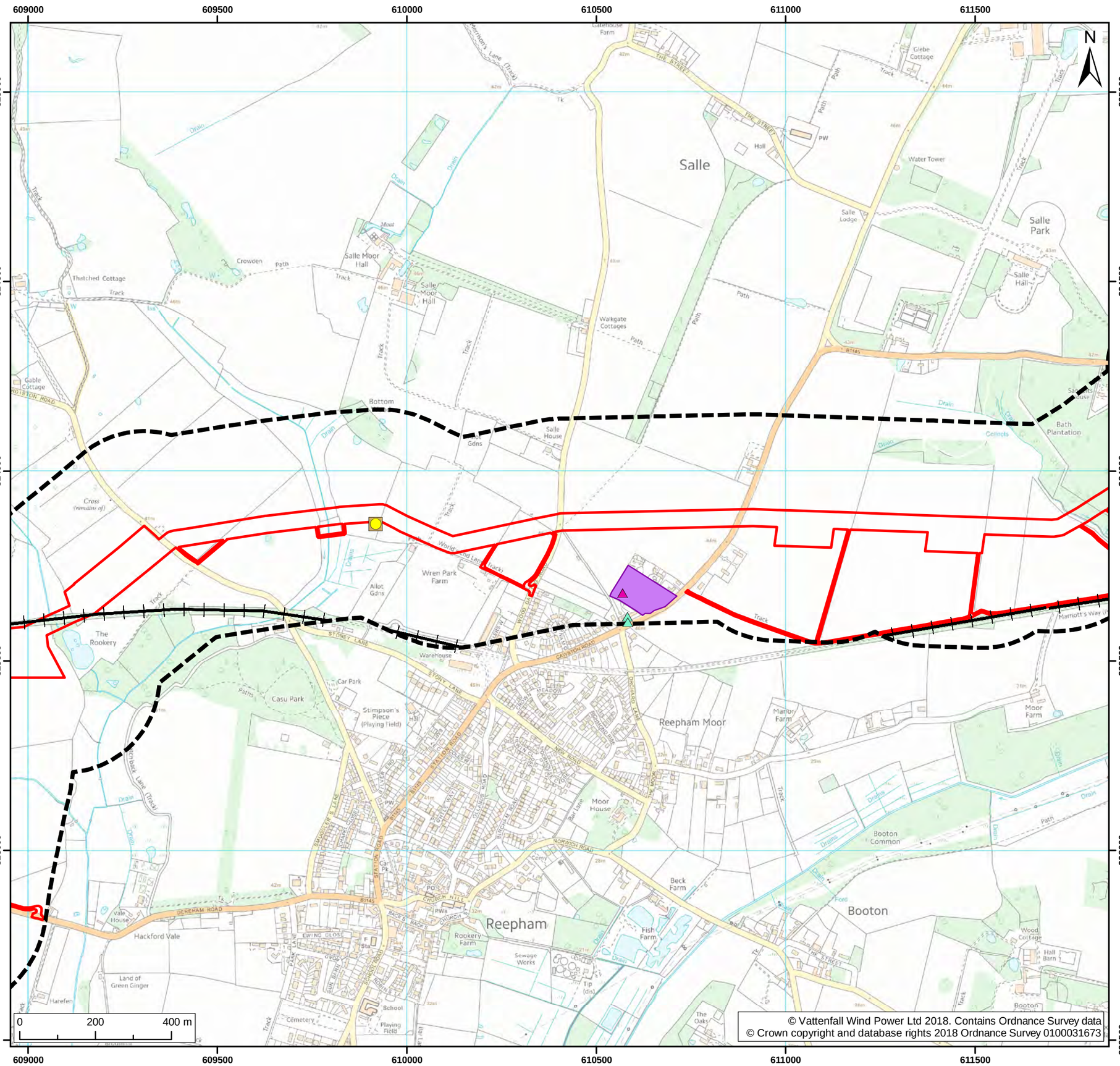

Legend:

- Norfolk Boreas red line boundary
- Study area

Historical Tanks and Energy Facilities[1]

- Electricity Industry Facilities
- Potential Tanks

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Road haulage
- Quarrying of sand & clay, operation of sand & gravel pits
- Railways

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 13 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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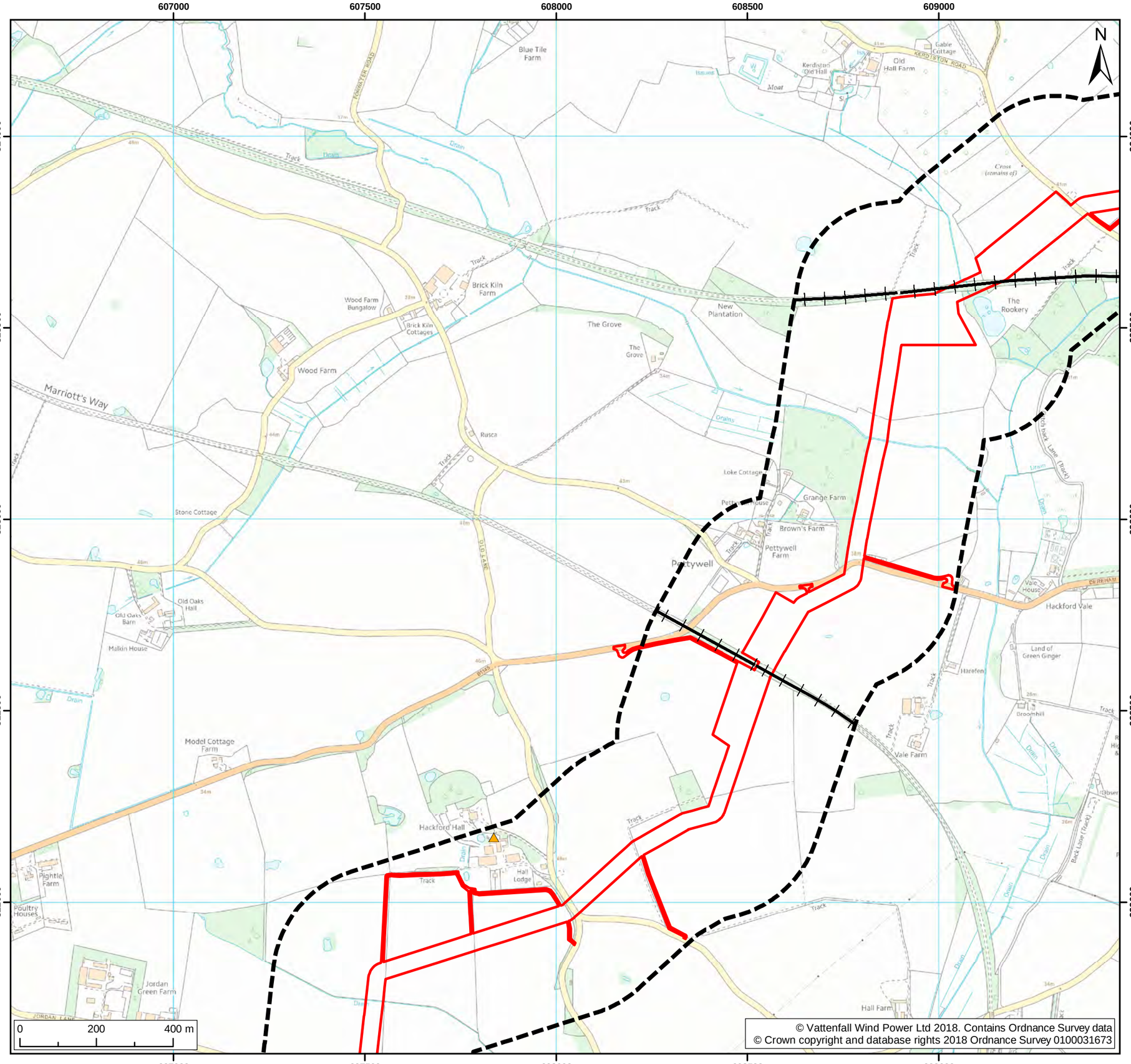

Legend:

- Norfolk Boreas red line boundary
- Study area

Historical Tanks and Energy Facilities[1]

- Electrical Sub Station Facilities

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Railways

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 14 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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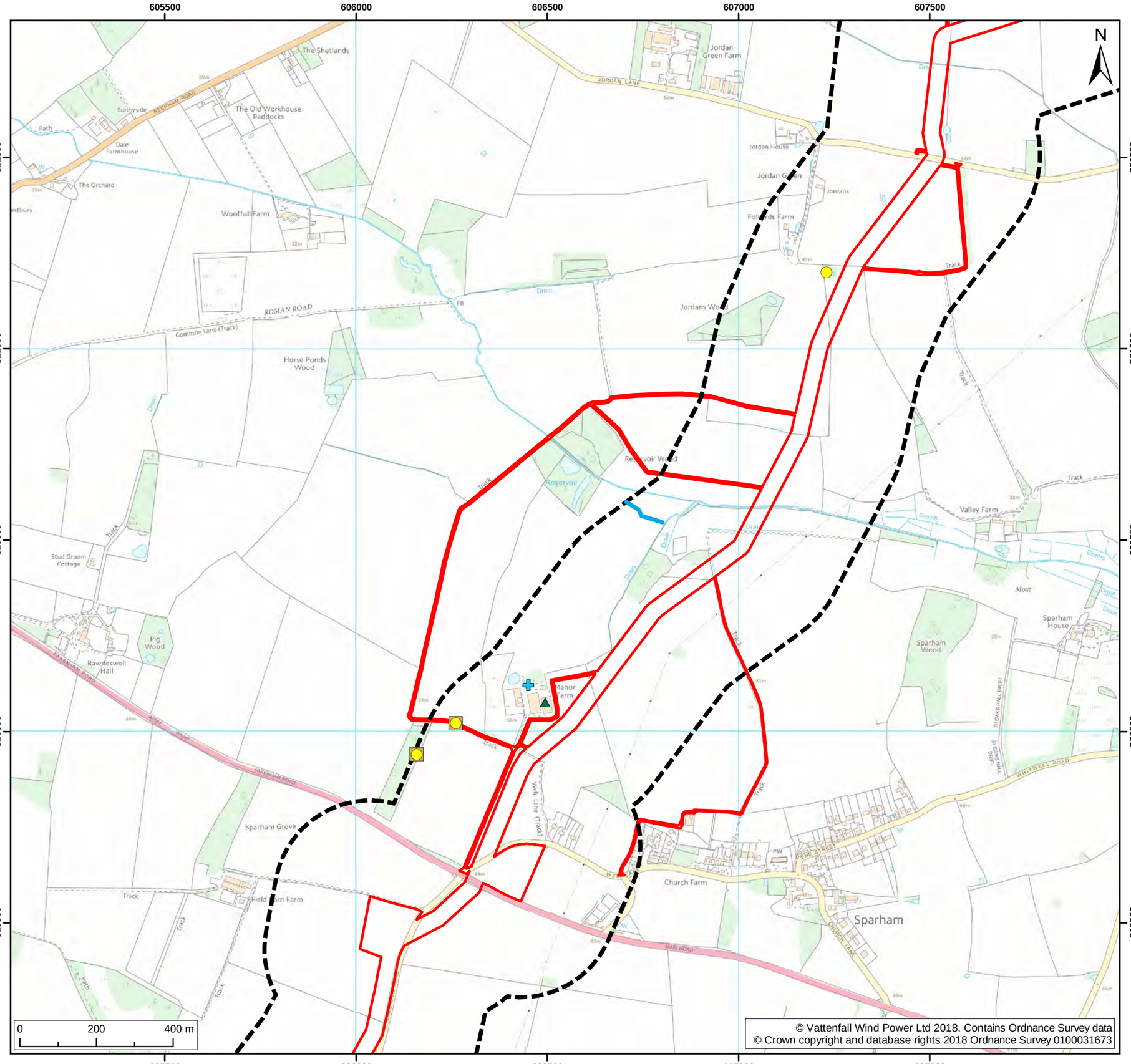

Legend:

- Norfolk Boreas red line boundary
- Study area

Historical Tanks and Energy Facilities[1]

- Tanks

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Infilled Land (Water)[1]

- Unknown Filled Ground (Pond, marsh, river, stream, dock etc)
- Unknown Filled Ground (Pond, marsh, river, stream, dock etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Quarrying of sand & clay, operation of sand & gravel pits

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 15 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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603500 604000 604500 605000 605500 606000

319500 319000 318500 318000 317500 317000

N

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)
- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Quarrying of sand & clay, operation of sand & gravel pits
- Cement, lime & plaster products [manufacture]
- Quarrying of sand & clay, operation of sand & gravel pits

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 16 of 23)

Figure:	Drawing No:
19.2.1	PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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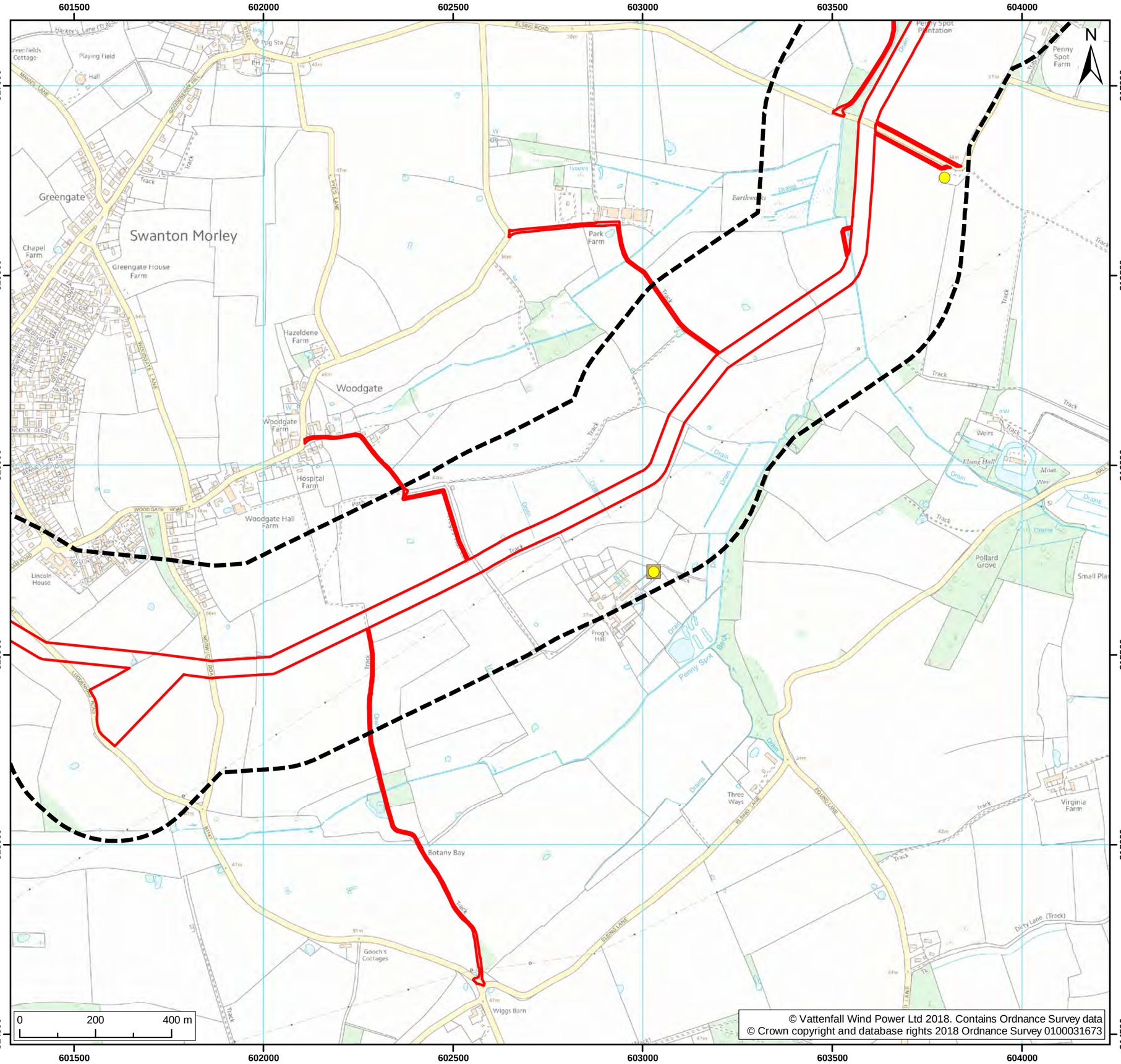
0 200 400 m



Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Quarrying of sand & clay, operation of sand & gravel pits

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 17 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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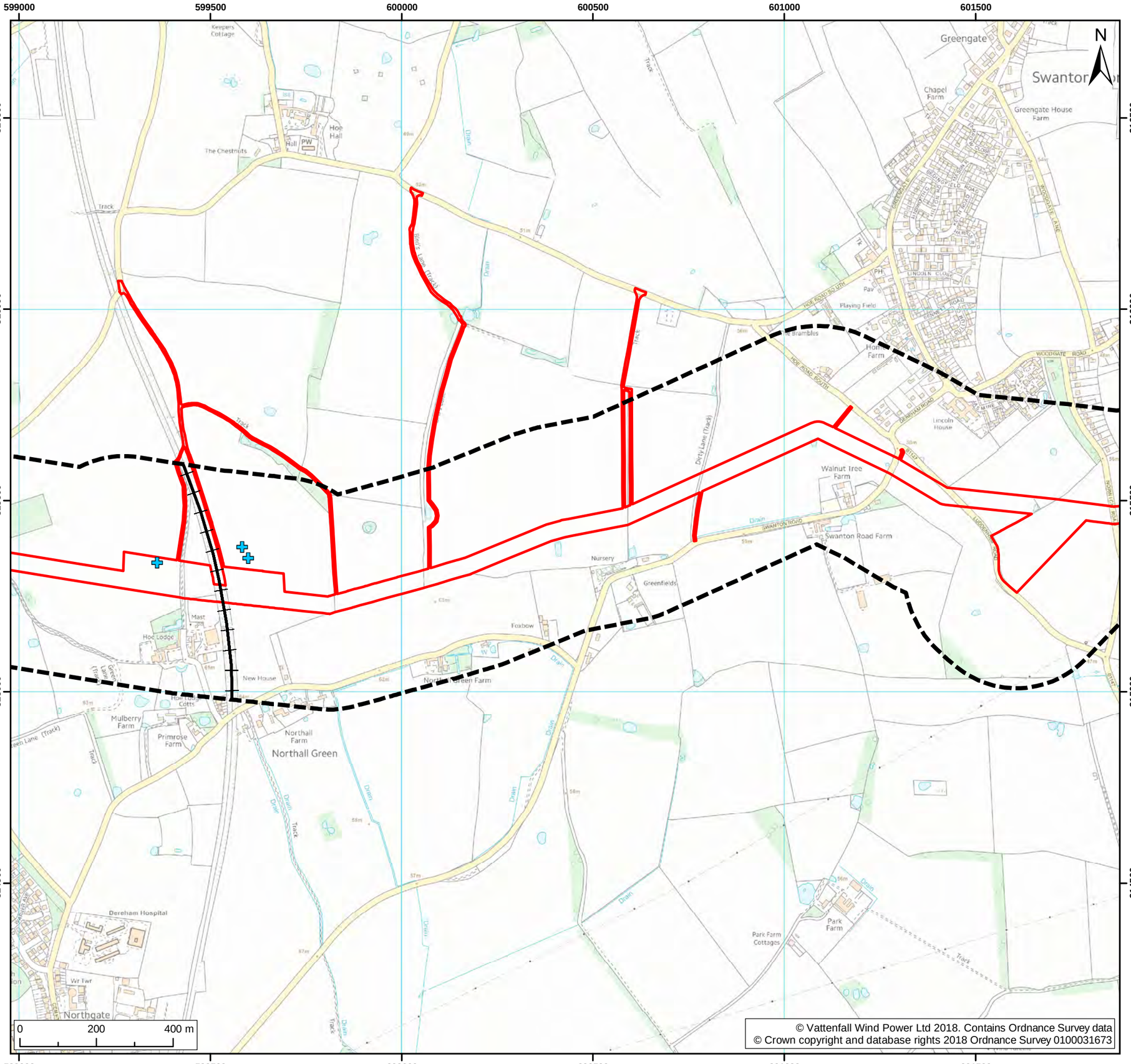

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Water)[1]

- Unknown Filled Ground (Pond, marsh, river, stream, dock etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Railways

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 18 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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596500 597000 597500 598000 598500 599000

316500 316000 315500 315000 314500

N

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)
- Unknown Filled Ground (Pit, quarry etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Clay bricks & tiles [manufacture]
- Quarrying of sand & clay, operation of sand & gravel pits
- Quarrying of sand & clay, operation of sand & gravel pits

[1] Envirocheck, 2018.

0 200 400 m

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 19 of 23)

Figure: 19.2.1 Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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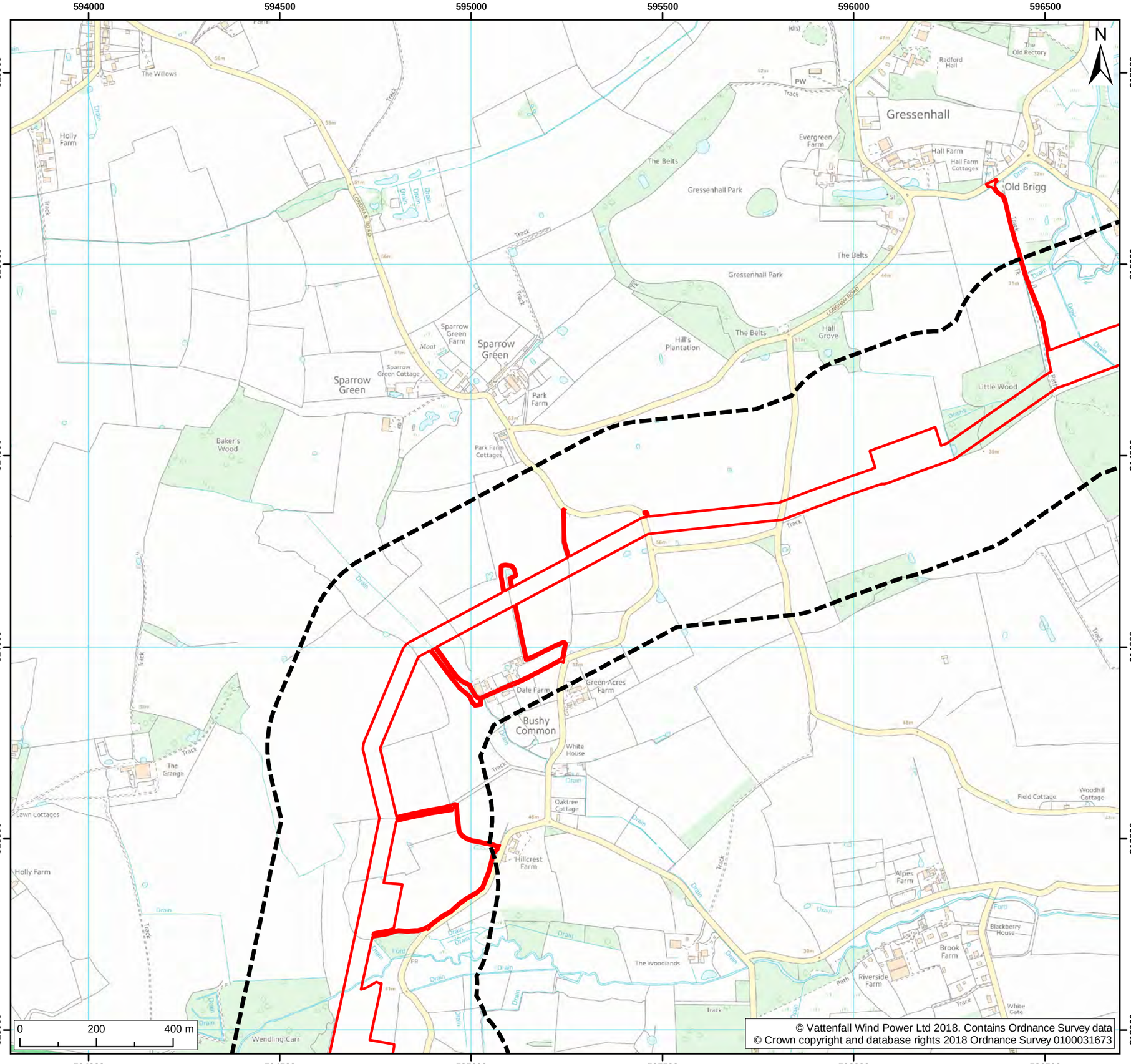

Legend:

- Norfolk Boreas red line boundary
- Study area

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 20 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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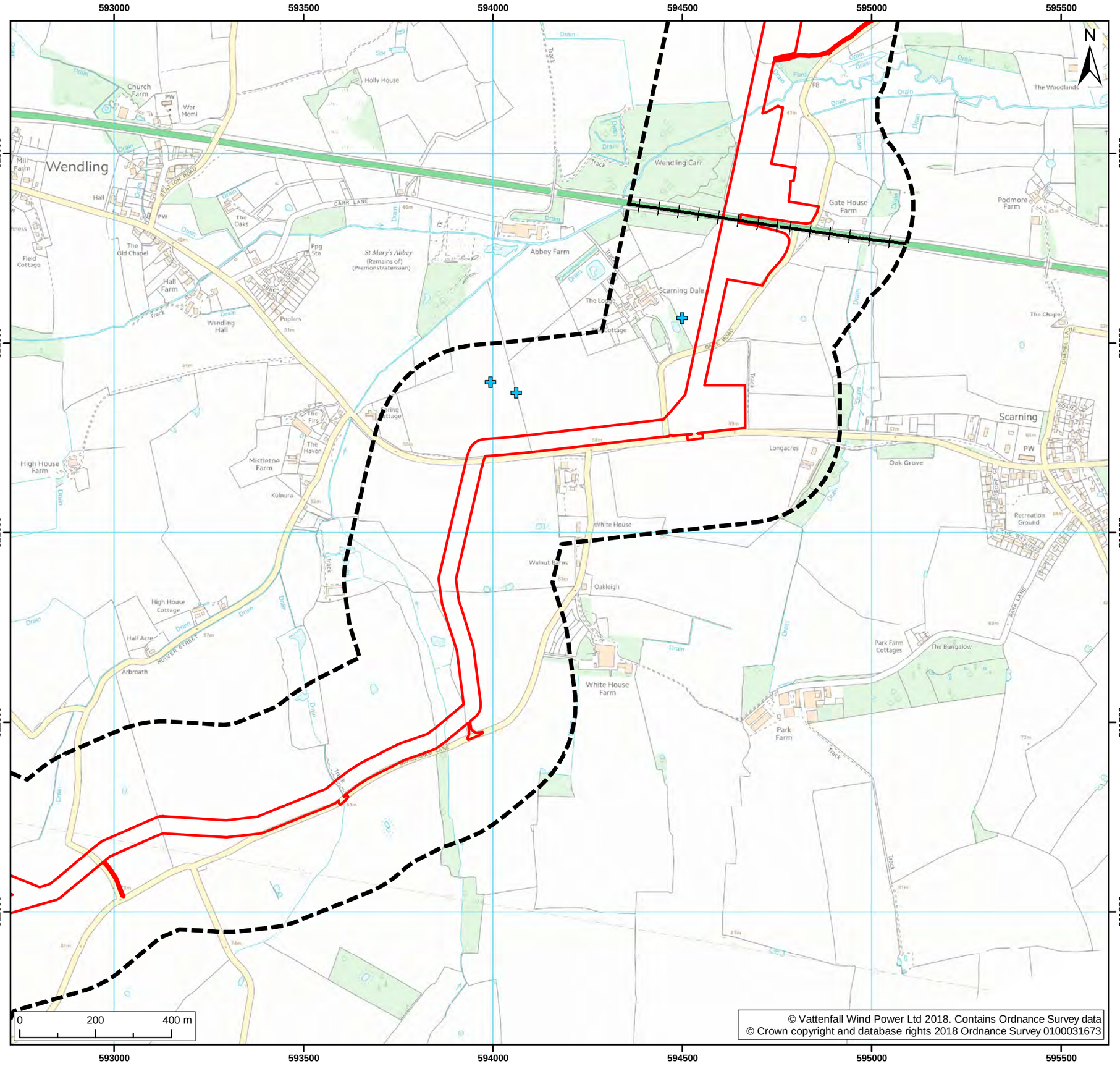

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Water)[1]

- Unknown Filled Ground (Pond, marsh, river, stream, dock etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Railways

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 21 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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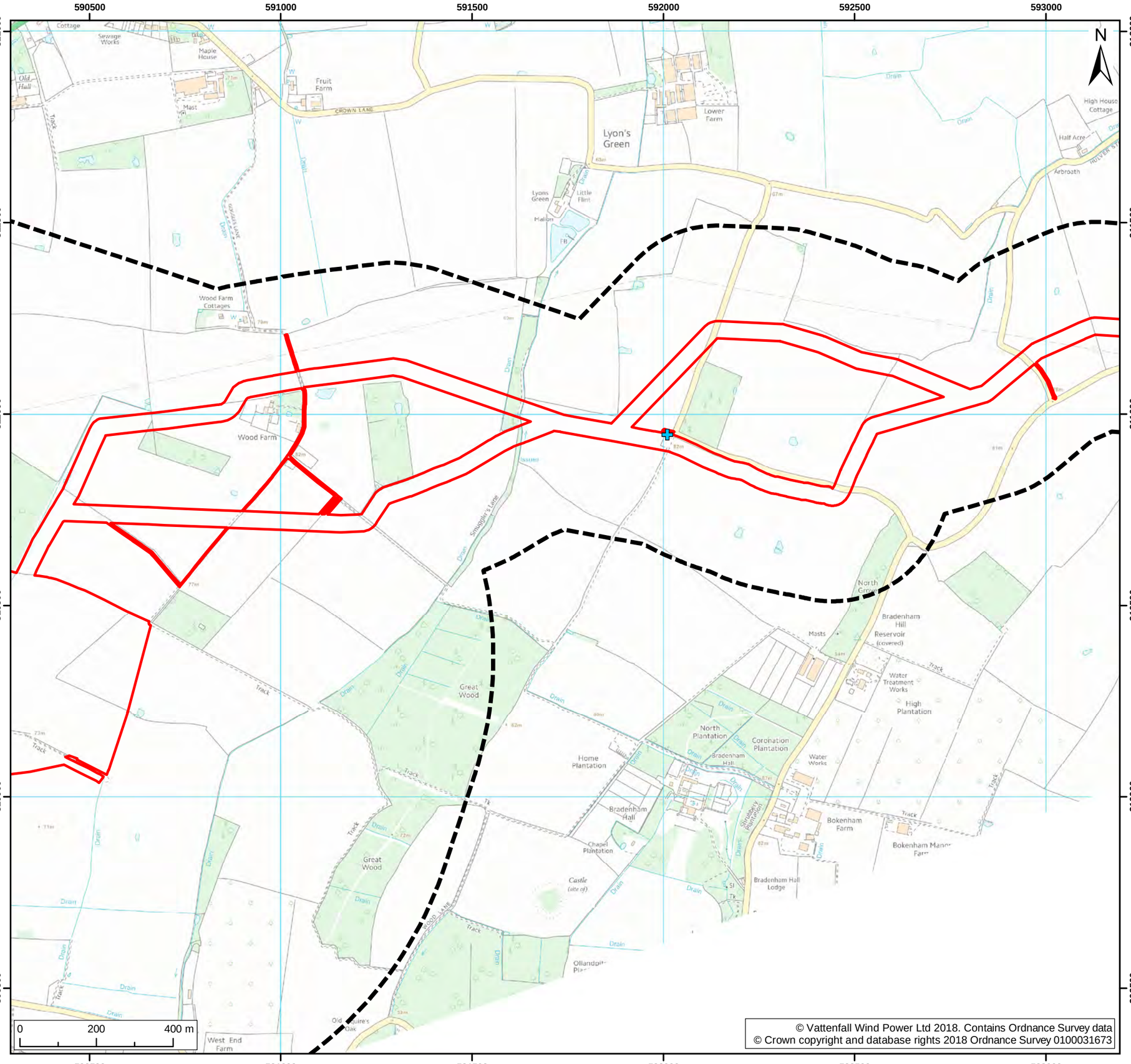

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Water)[1]

- Unknown Filled Ground (Pond, marsh, river, stream, dock etc)

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 22 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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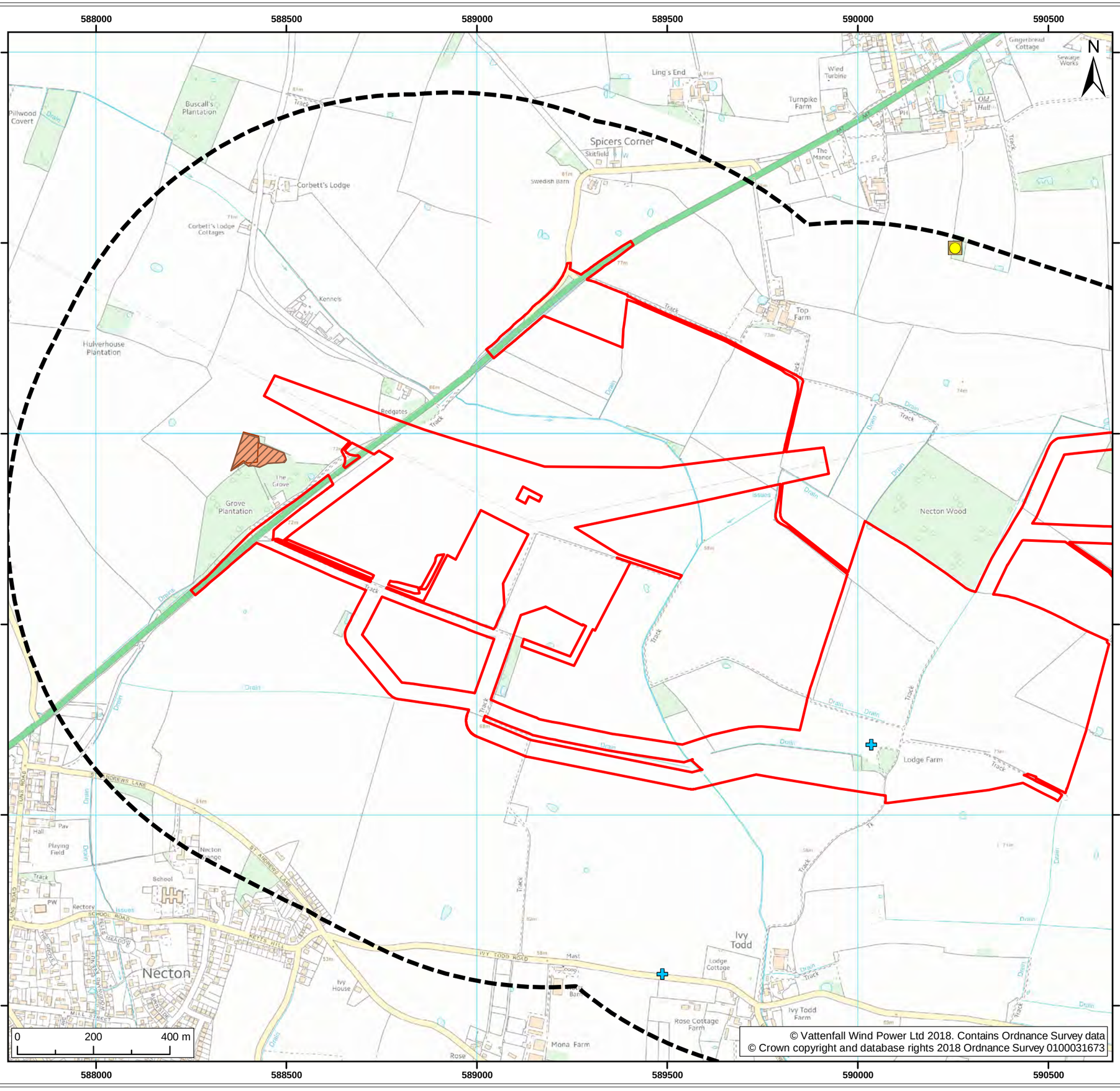

Legend:

- Norfolk Boreas red line boundary
- Study area

Potentially Infilled Land (Non-Water)[1]

- Unknown Filled Ground (Pit, quarry etc)
- Unknown Filled Ground (Pit, quarry etc)

Potentially Infilled Land (Water)[1]

- Unknown Filled Ground (Pond, marsh, river, stream, dock etc)

Potentially Contaminative Industrial Uses (Past Land Use)[1]

- Clay bricks & tiles [manufacture]
- Quarrying of sand & clay, operation of sand & gravel pits

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Historic Land Use
(Map 23 of 23)

Figure: 19.2.1 | Drawing No: PB5640-005-0192-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	19/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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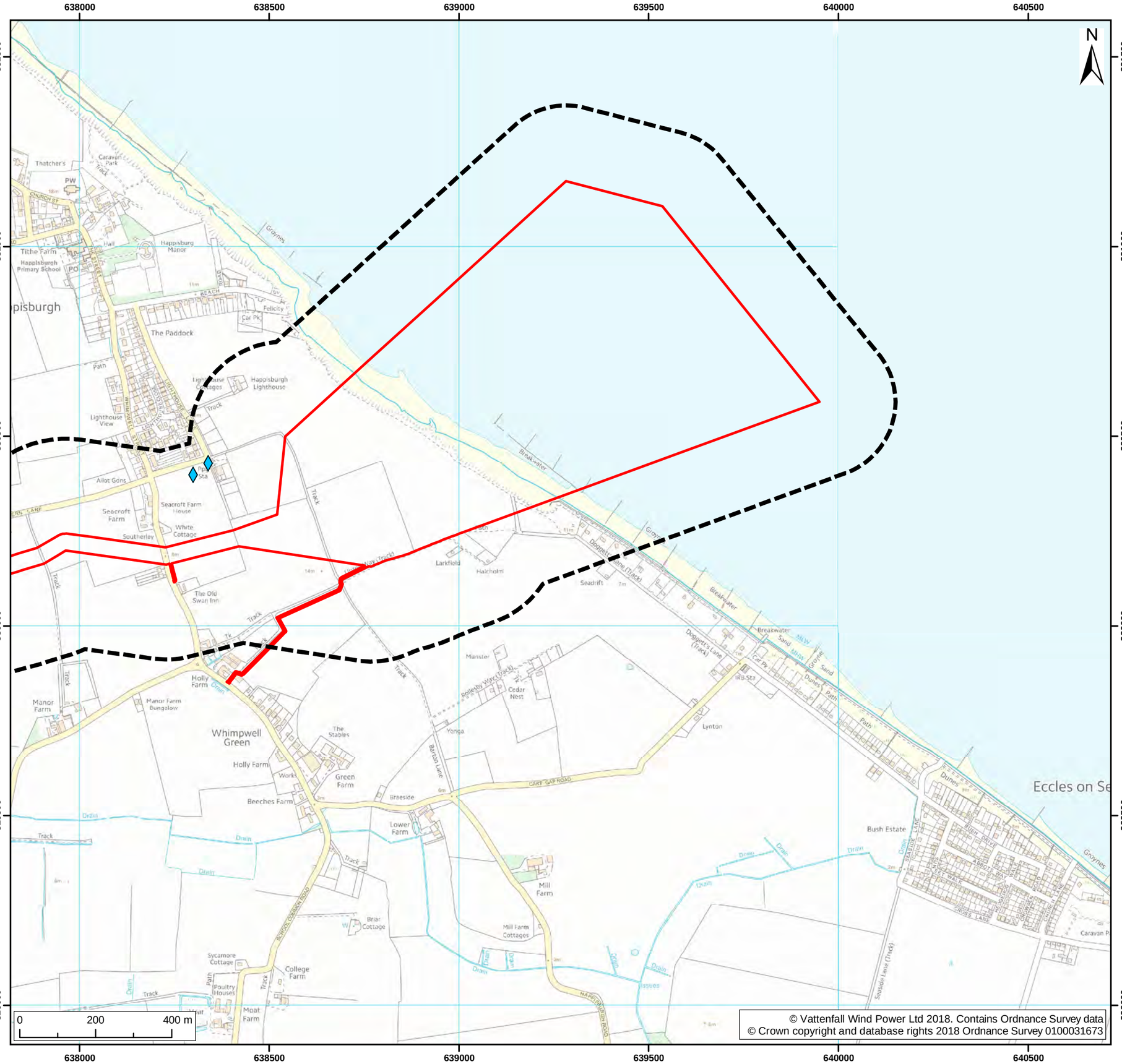

Legend:

- Norfolk Boreas red line boundary
- Study area
- Discharge Consents[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 1 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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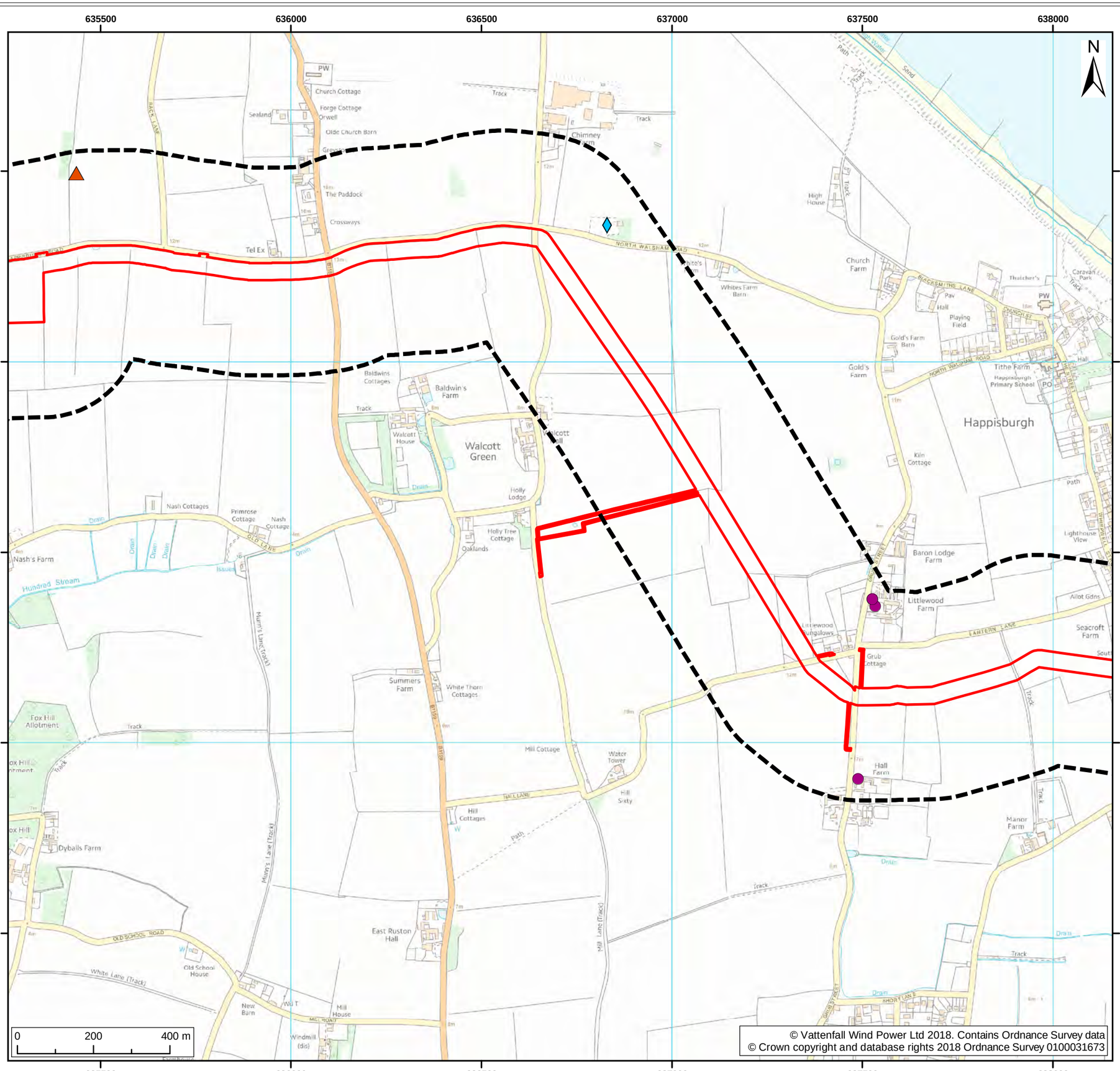

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Discharge Consents[1]
- Trade Directories[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 2 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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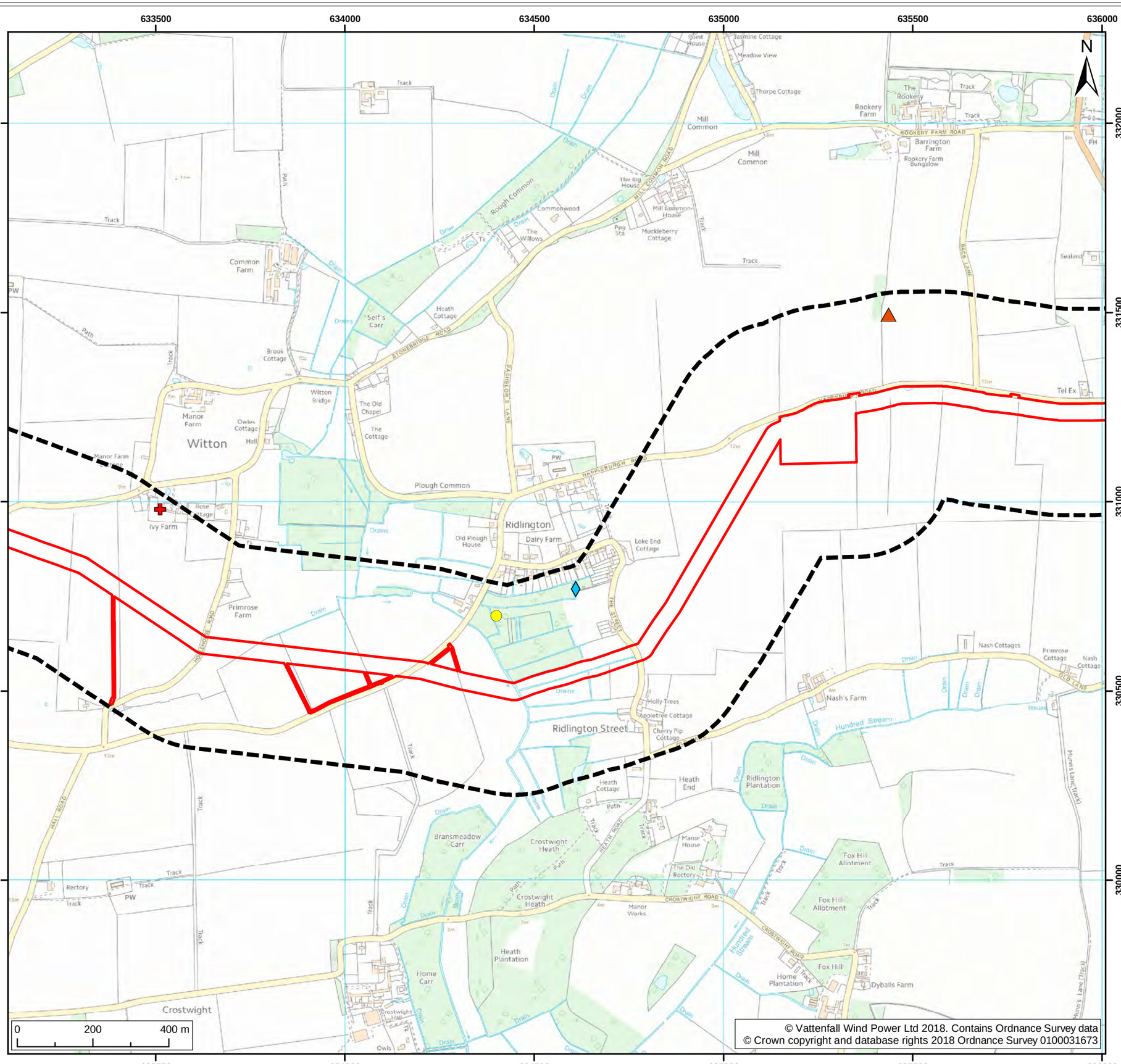

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Planning Hazardous Substance Consent[1]
- Pollution Incidents[1]
- Discharge Consents[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Site Sensitvity (Map 3 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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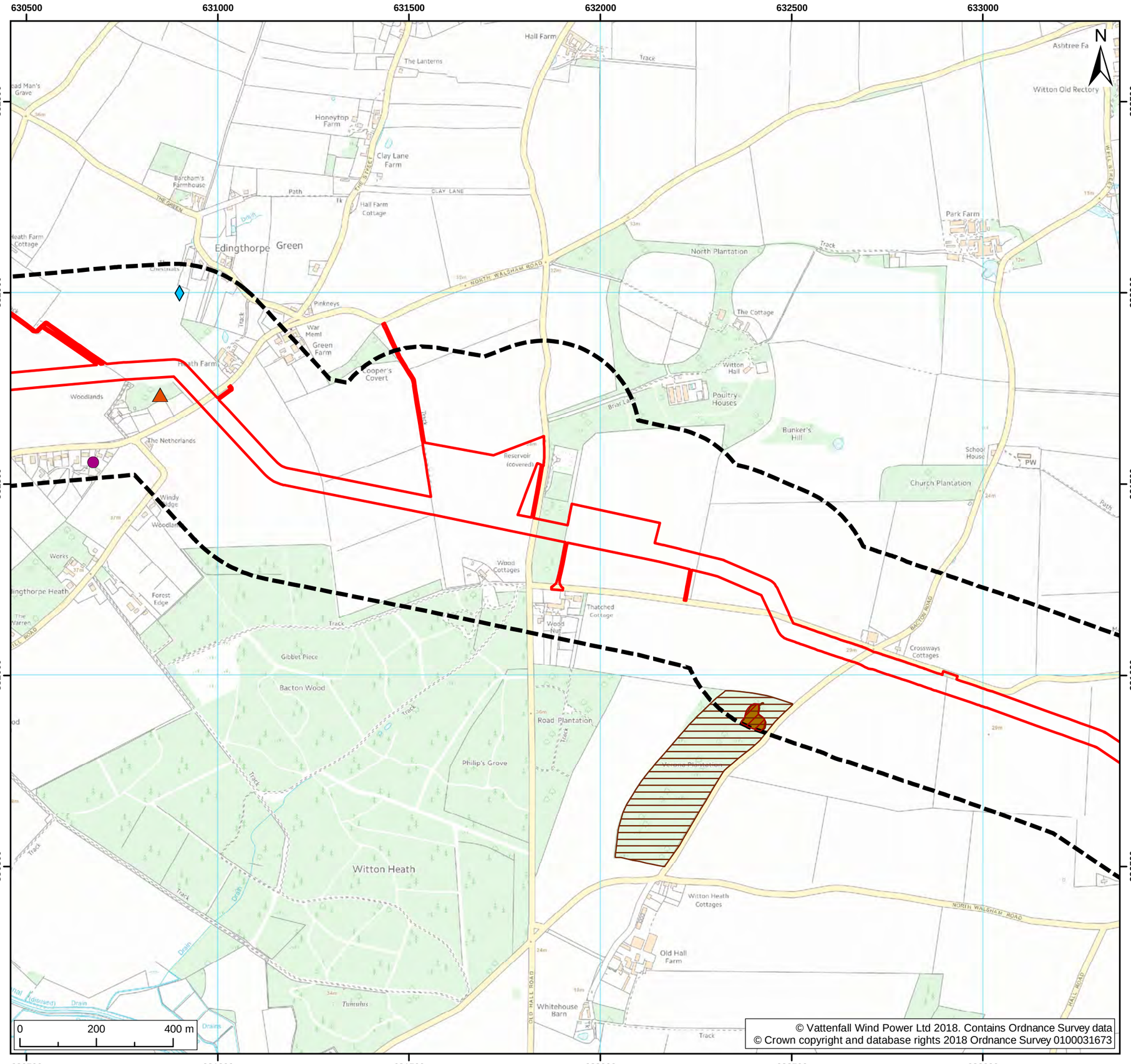

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Landfill Site[1]
- EA Historic Landfill[2]
- Local Authority Recorded Landfill Site[1]
- BGS Recorded Mineral Site[1]
- Discharge Consents[1]
- Trade Directories[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 4 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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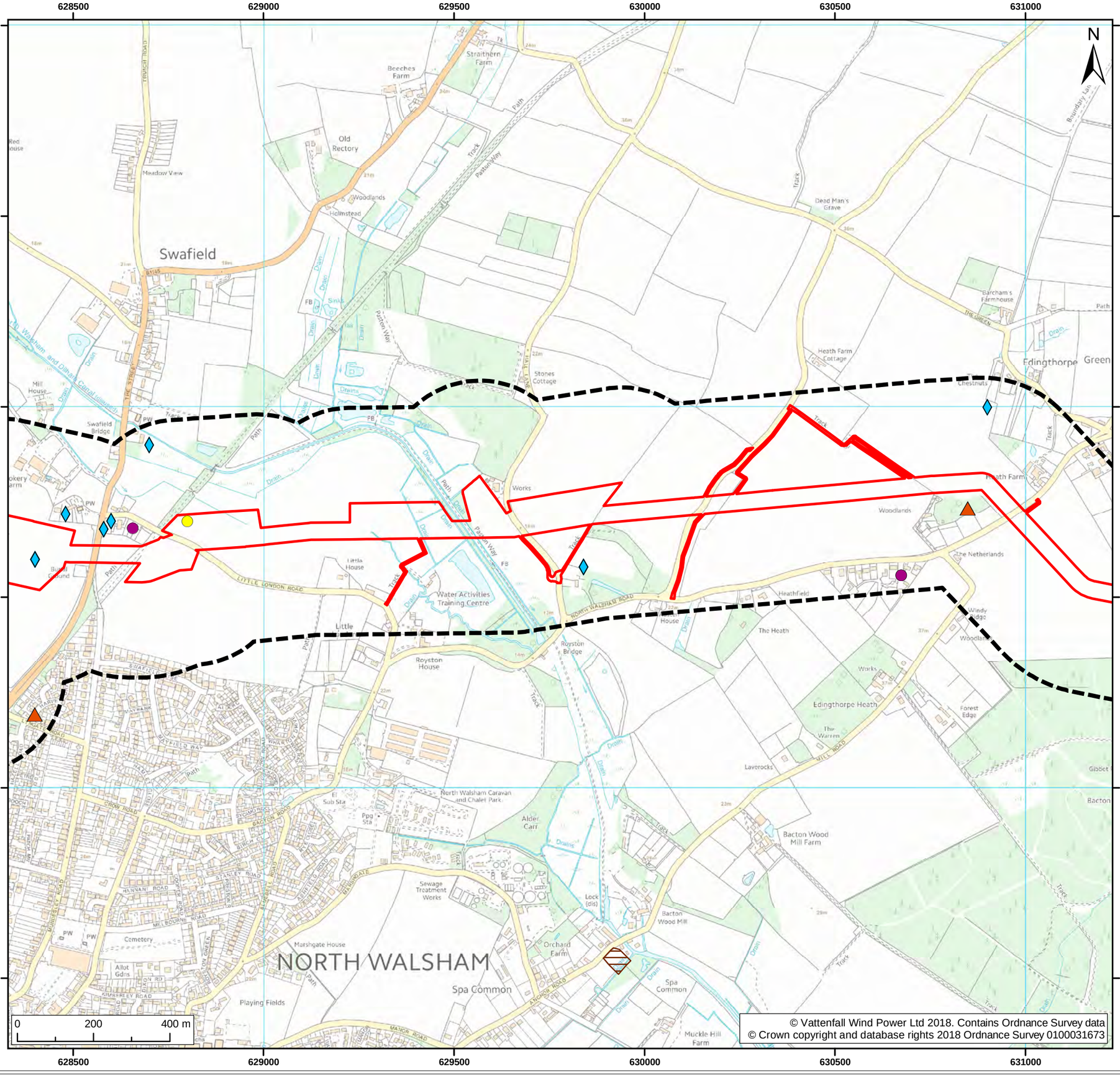

Legend:

- Norfolk Boreas red line boundary
- Study area
- EA Historic Landfill²
- BGS Recorded Mineral Site¹
- Pollution Incidents¹
- Discharge Consents¹
- Trade Directories¹

¹ Envirocheck, 2018.
² Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 5 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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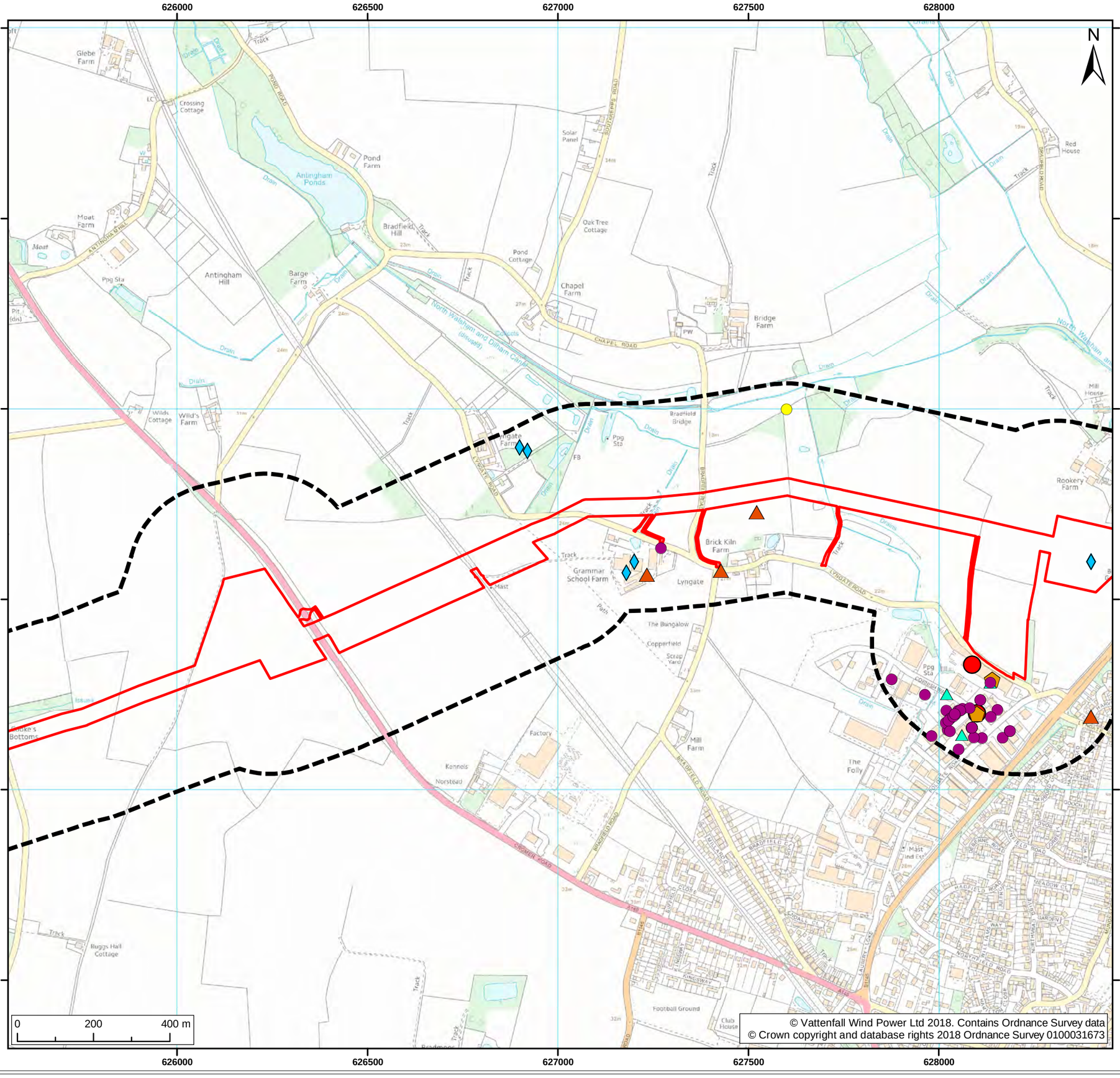

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Registered Waste Transfer Site[1]
- Licensed Waste Management Facility[1]
- Pollution Incidents[1]
- Local Authority Integrated Pollution Prevention and Control[1]
- Discharge Consents[1]
- Trade Directories[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 6 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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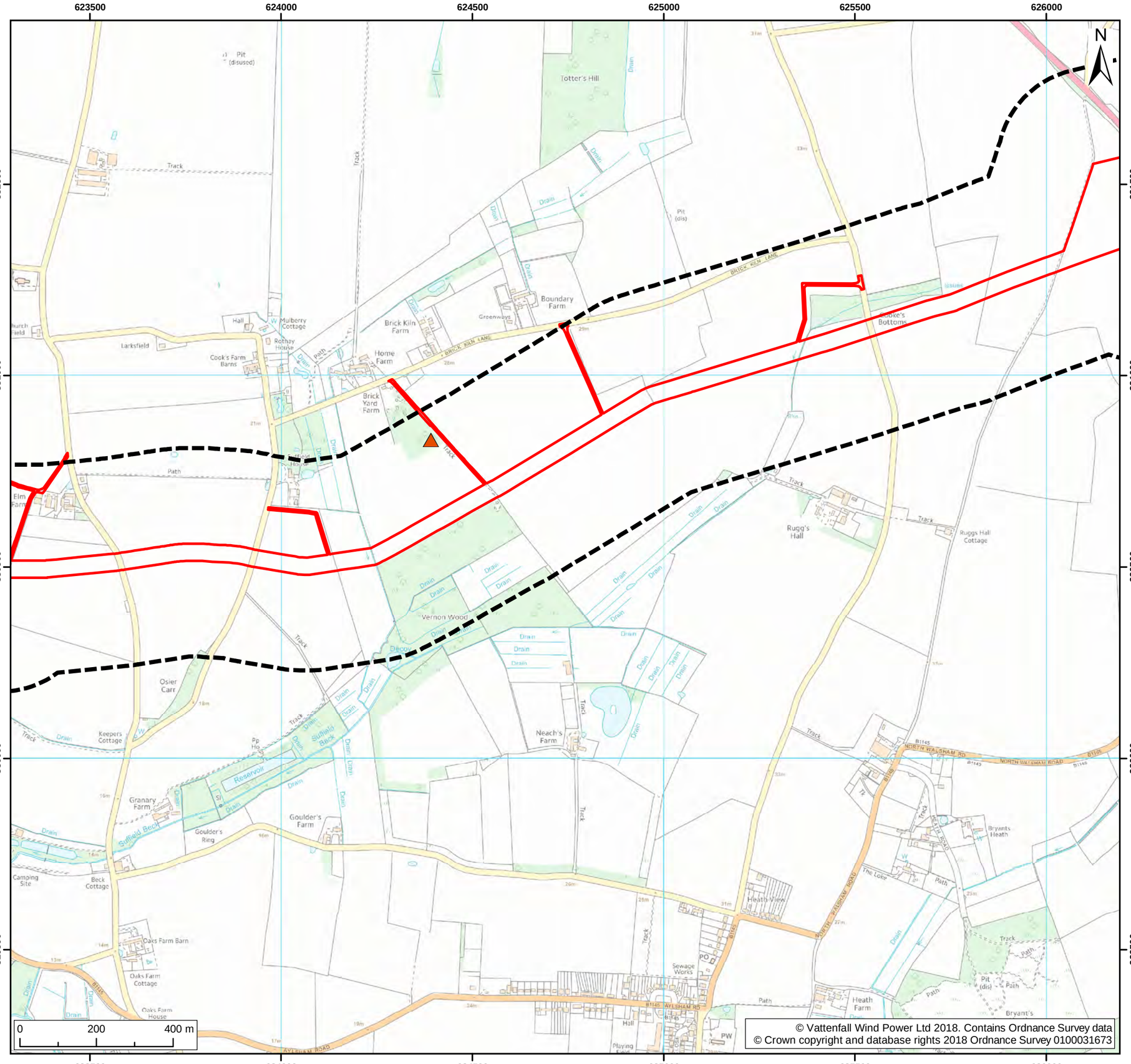

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
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Title:

Site Sensitvity
(Map 7 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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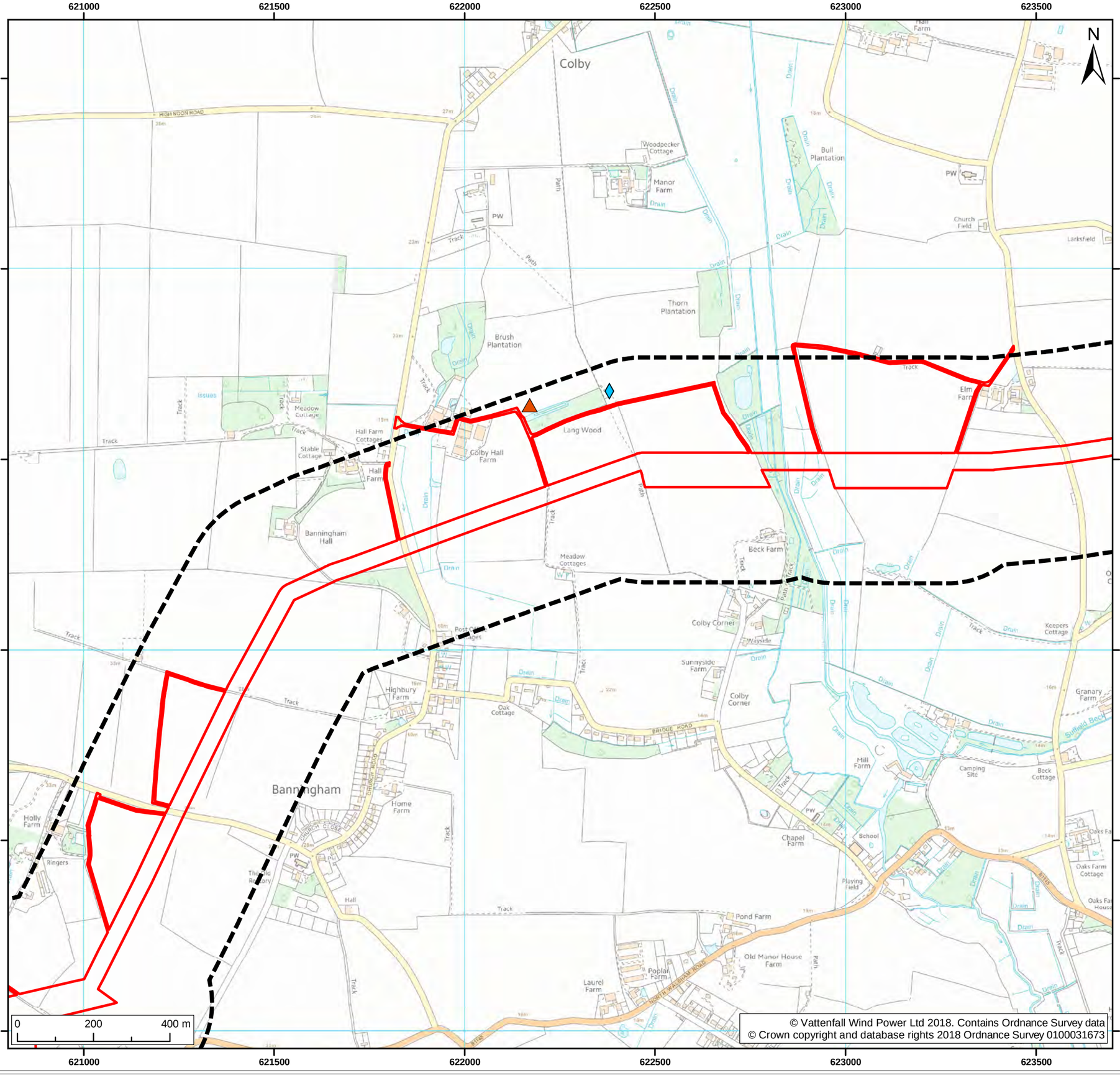

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Discharge Consents[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 8 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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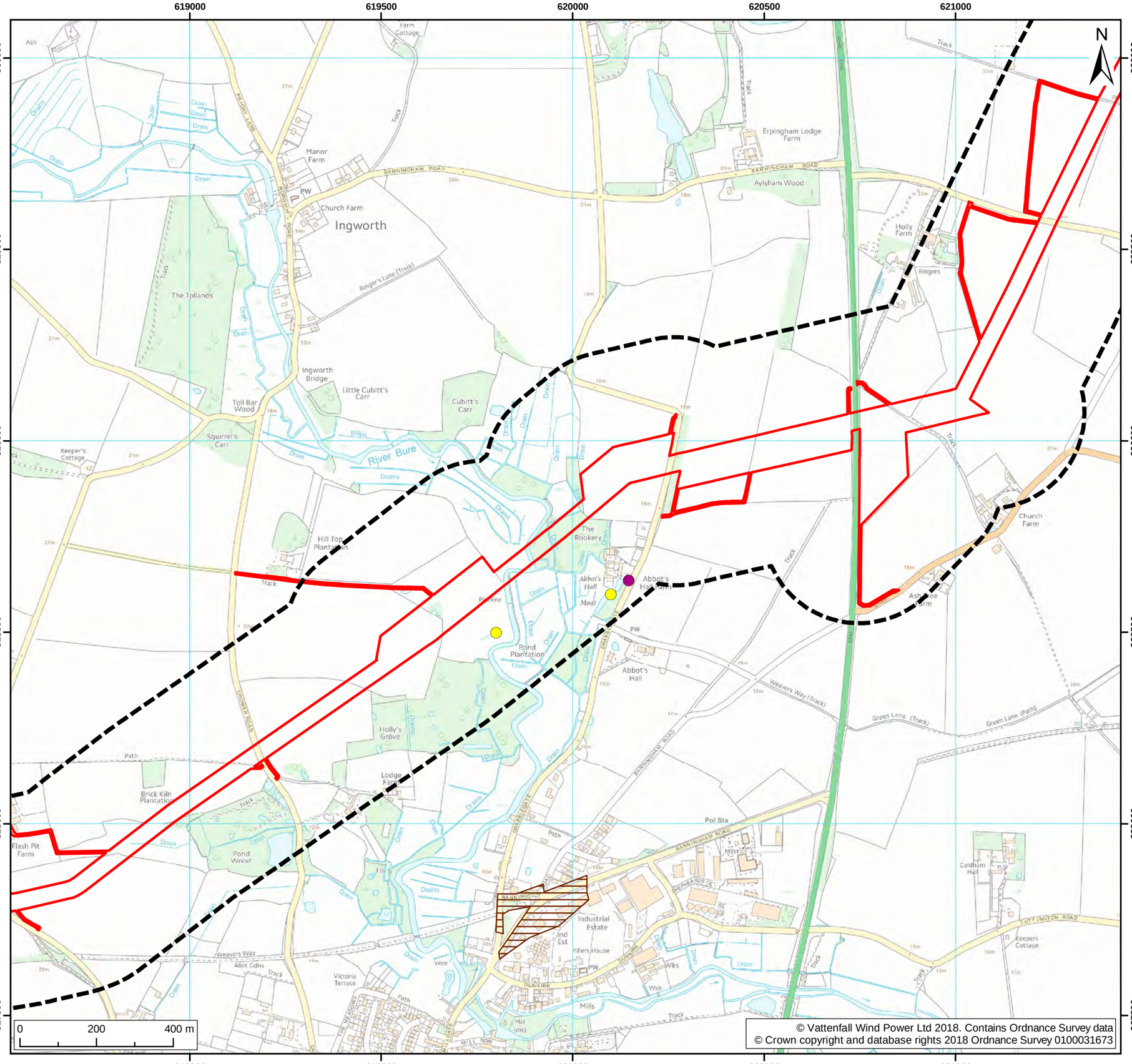

Legend:

- Norfolk Boreas red line boundary
- Study area
- EA Historic Landfill²
- Pollution Incidents¹
- Trade Directories¹

¹ Envirocheck, 2018.
² Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 9 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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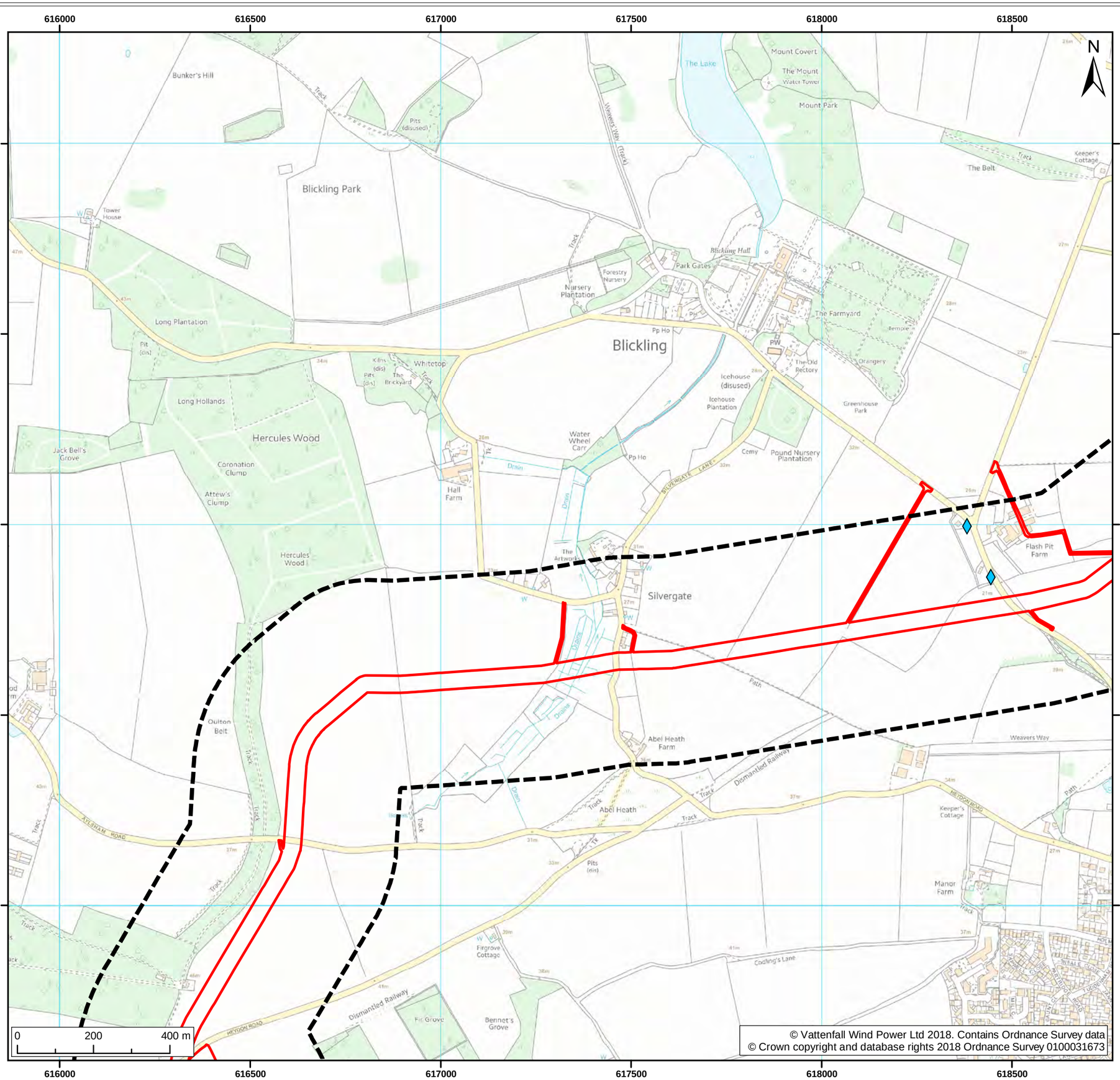

Legend:

- Norfolk Boreas red line boundary
- Study area
- Discharge Consents[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 10 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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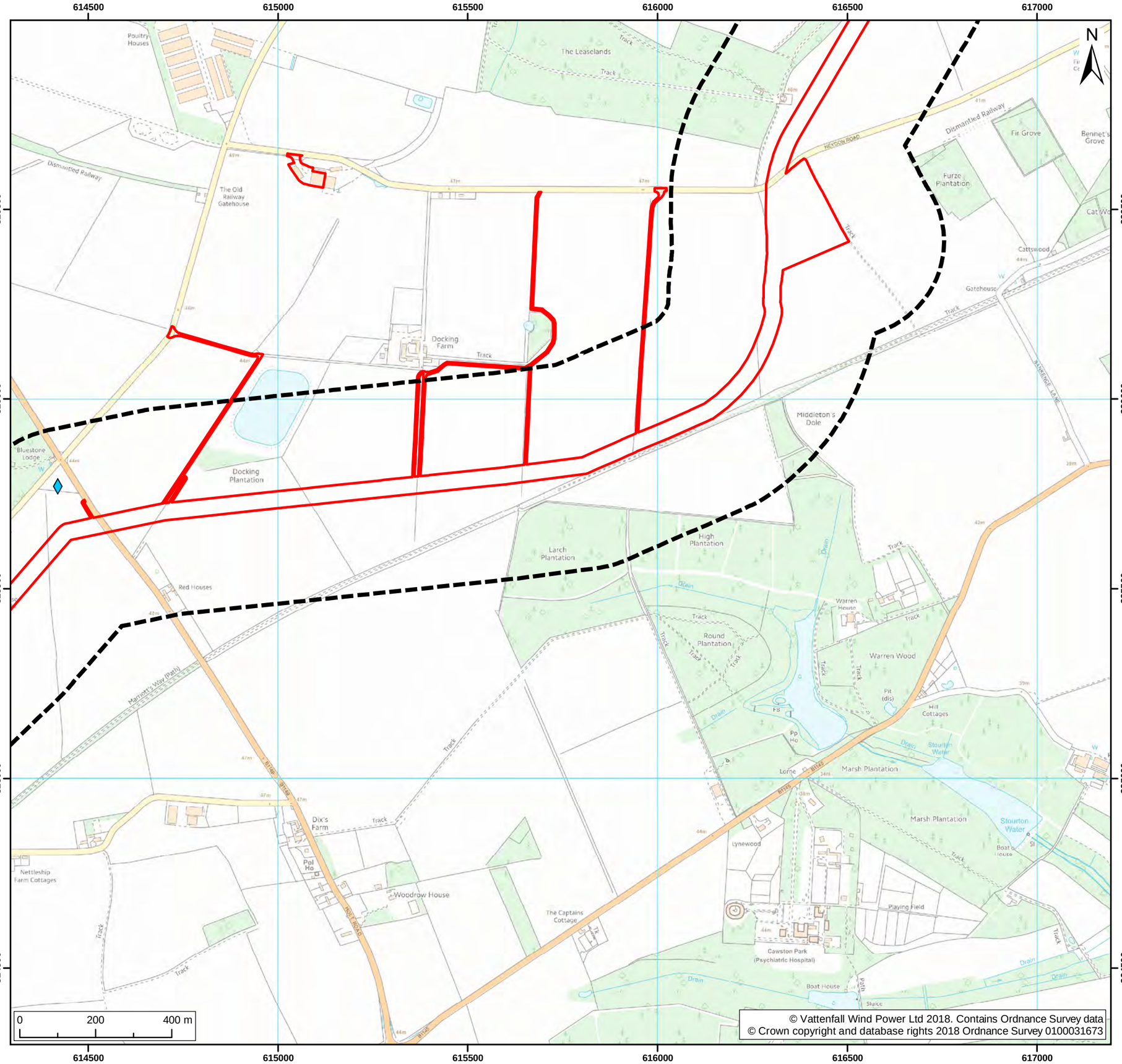

Legend:

- Norfolk Boreas red line boundary
- Study area
- Discharge Consents[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 11 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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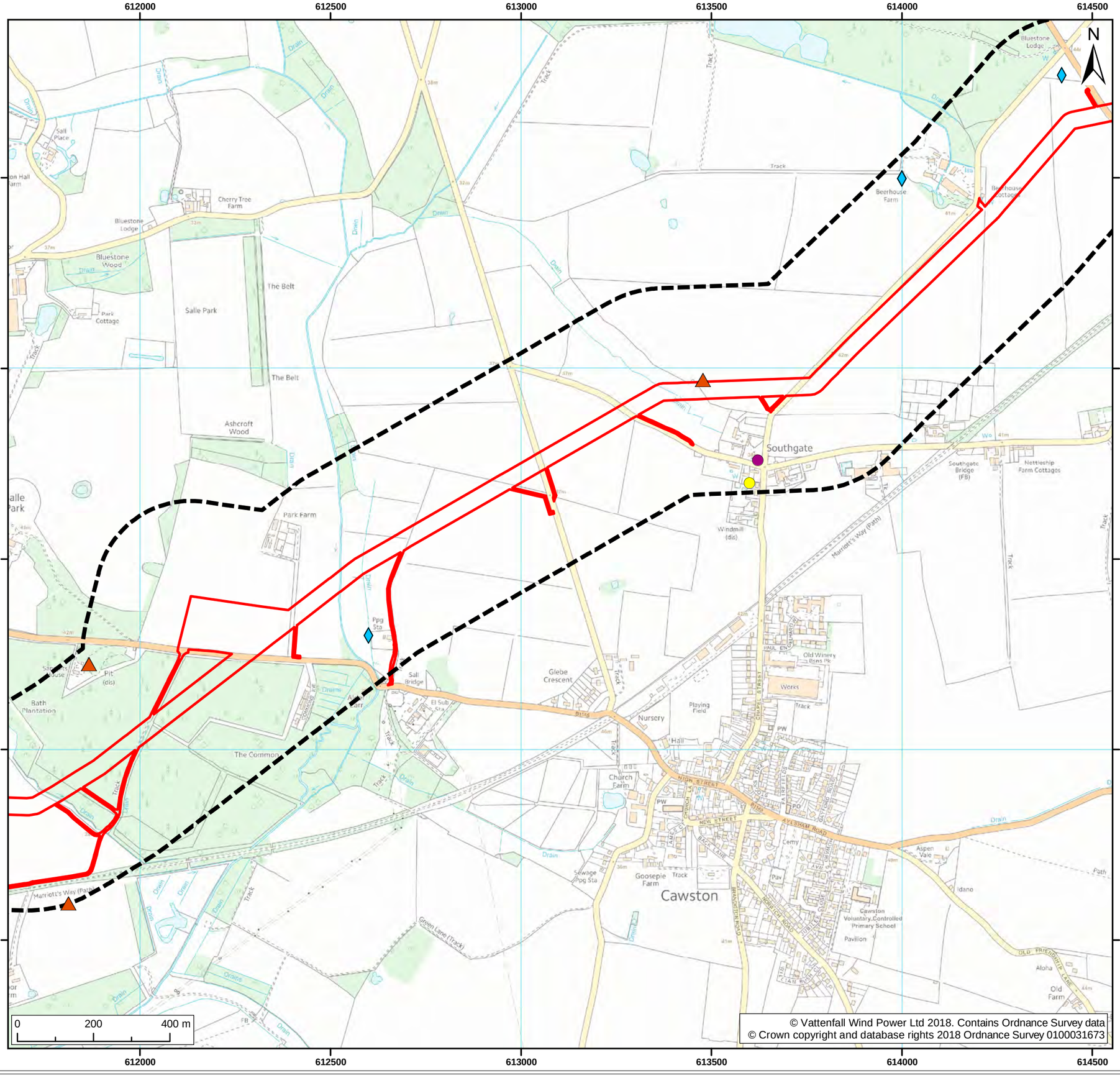

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Pollution Incidents[1]
- Discharge Consents[1]
- Trade Directories[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 12 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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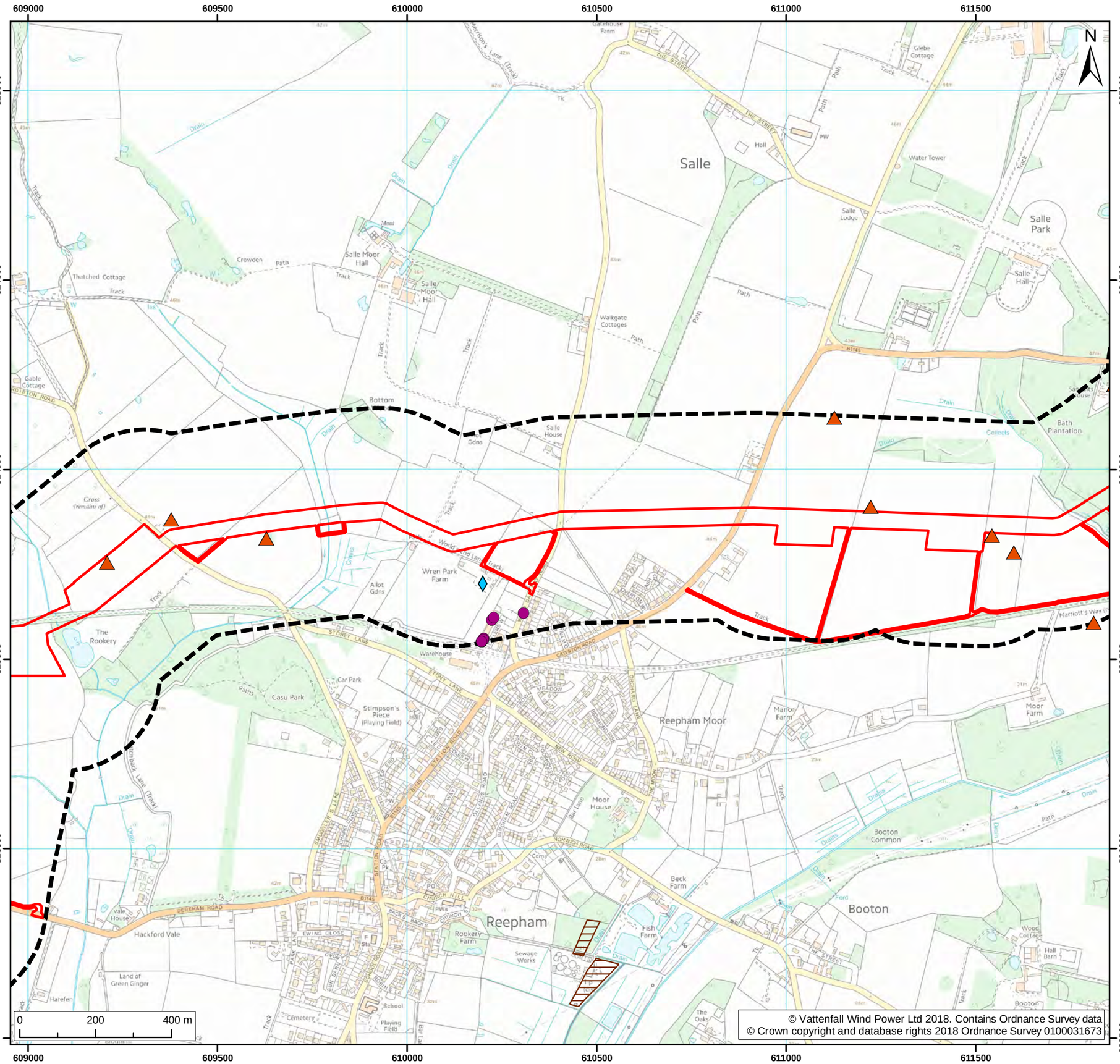

Legend:

- Norfolk Boreas red line boundary
- Study area
- EA Historic Landfill[2]
- BGS Recorded Mineral Site[1]
- Discharge Consents[1]
- Trade Directories[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 13 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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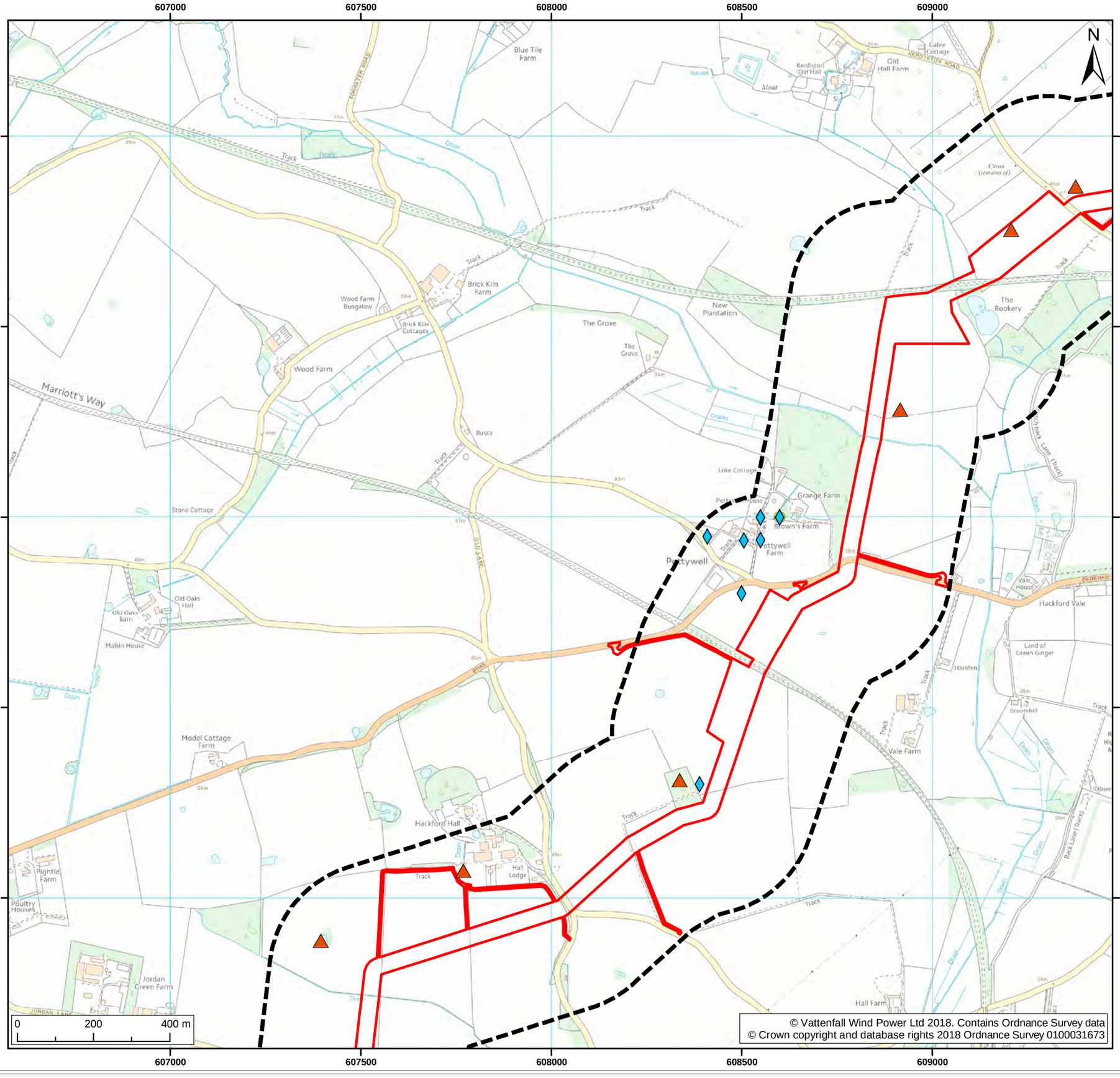

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Pollution Incidents[1]
- Discharge Consents[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 14 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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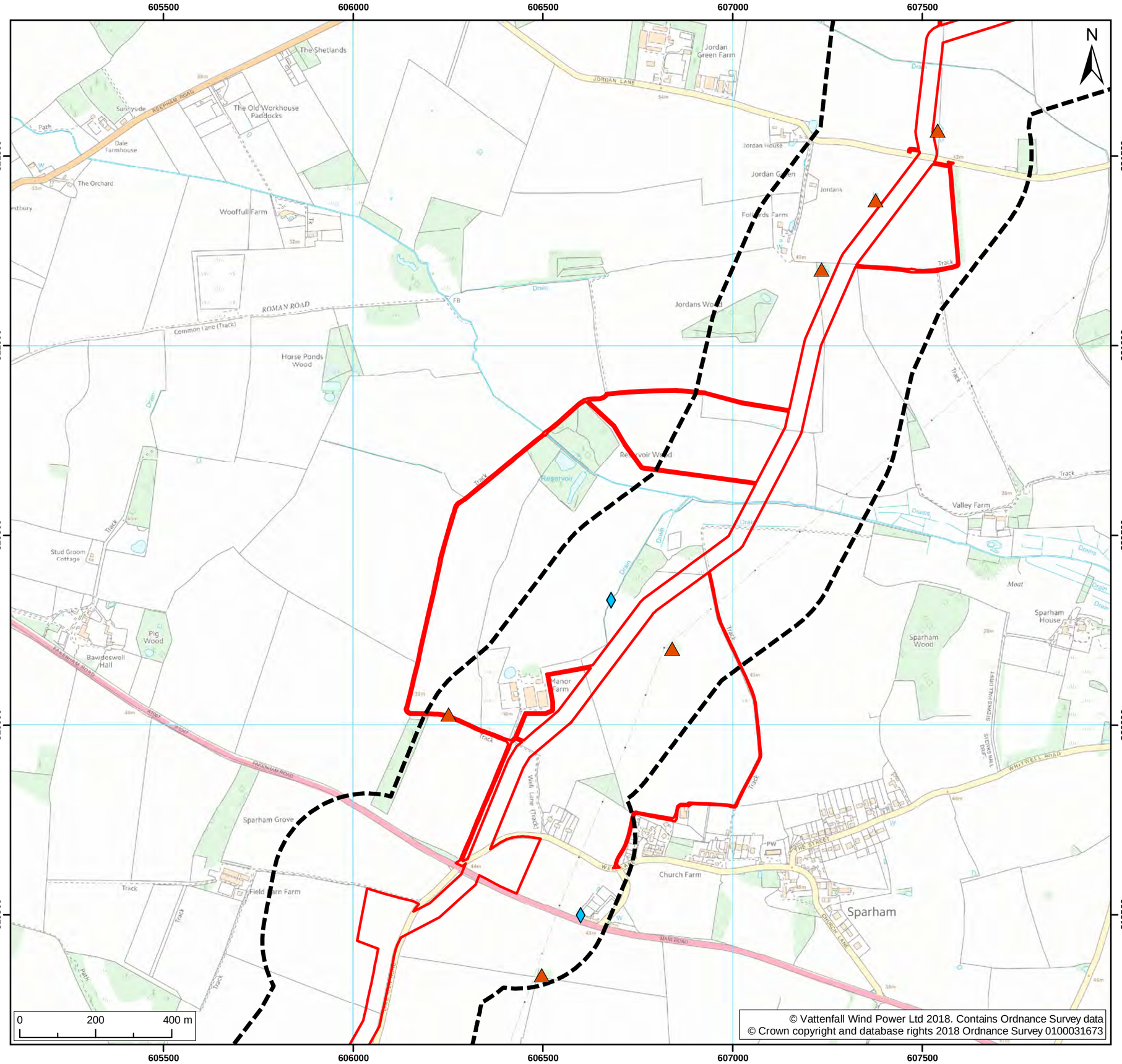

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Discharge Consents[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 15 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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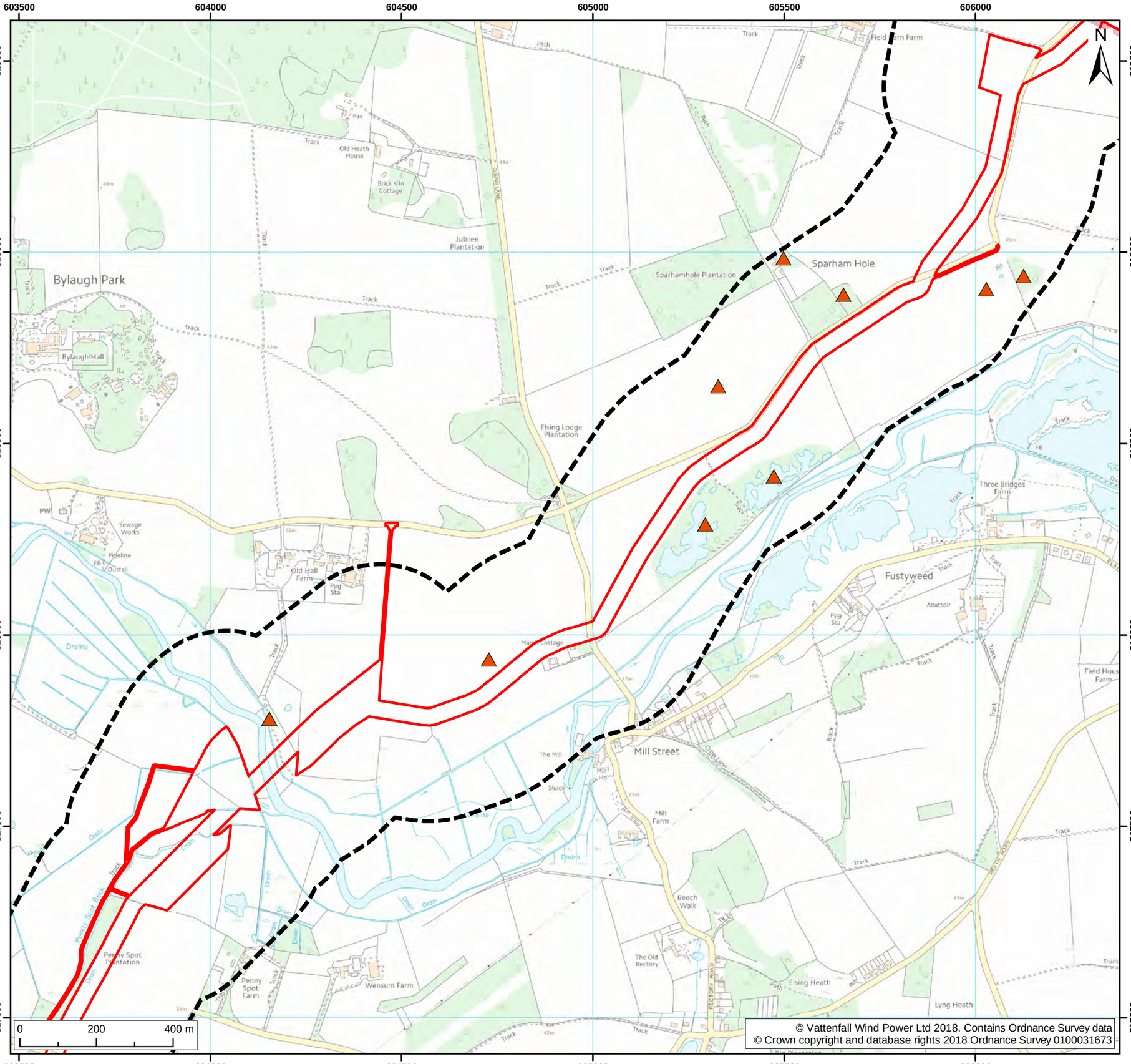

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 16 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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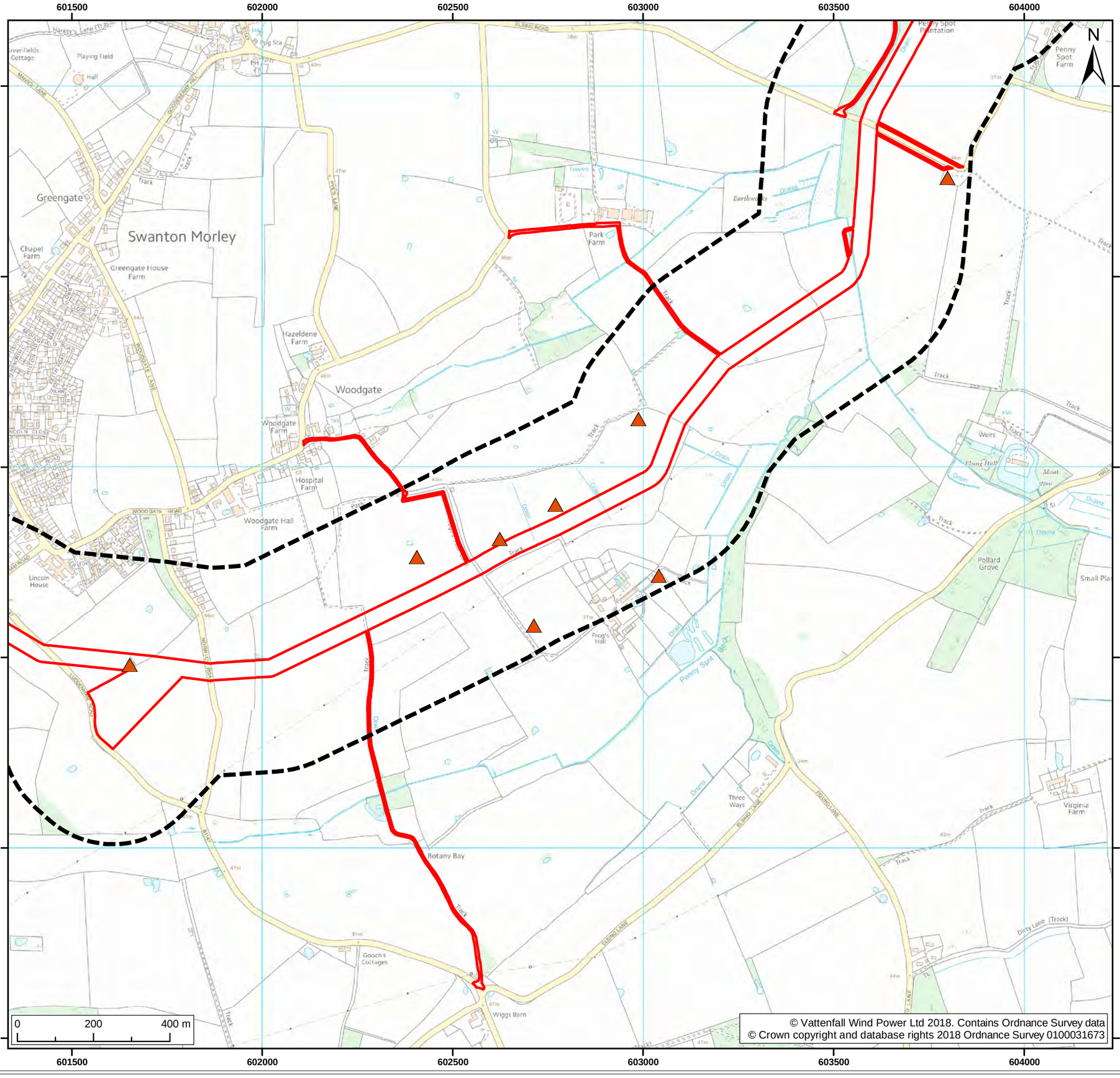

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 17 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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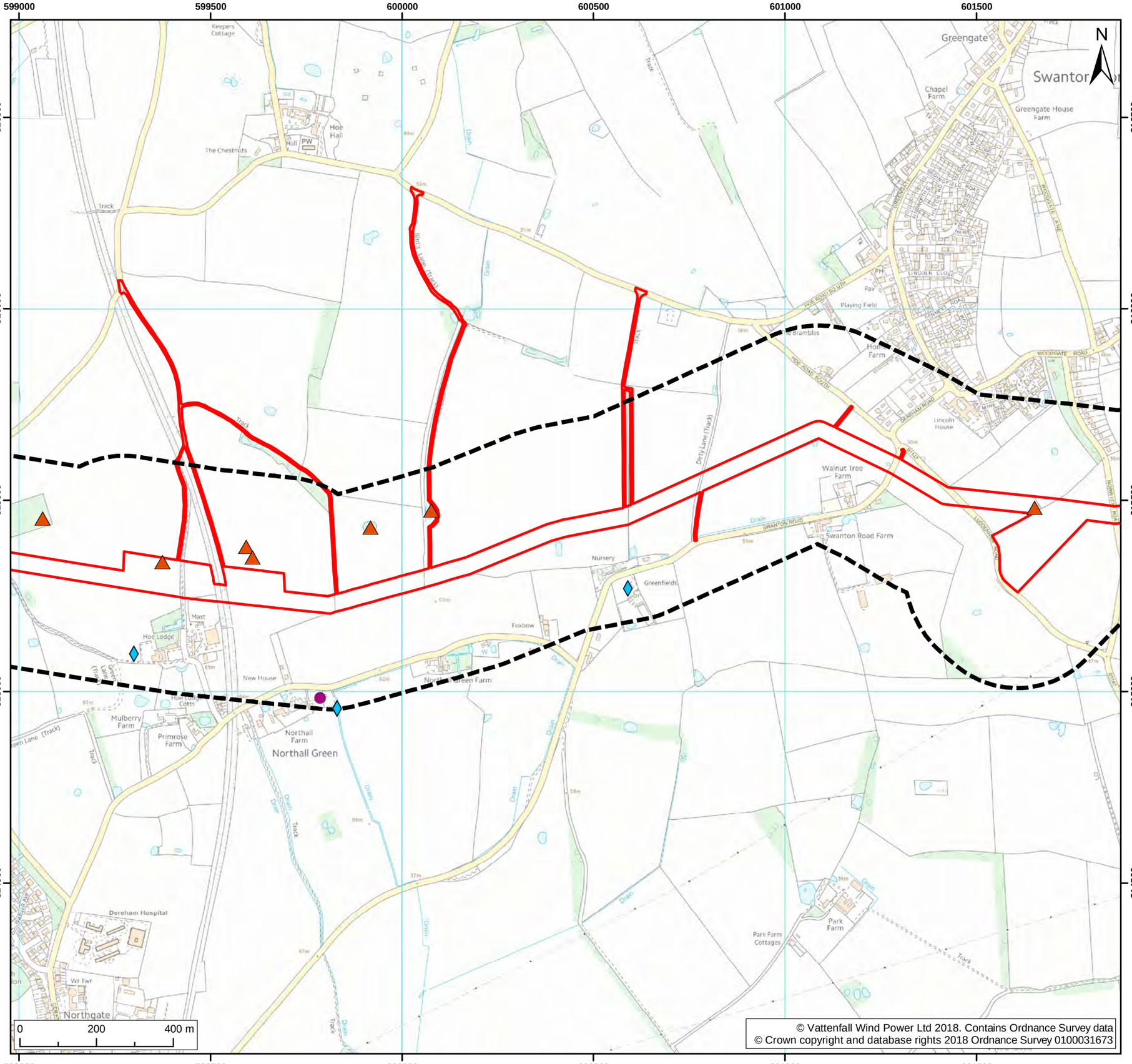

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Discharge Consents[1]
- Trade Directories[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 18 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

VATTENFALL

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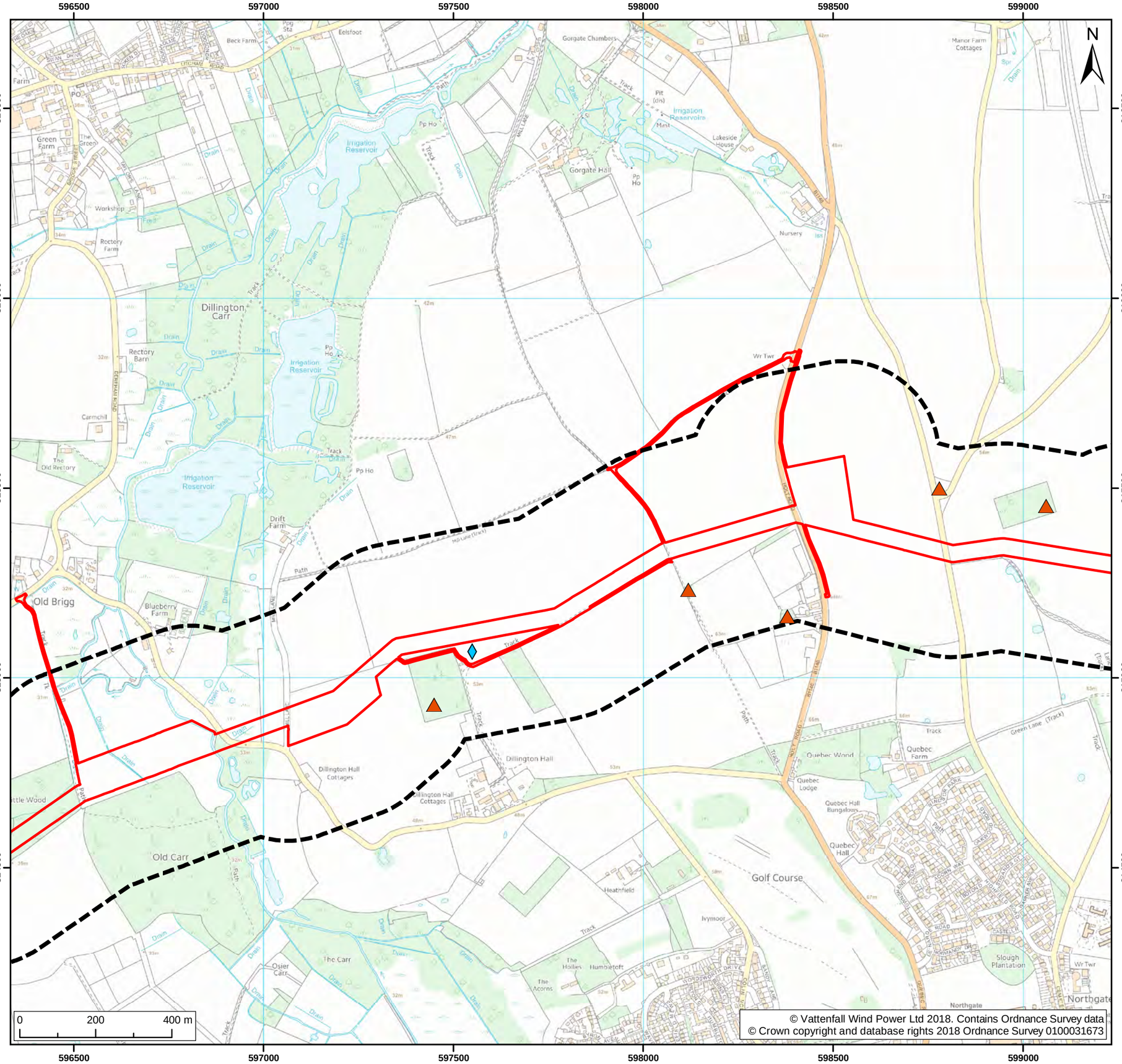

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Discharge Consents[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 19 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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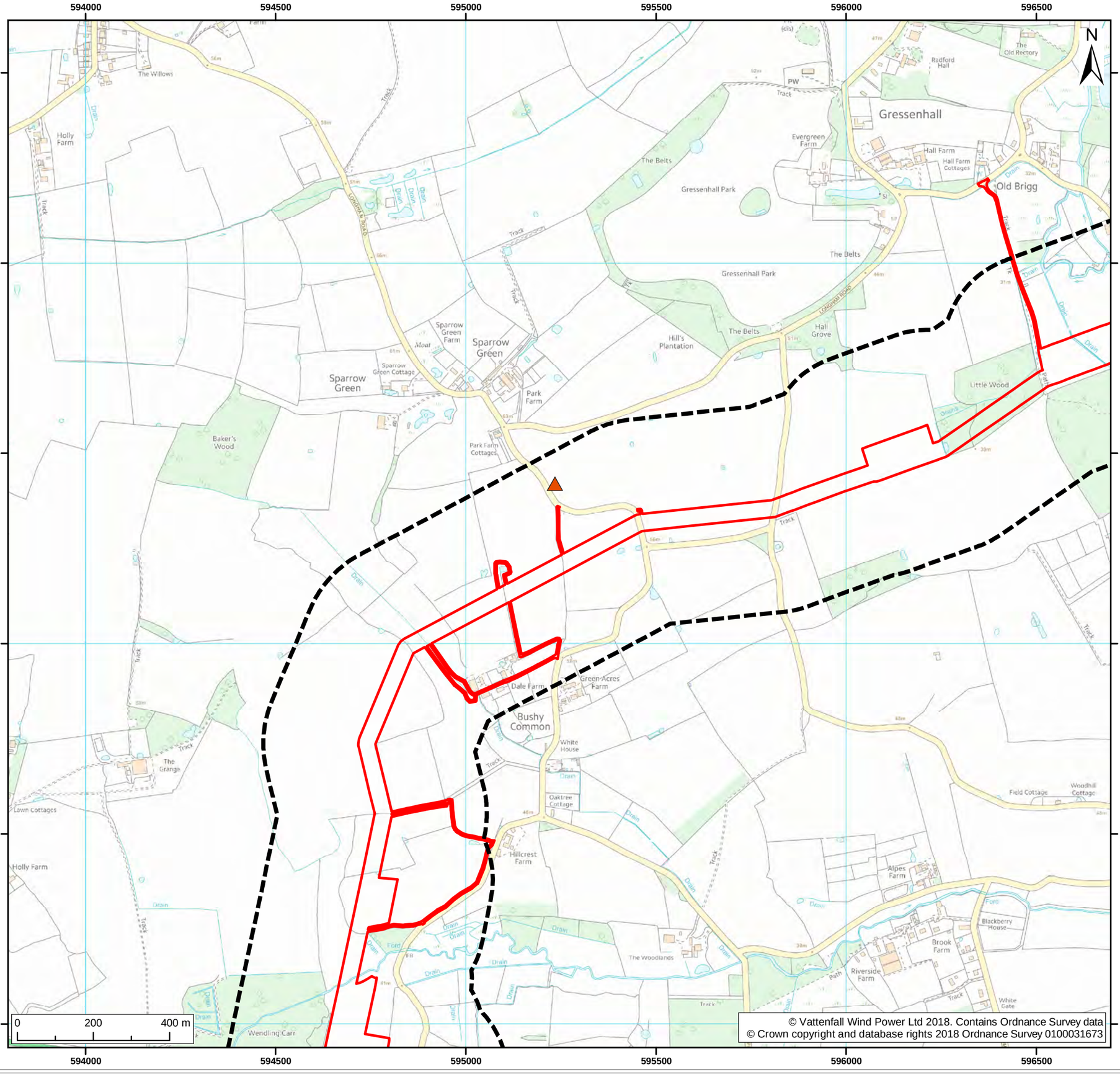

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 20 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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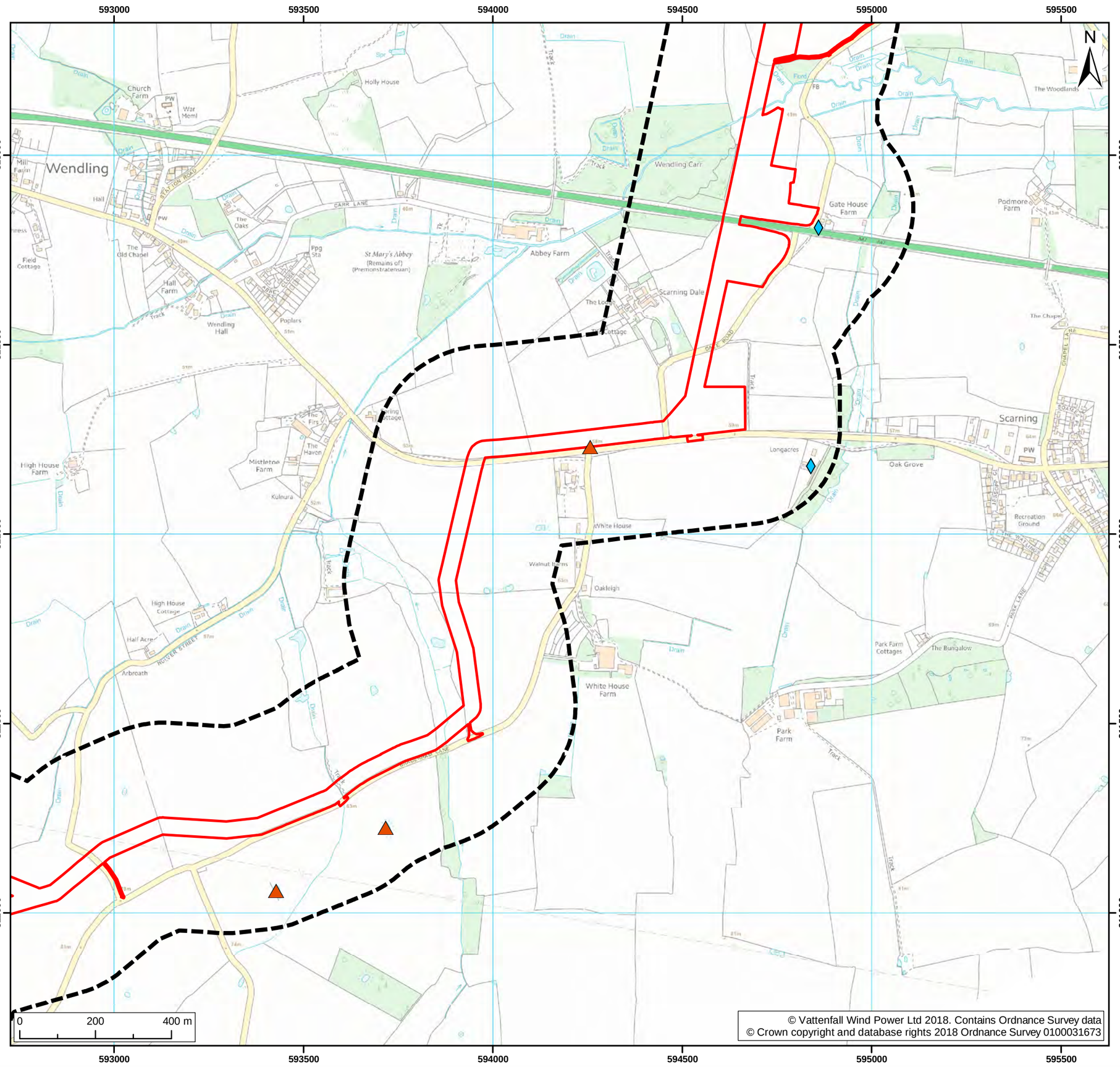

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Discharge Consents[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 21 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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590500 591000 591500 592000 592500 593000

312000 311500 311000 310500 310000 309500

N

Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 22 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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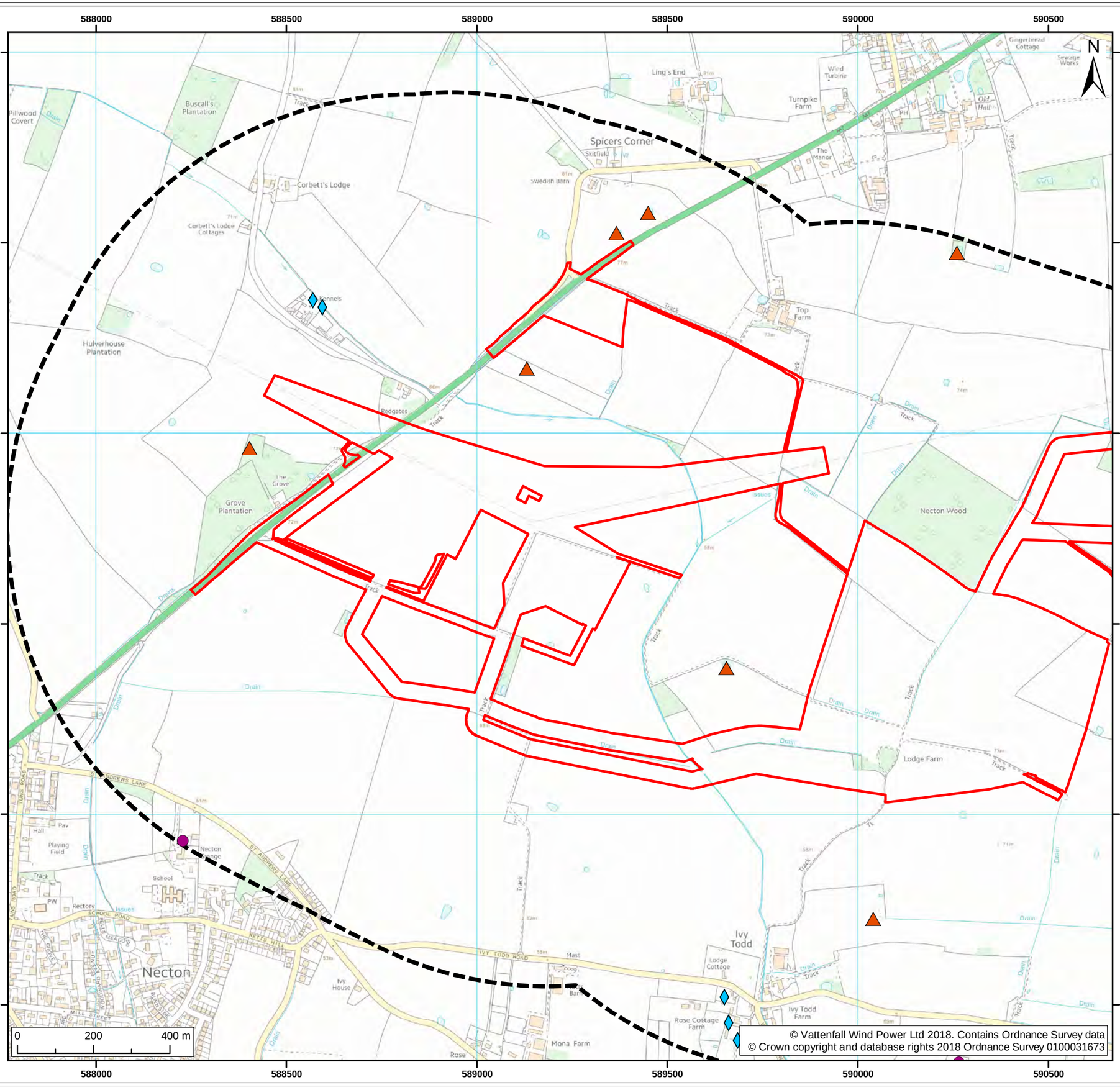
0 200 400 m



Legend:

- Norfolk Boreas red line boundary
- Study area
- BGS Recorded Mineral Site[1]
- Discharge Consents[1]
- Trade Directories[1]

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Site Sensitvity
(Map 23 of 23)

Figure: 19.2.2 | Drawing No: PB5640-005-0192-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	24/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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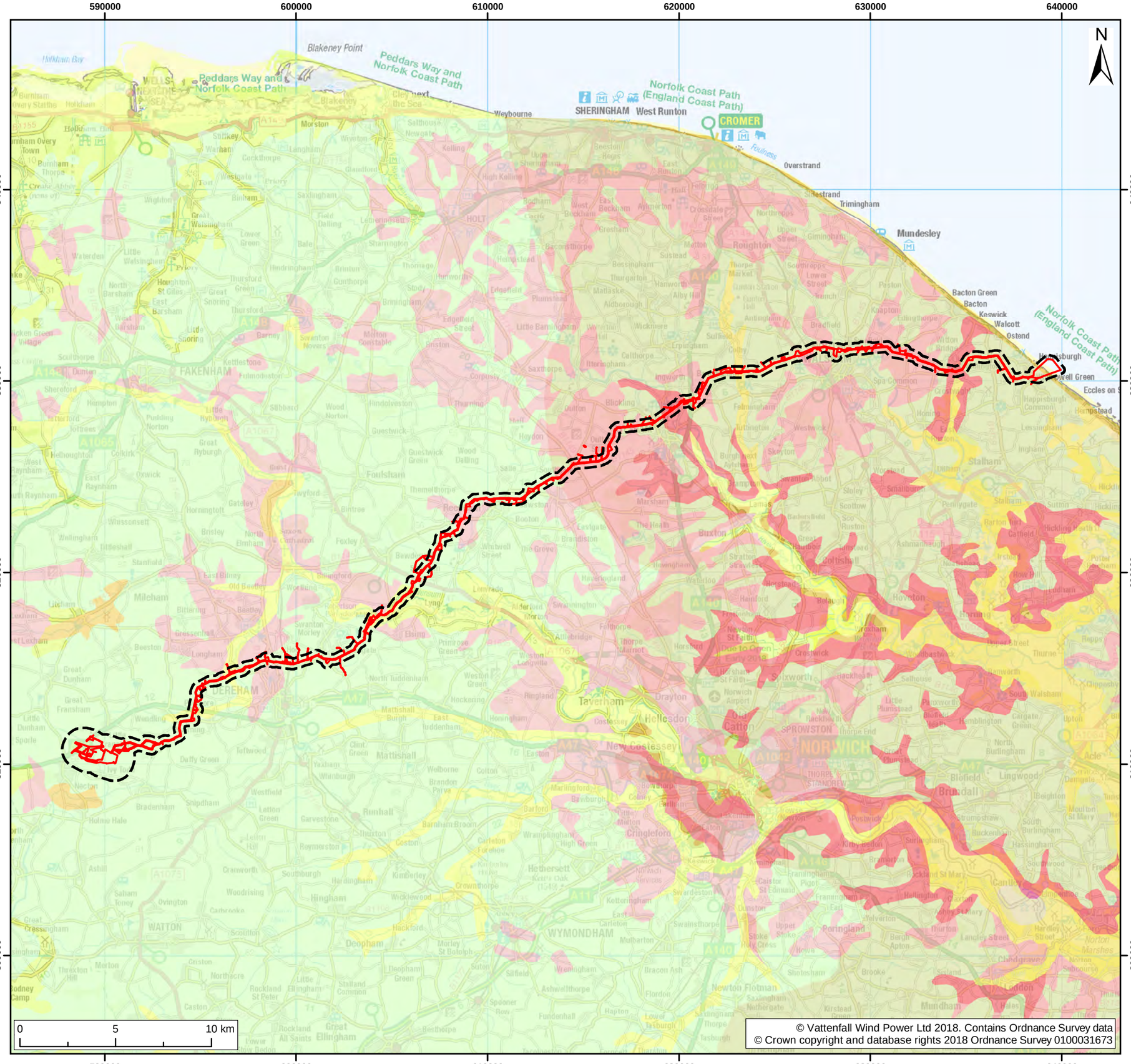

Legend:

- Norfolk Boreas onshore red line boundary
- Study area

Superficial geology[1]

- Till - Diamicton
- Glacial Sand and Gravel
- Crag group - Sand and Gravel
- Alluvium - Clay, Silt and Sand
- River Terrace deposits - Undifferentiated Sand and Gravel
- Brickearth - Silt

Bedrock Geology[1]

- Neogene to Quaternary Rocks (Undifferentiated) - Gravel, Sand, Silt and Clay
- White Chalk Subgroup - Chalk
- Thames Group - Clay, Silt, Sand and Gravel

[1] British Geological Survey, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Geology

Figure: 19.2.3 | Drawing No: PB5640-005-0192-003

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	27/06/2018	LB	MW	A3	1:200,000

Co-ordinate system: British National Grid **EPSG:** 27700

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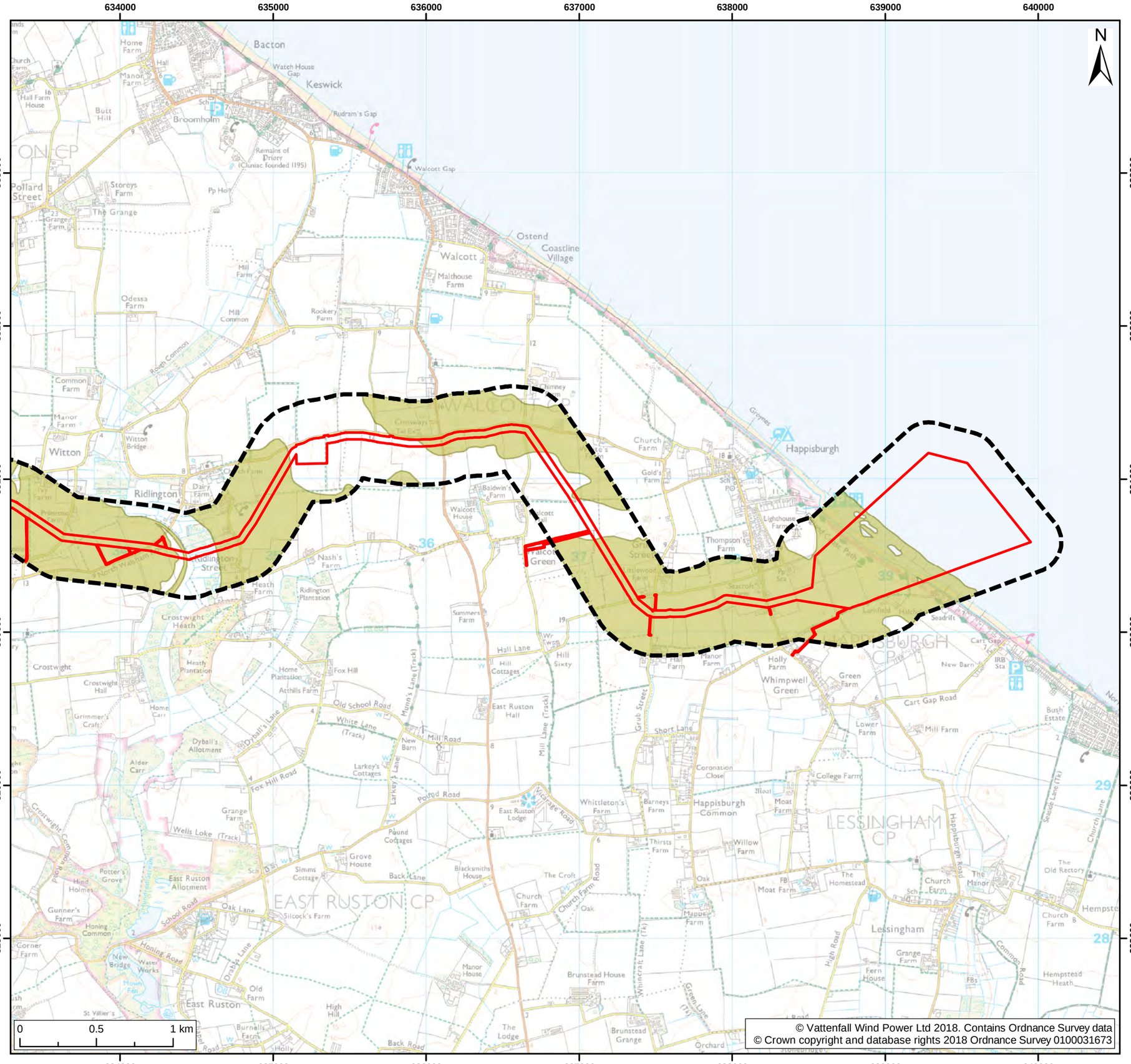

Legend:

- Norfolk Boreas red line boundary
- Study area

Mineral and waste site[1]

- Sand and gravel safe guard zone

[1] NCC, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Minerals safeguarding area
(Map 1 of 9)

Figure: 19.2.4 | Drawing No: PB5640-005-0192-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	20/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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627000 628000 629000 630000 631000 632000 633000 634000

333000 332000 331000 330000 329000 328000

N

Legend:

- Norfolk Boreas red line boundary
- Study area

Mineral and waste site[1]

- Sand and gravel safe guard zone
- Waste management site
- Waste management site consultation area

[1] NCC, 2018.

0 0.5 1 km

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Minerals safeguarding area (Map 2 of 9)

Figure: 19.2.4 | Drawing No: PB5640-005-0192-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	20/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

VATTENFALL

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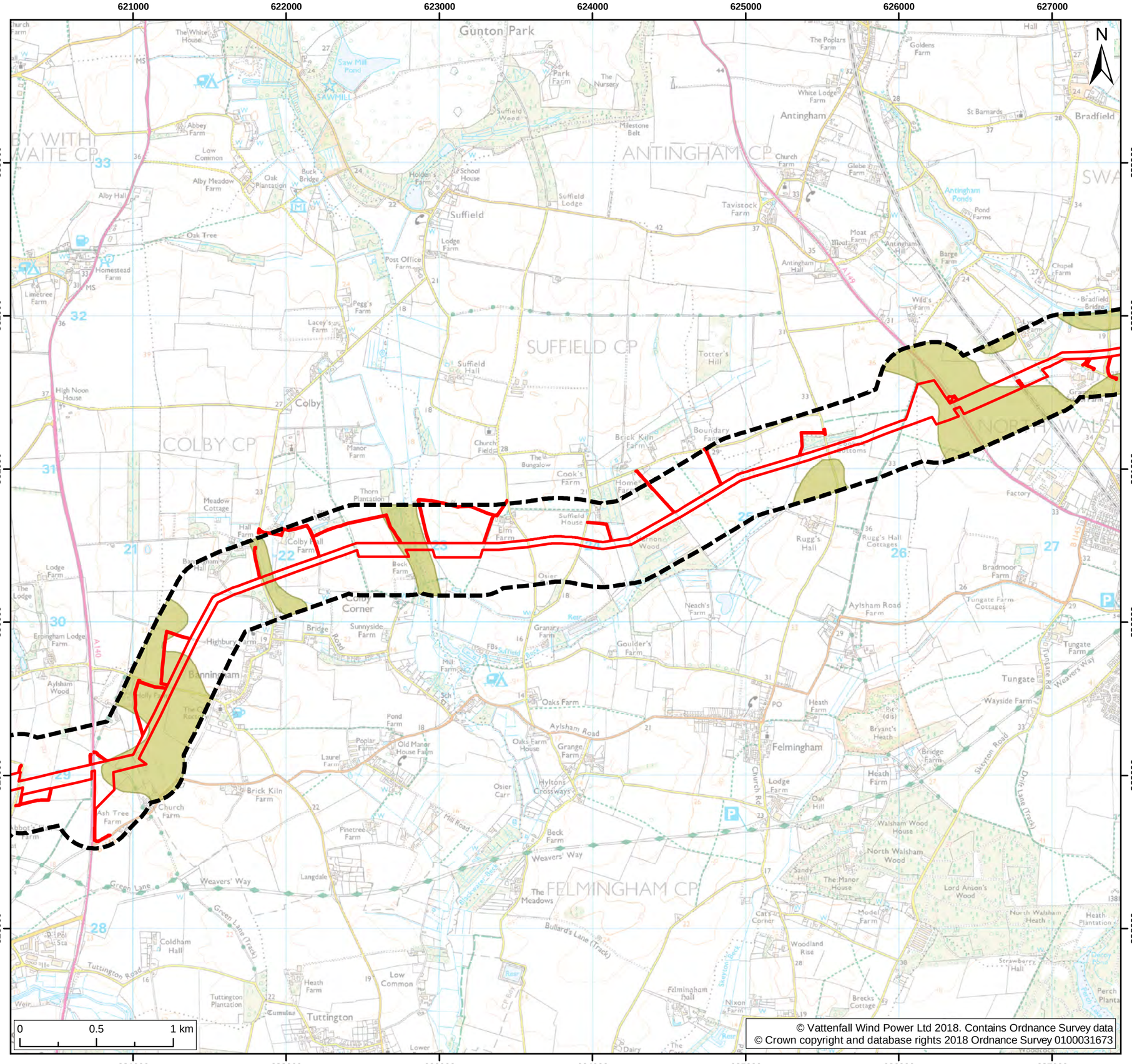

Legend:

- Norfolk Boreas red line boundary
- Study area

Mineral and waste site[1]

- Sand and gravel safe guard zone

[1] NCC, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Minerals safeguarding area
(Map 3 of 9)

Figure: 19.2.4 | Drawing No: PB5640-005-0192-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	20/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

VATTENFALL

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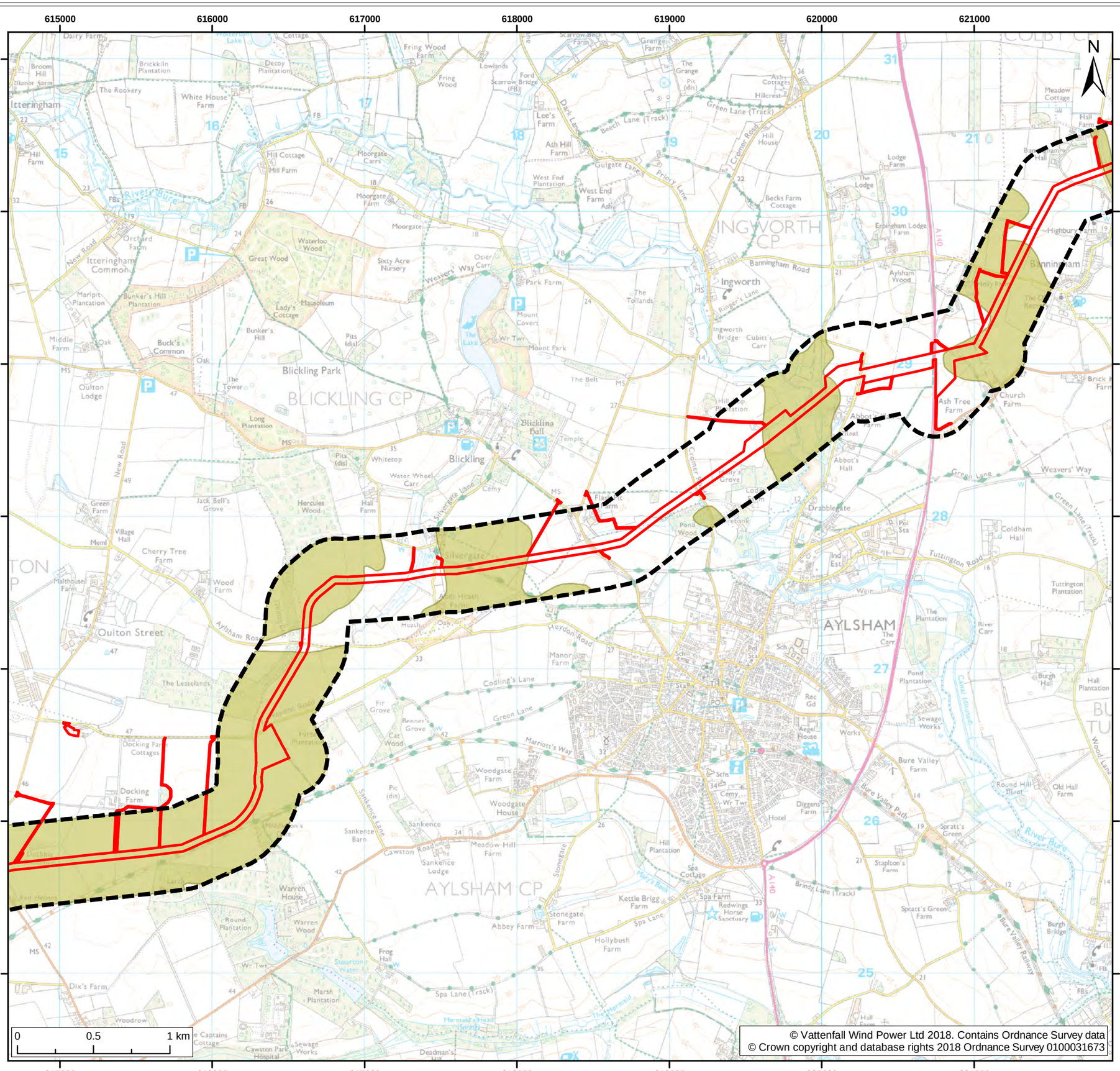

Legend:

- Norfolk Boreas red line boundary
- Study area

Mineral and waste site[1]

- Sand and gravel safe guard zone

[1] NCC, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Minerals safeguarding area
(Map 4 of 9)

Figure: 19.2.4 | Drawing No: PB5640-005-0192-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	20/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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609000 610000 611000 612000 613000 614000 615000

327000 326000 325000 324000 323000 322000

N

Legend:

- Norfolk Boreas red line boundary
- Study area

Mineral and waste site[1]

- Sand and gravel safe guard zone

[1] NCC, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Minerals safeguarding area
(Map 5 of 9)

Figure: 19.2.4 | Drawing No: PB5640-005-0192-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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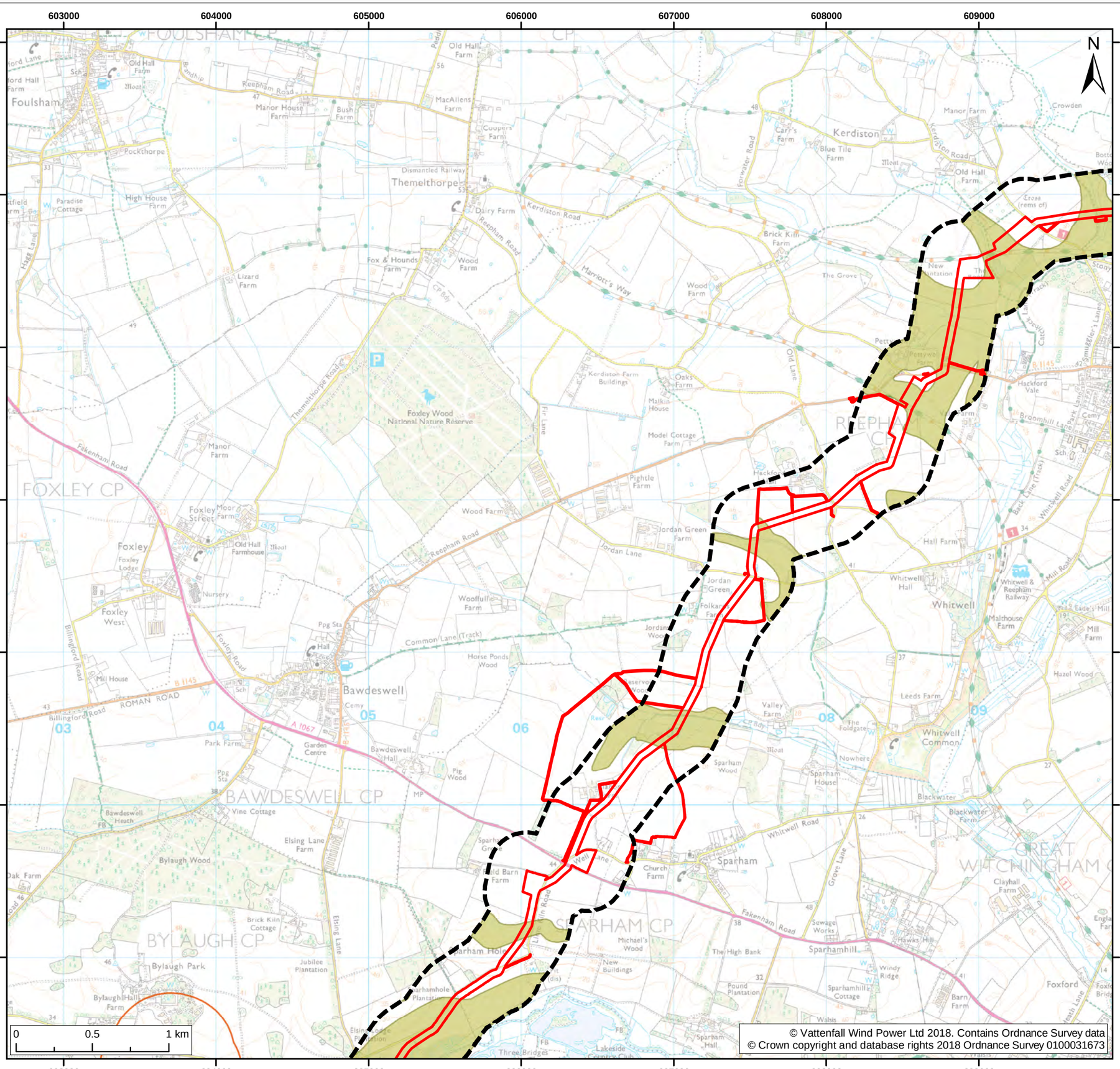
0 0.5 1 km



Legend:

- Norfolk Boreas red line boundary
- Study area

Mineral and waste site[1]

- Sand and gravel safe guard zone
- Wastewater consultation area

[1] NCC, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Minerals safeguarding area
(Map 6 of 9)

Figure: 19.2.4 | Drawing No: PB5640-005-0192-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	20/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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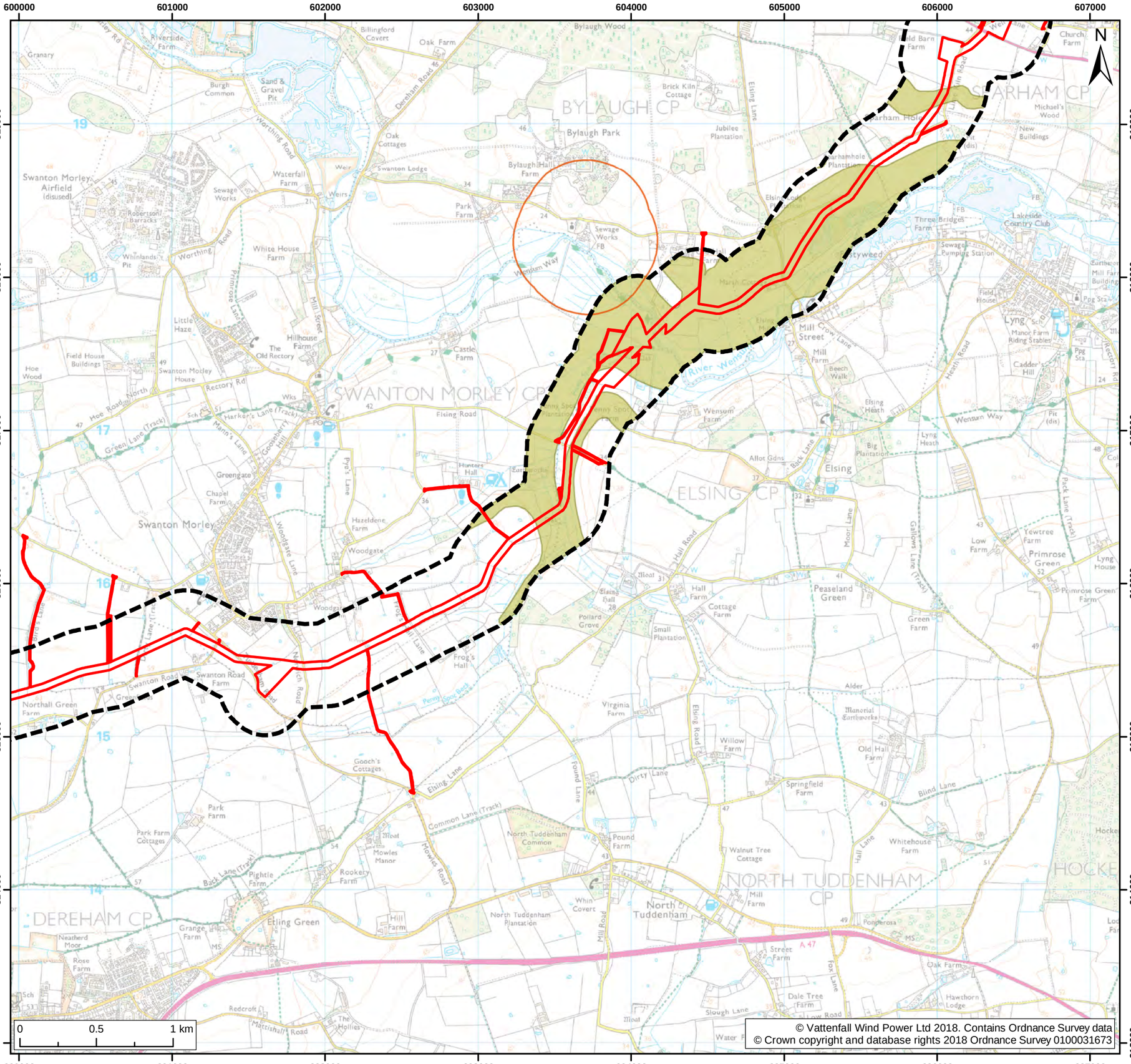

Legend:

- Norfolk Boreas red line boundary
- Study area

Mineral and waste site[1]

- Sand and gravel safe guard zone
- Wastewater consultation area

[1] NCC, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Minerals safeguarding area
(Map 7 of 9)

Figure: 19.2.4 | Drawing No: PB5640-005-0192-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	20/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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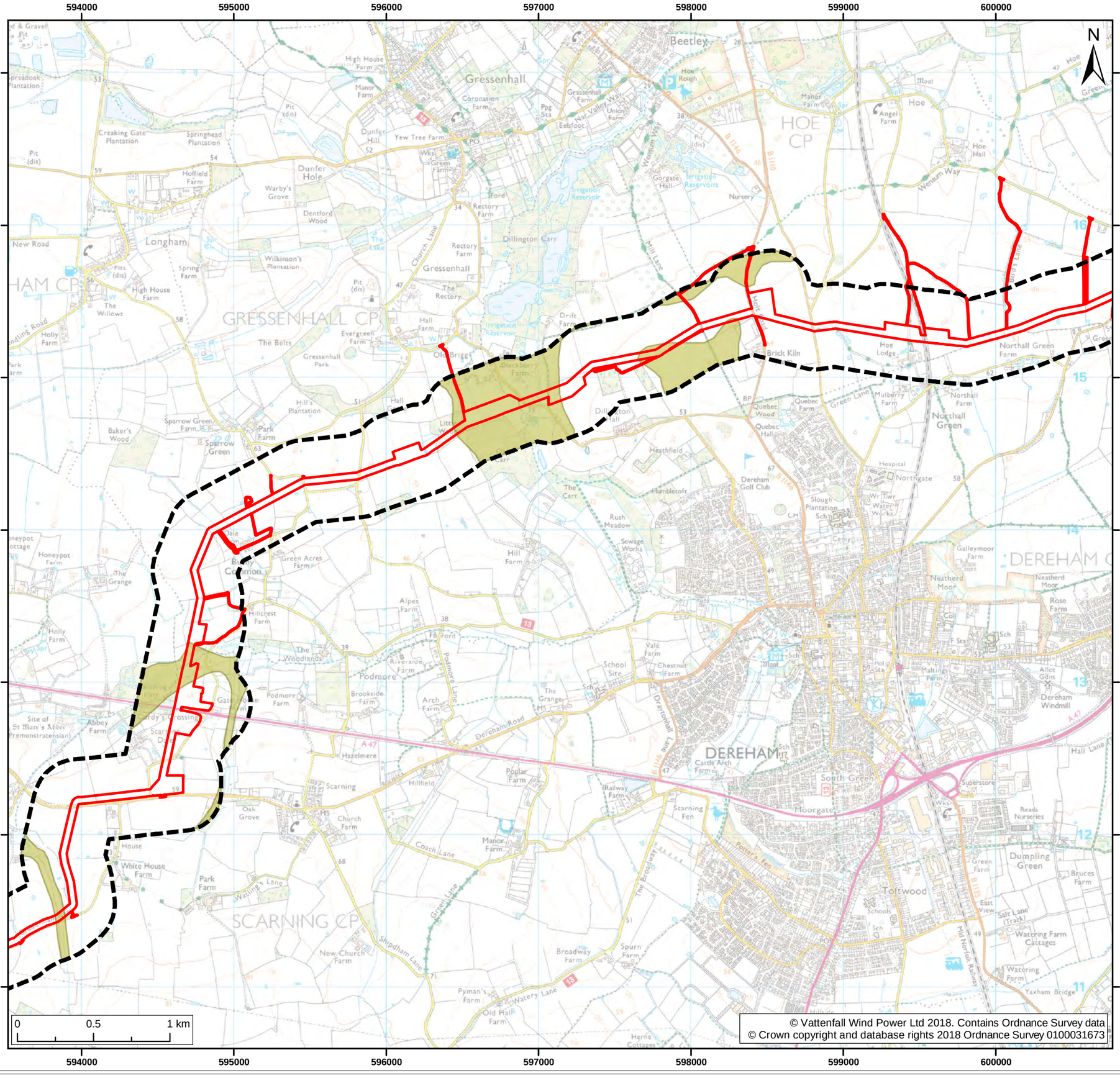

Legend:

- Norfolk Boreas red line boundary
- Study area

Mineral and waste site[1]

- Sand and gravel safe guard zone

[1] NCC, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Minerals safeguarding area
(Map 8 of 9)

Figure: 19.2.4 | Drawing No: PB5640-005-0192-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	20/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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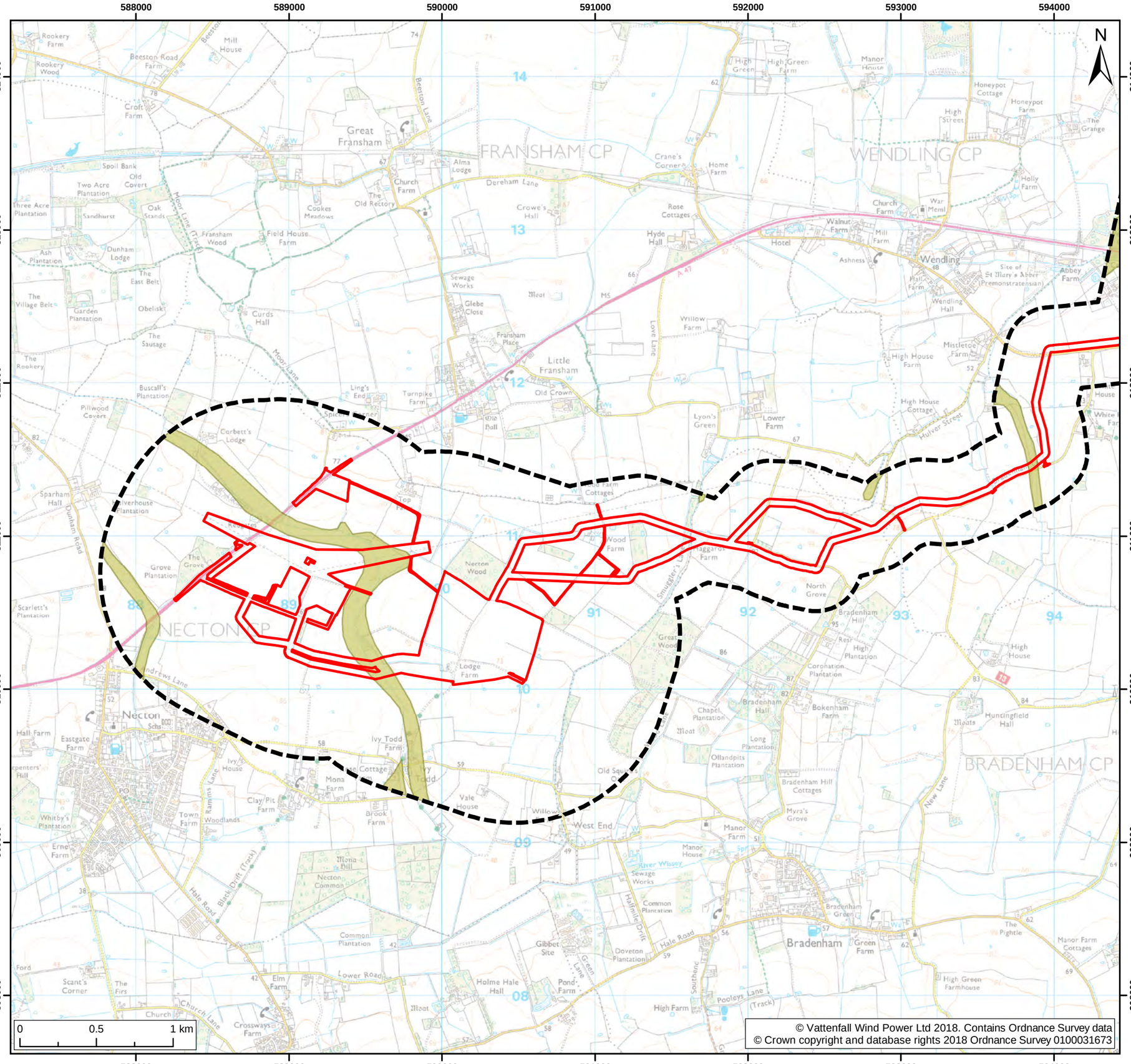

Legend:

- Norfolk Boreas red line boundary
- Study area

Mineral and waste site[1]

- Sand and gravel safe guard zone

[1] NCC, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Minerals safeguarding area
(Map 9 of 9)

Figure: 19.2.4 | Drawing No: PB5640-005-0192-004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	20/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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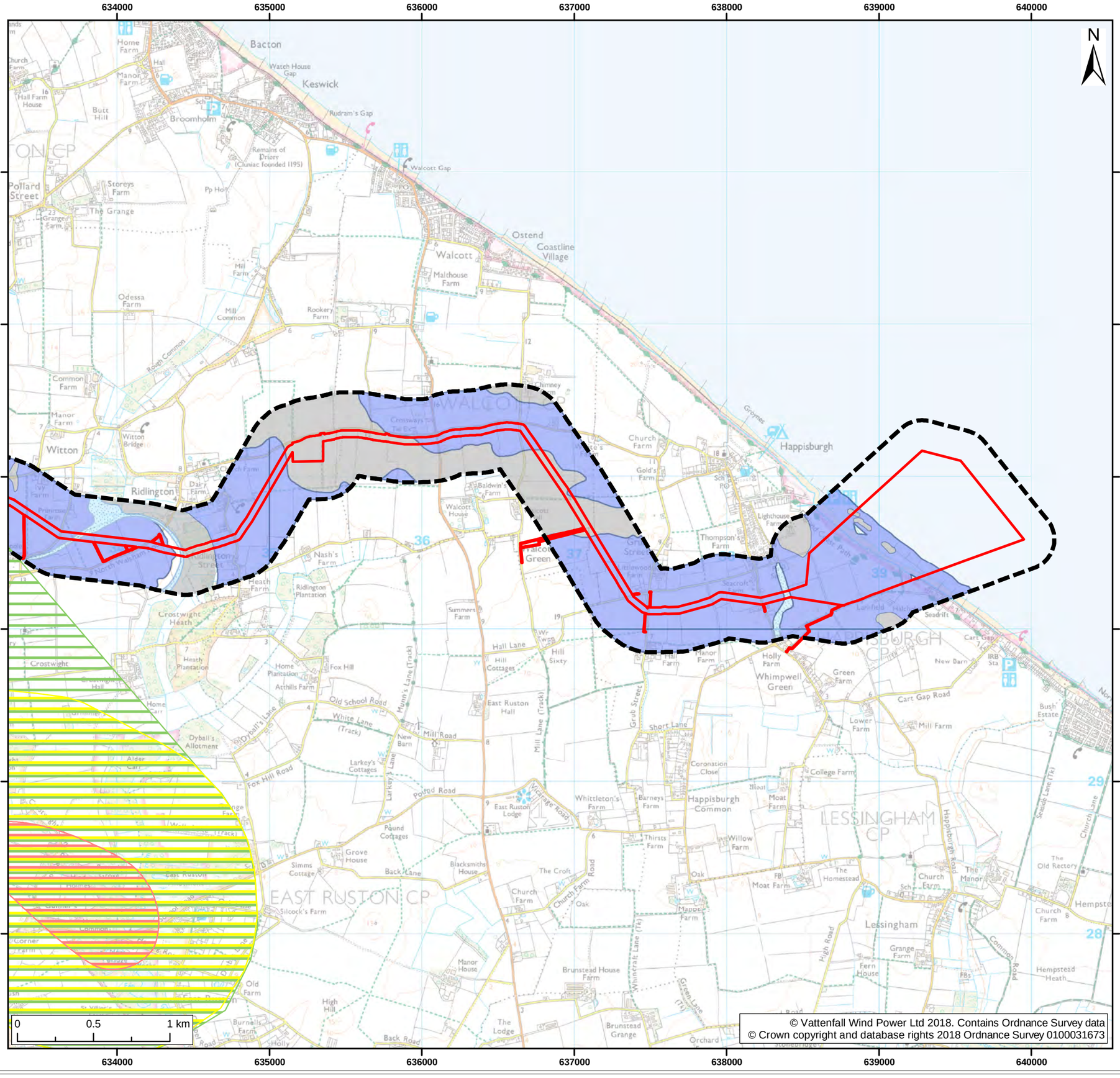

Legend:

- Norfolk Boreas red line boundary
- Study area

Superficial aquifer designations[1]

- Secondary aquifer - A
- Secondary aquifer - undifferentiated
- Unproductive strata

Source Protection Zones[2]

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Groundwater designations and Source Protection Zones (Map 1 of 9)

Figure: 19.2.5 | Drawing No: PB5640-005-0192-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	30/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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627000 628000 629000 630000 631000 632000 633000 634000

333000 332000 331000 330000 329000 328000

N

Legend:

- Norfolk Boreas red line boundary
- Study area

Superficial aquifer designations[1]

- Secondary aquifer - A
- Secondary aquifer - B
- Secondary aquifer - undifferentiated
- Unproductive strata

Source Protection Zones[2]

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Groundwater designations and Source Protection Zones (Map 2 of 9)

Figure: 19.2.5 | Drawing No: PB5640-005-0192-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	30/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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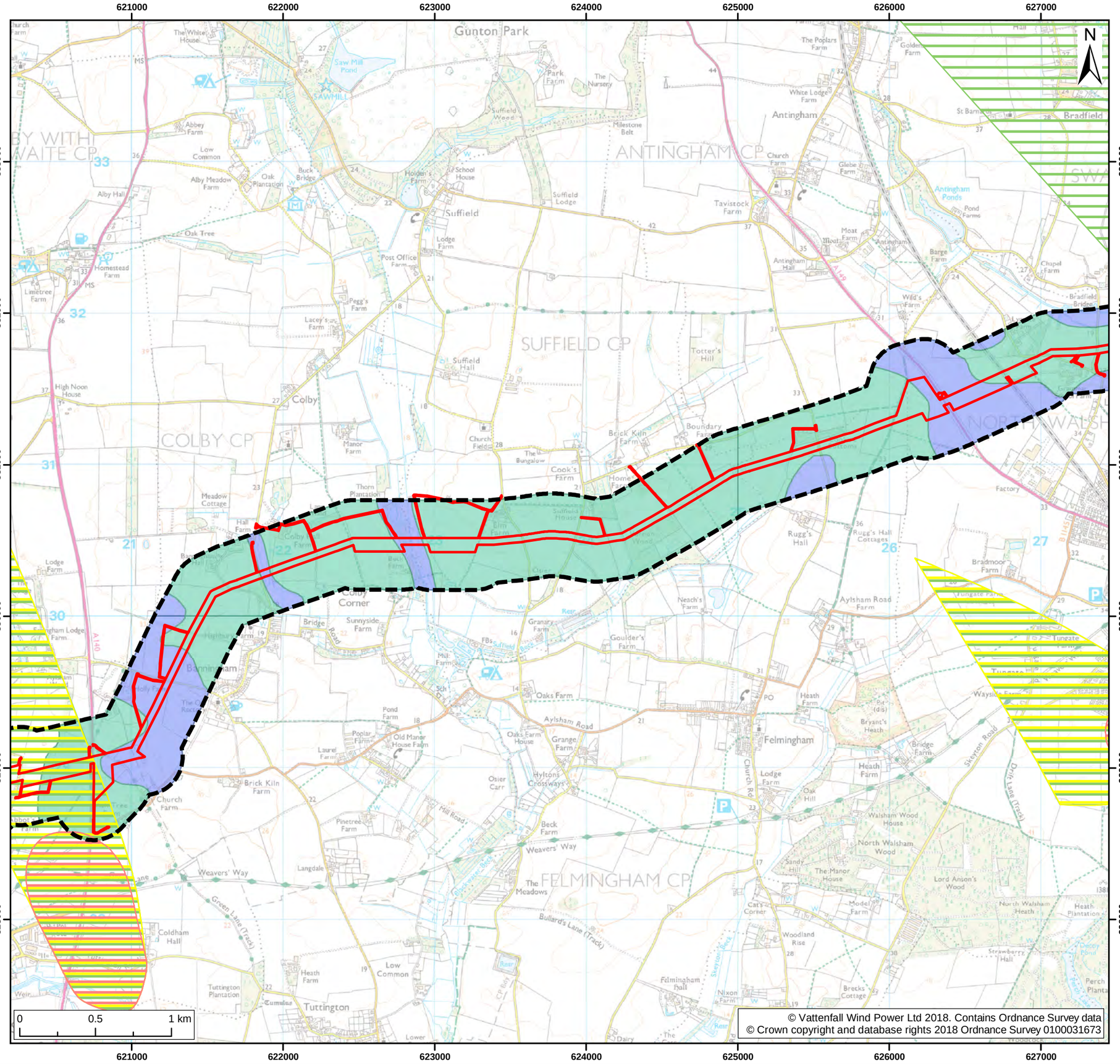
0 0.5 1 km



Legend:

- Norfolk Boreas red line boundary
- Study area

Superficial aquifer designations[1]

- Secondary aquifer - A
- Secondary aquifer - B

Source Protection Zones[2]

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Groundwater designations and Source Protection Zones (Map 3 of 9)

Figure: 19.2.5 | Drawing No: PB5640-005-0192-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	30/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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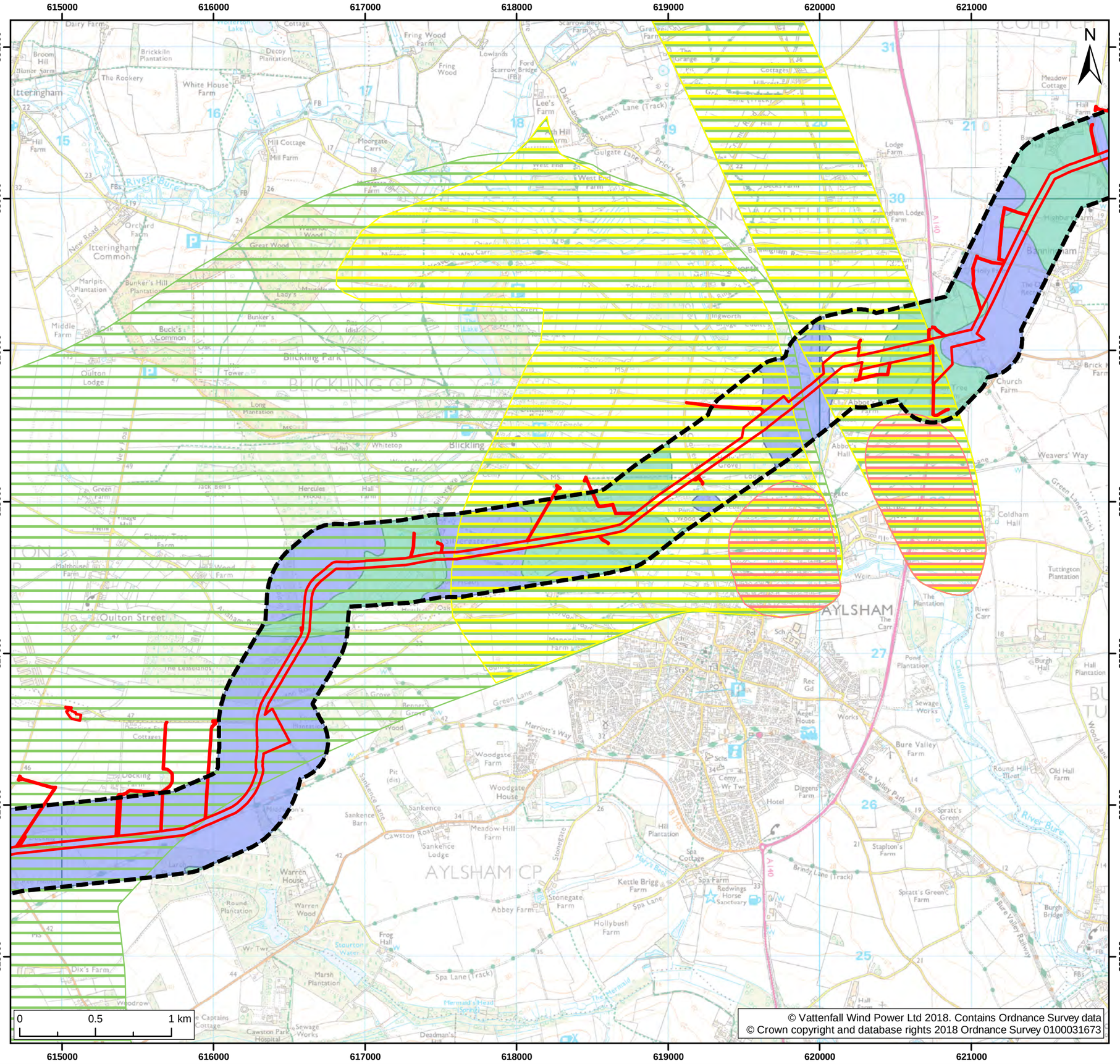

Legend:

- Norfolk Boreas red line boundary
- Study area

Superficial aquifer designations[1]

- Secondary aquifer - A
- Secondary aquifer - B

Source Protection Zones[2]

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Groundwater designations and Source Protection Zones (Map 4 of 9)

Figure: 19.2.5 | Drawing No: PB5640-005-0192-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	30/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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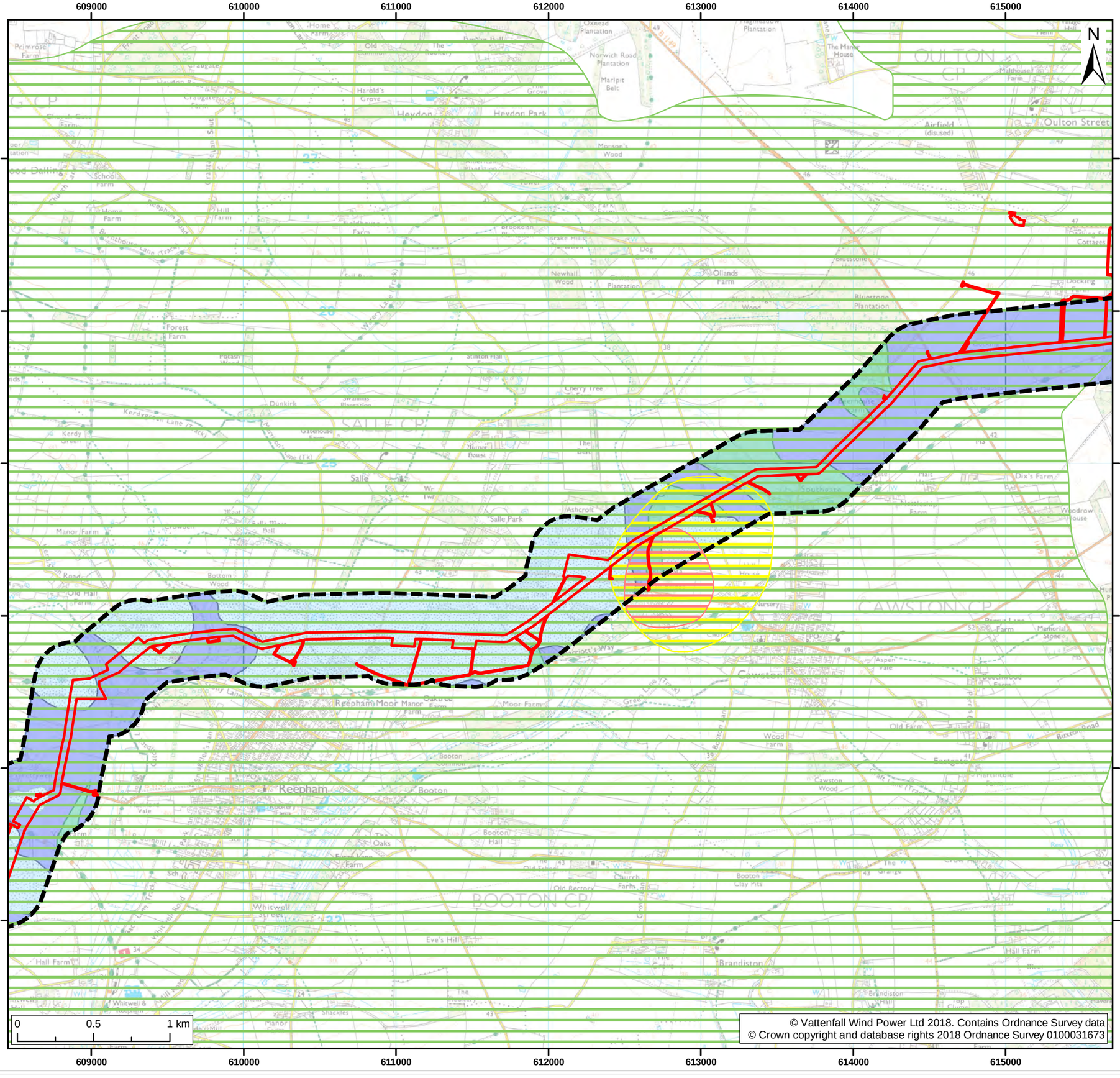

Legend:

- Norfolk Boreas red line boundary
- Study area

Superficial aquifer designations[1]

- Secondary aquifer - A
- Secondary aquifer - B
- Secondary aquifer - undifferentiated

Source Protection Zones[2]

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Groundwater designations and Source Protection Zones (Map 5 of 9)

Figure: 19.2.5 | Drawing No: PB5640-005-0192-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	30/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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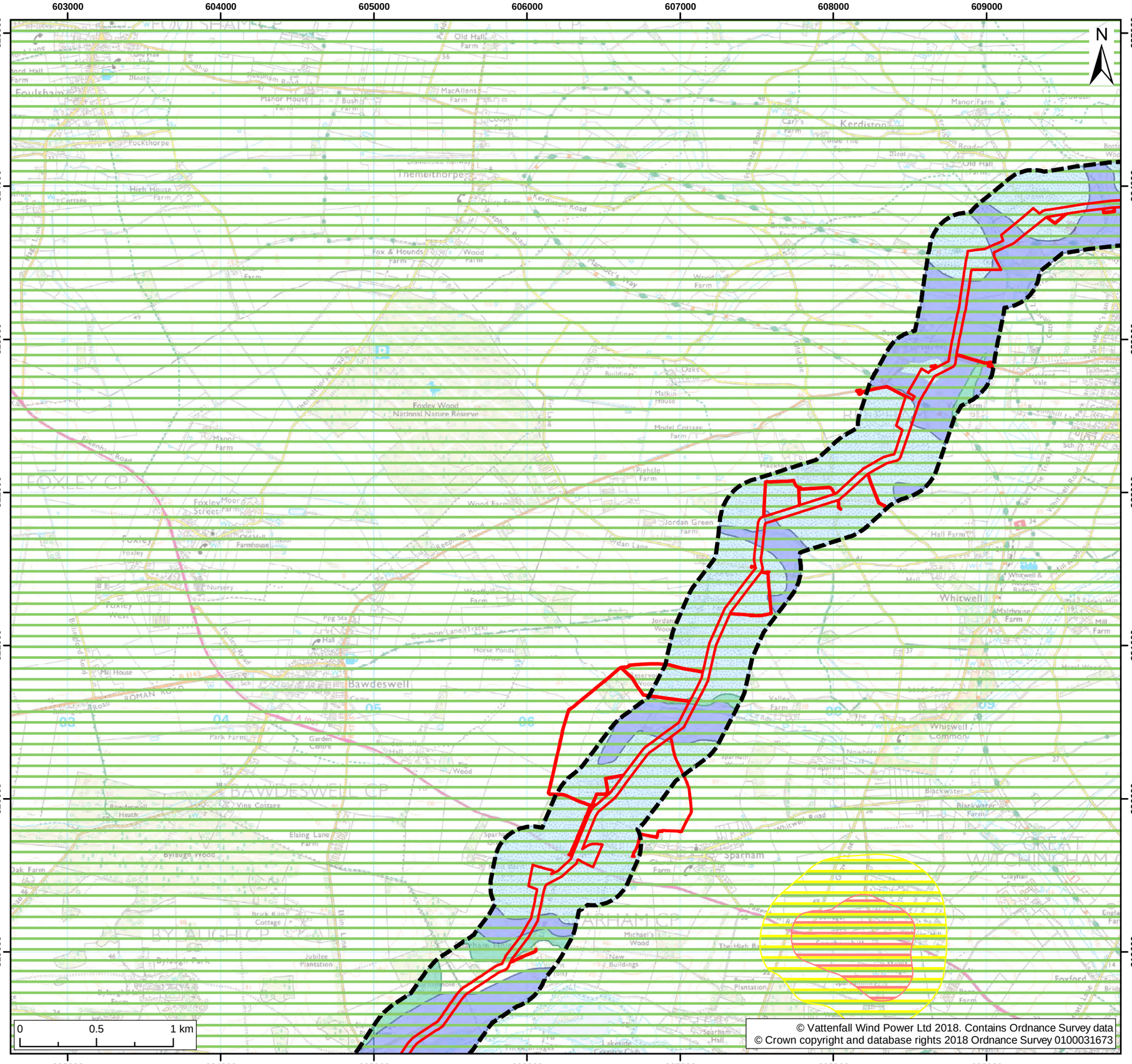

Legend:

- Norfolk Boreas red line boundary
- Study area

Superficial aquifer designations[1]

- Secondary aquifer - A
- Secondary aquifer - B
- Secondary aquifer - undifferentiated

Source Protection Zones[2]

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Groundwater designations and Source Protection Zones (Map 6 of 9)

Figure: 19.2.5 | Drawing No: PB5640-005-0192-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	30/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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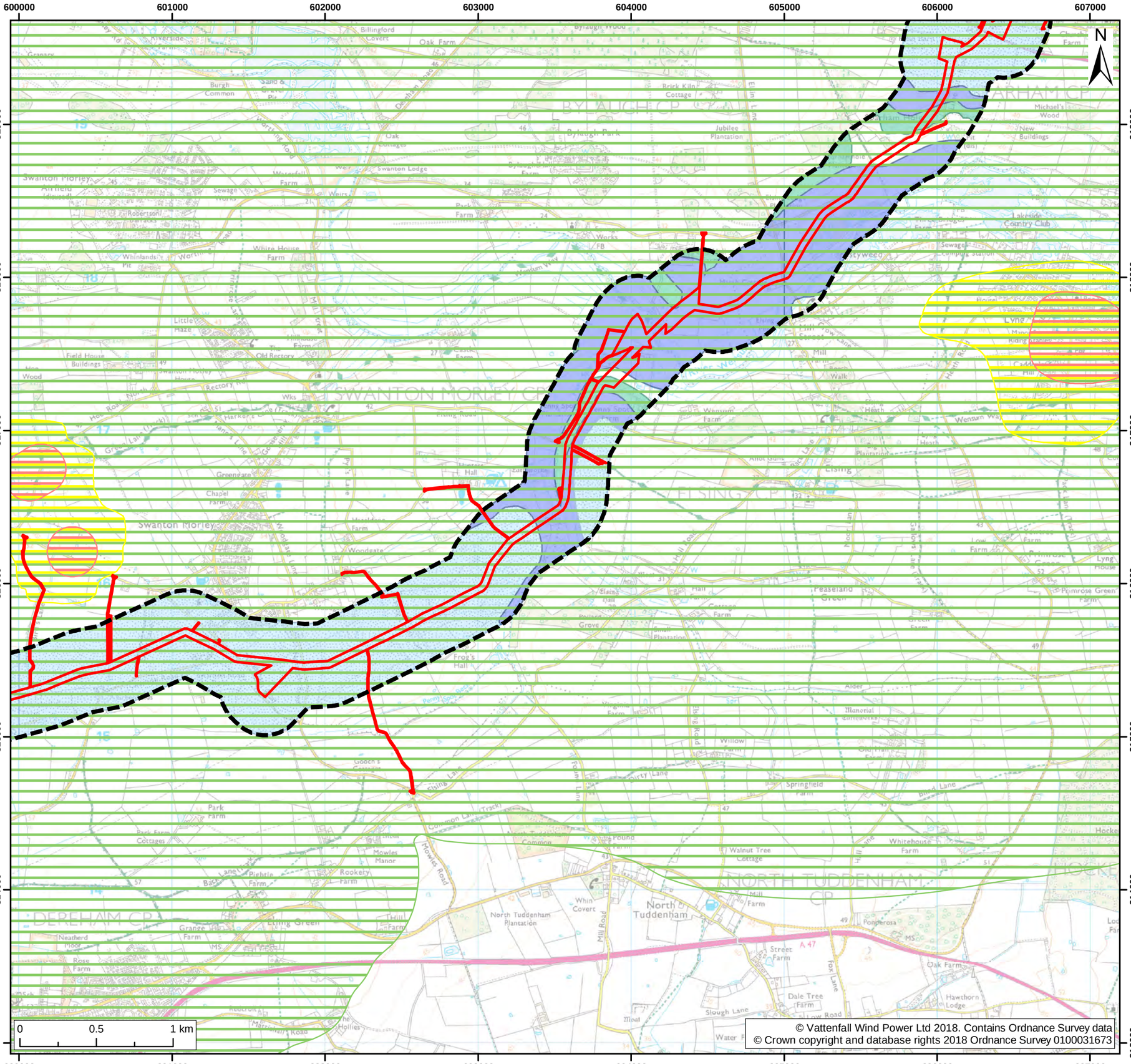

Legend:

- Norfolk Boreas red line boundary
- Study area

Superficial aquifer designations[1]

- Secondary aquifer - A
- Secondary aquifer - B
- Secondary aquifer - undifferentiated

Source Protection Zones[2]

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Groundwater designations and Source Protection Zones (Map 7 of 9)

Figure: 19.2.5 | Drawing No: PB5640-005-0192-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	30/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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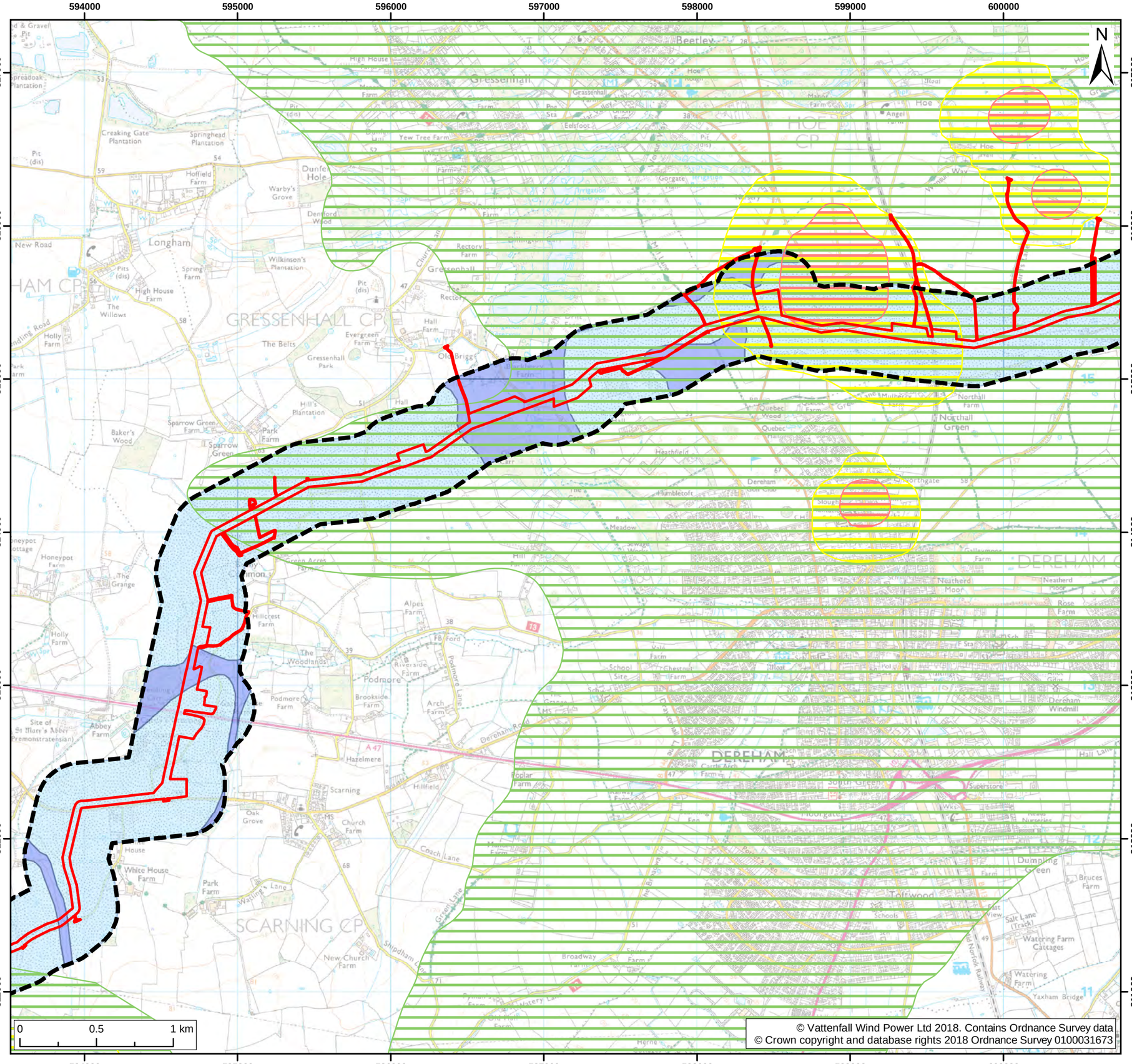

Legend:

- Norfolk Boreas red line boundary
- Study area

Superficial aquifer designations[1]

- Secondary aquifer - A
- Secondary aquifer - undifferentiated

Source Protection Zones[2]

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Groundwater designations and Source Protection Zones (Map 8 of 9)

Figure: 19.2.5 | Drawing No: PB5640-005-0192-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	30/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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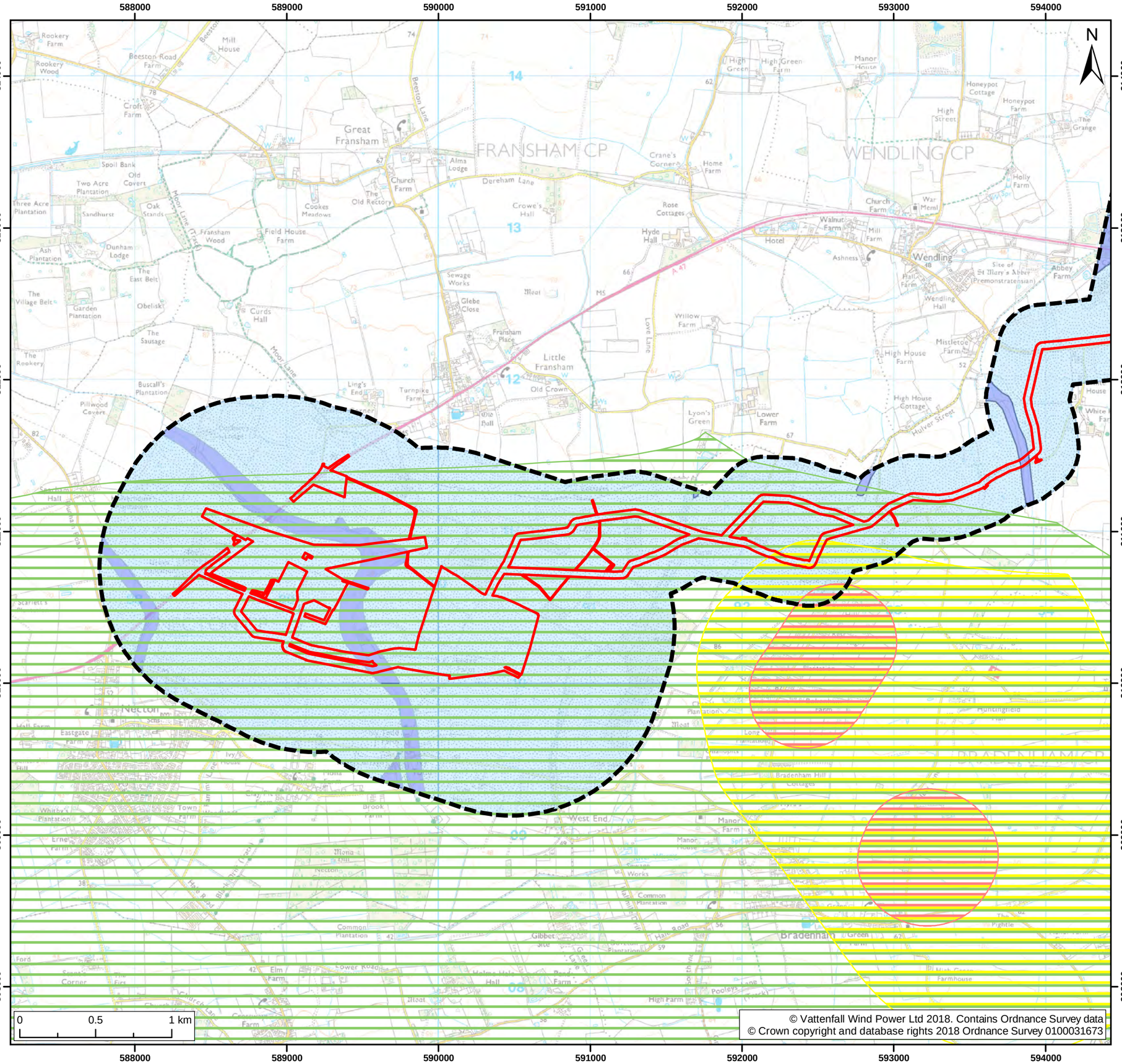

Legend:

- Norfolk Boreas red line boundary
- Study area

Superficial aquifer designations[1]

- Secondary aquifer - A
- Secondary aquifer - undifferentiated

Source Protection Zones[2]

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III

[1] Envirocheck, 2018.
[2] Environment Agency, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title: Groundwater designations and Source Protection Zones (Map 9 of 9)

Figure: 19.2.5 | Drawing No: PB5640-005-0192-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	30/07/2018	JT	MW	A3	1:25,000
01	27/06/2018	LB	MW	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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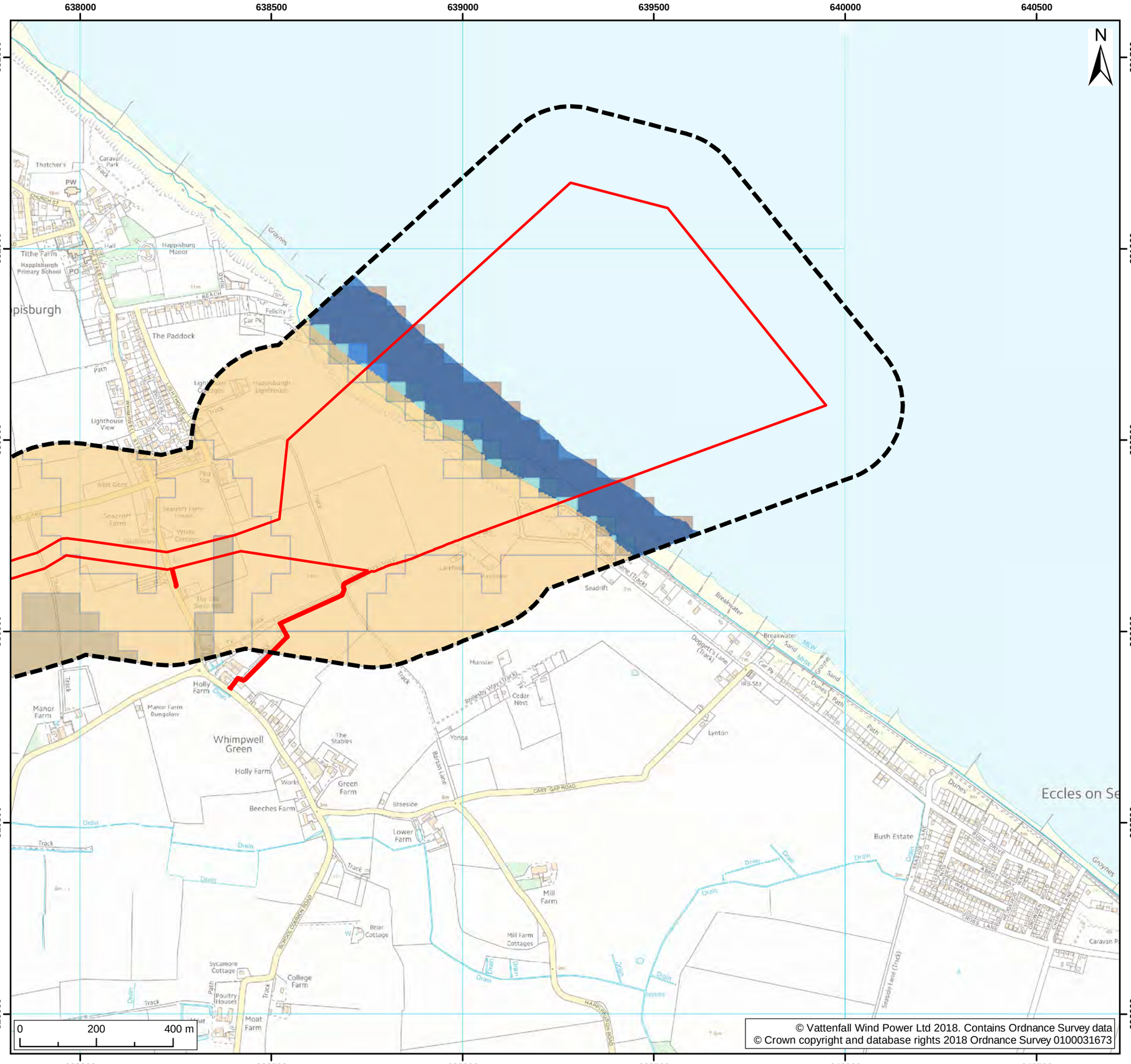

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 1 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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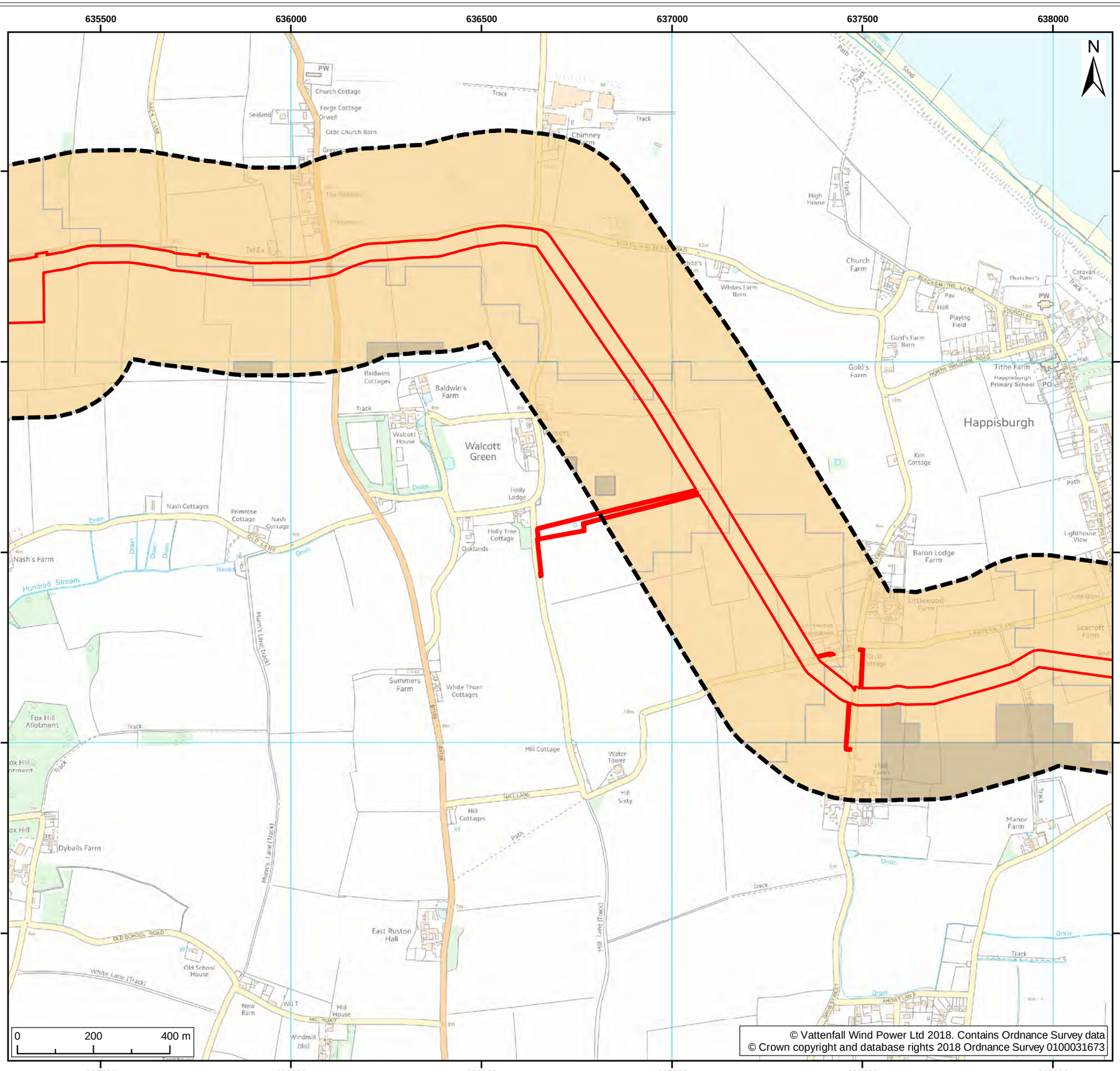

Legend:

- Norfolk Boreas red line boundary
- Study area

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk
(Map 2 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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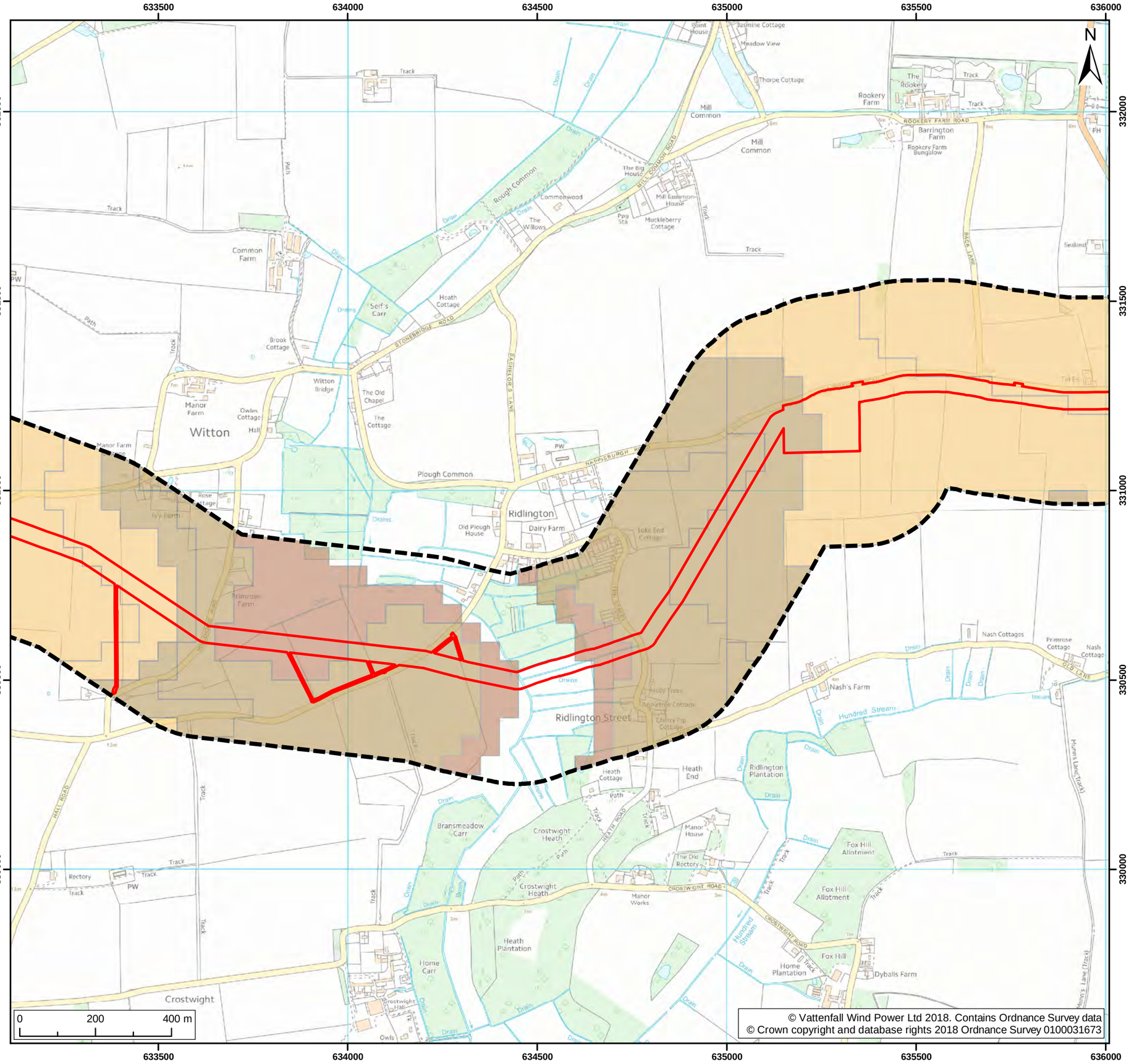

Legend:

- Norfolk Boreas red line boundary
- Study area

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 3 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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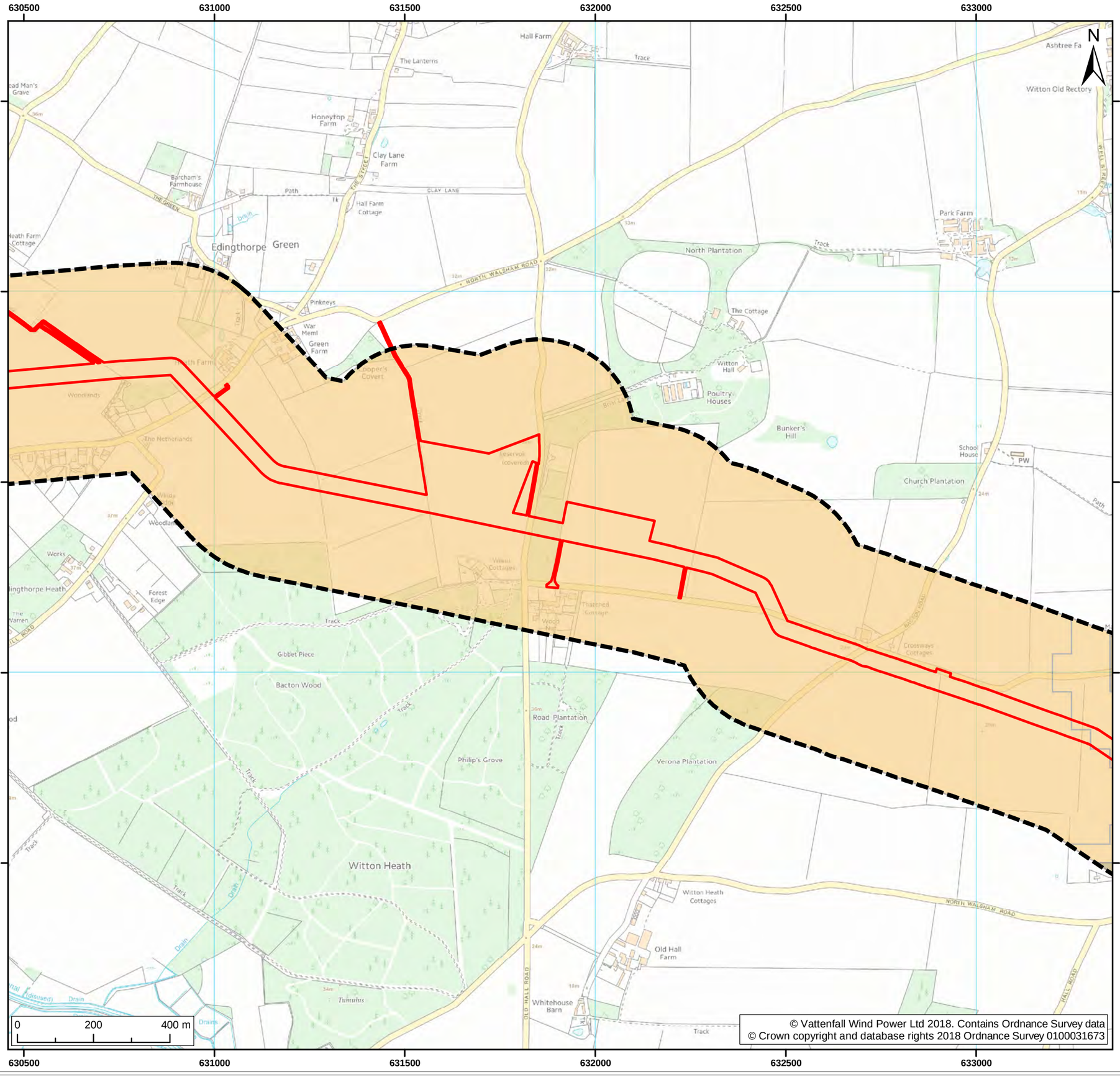

Legend:

- Norfolk Boreas red line boundary
- Study area

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 4 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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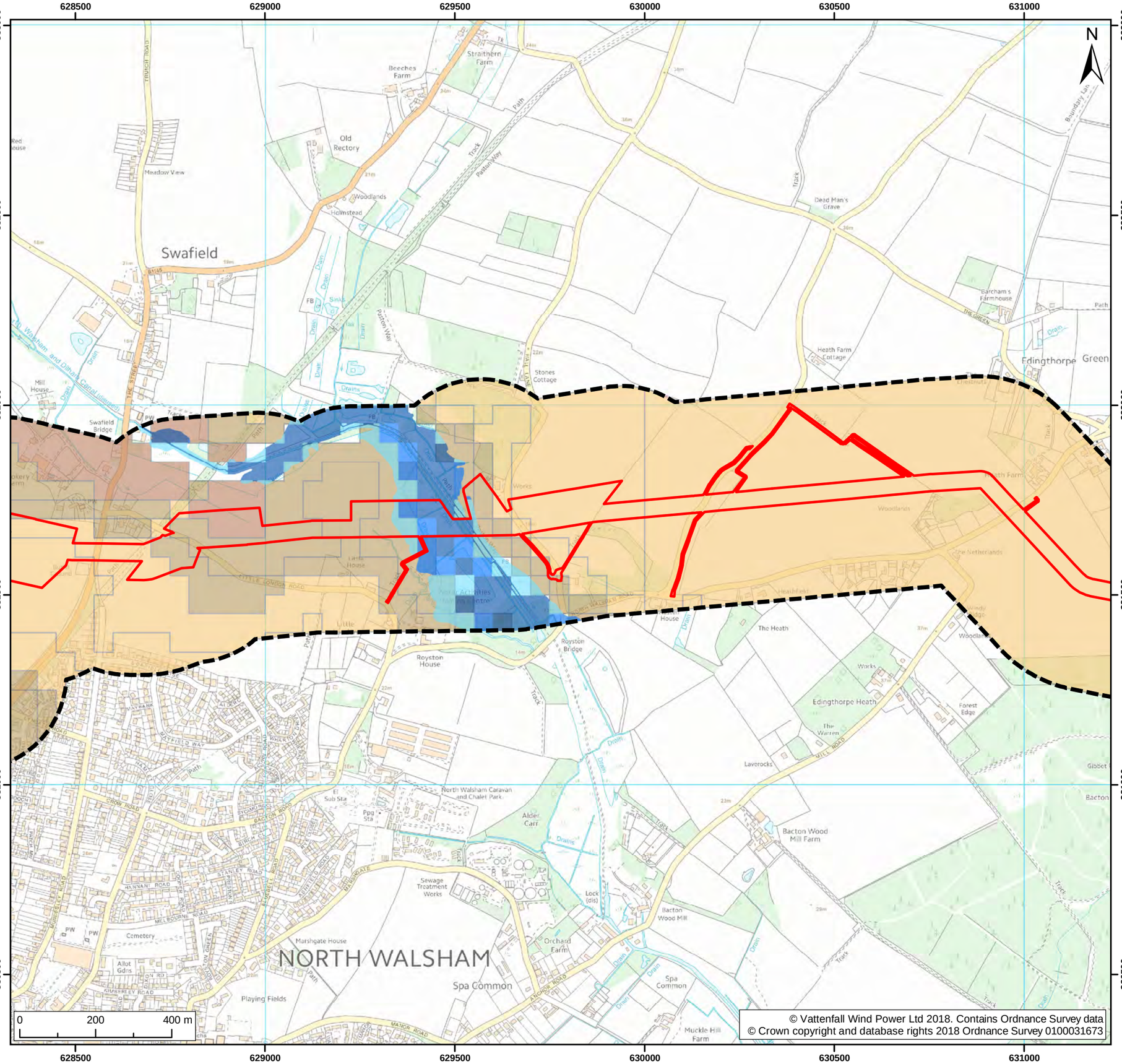

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 5 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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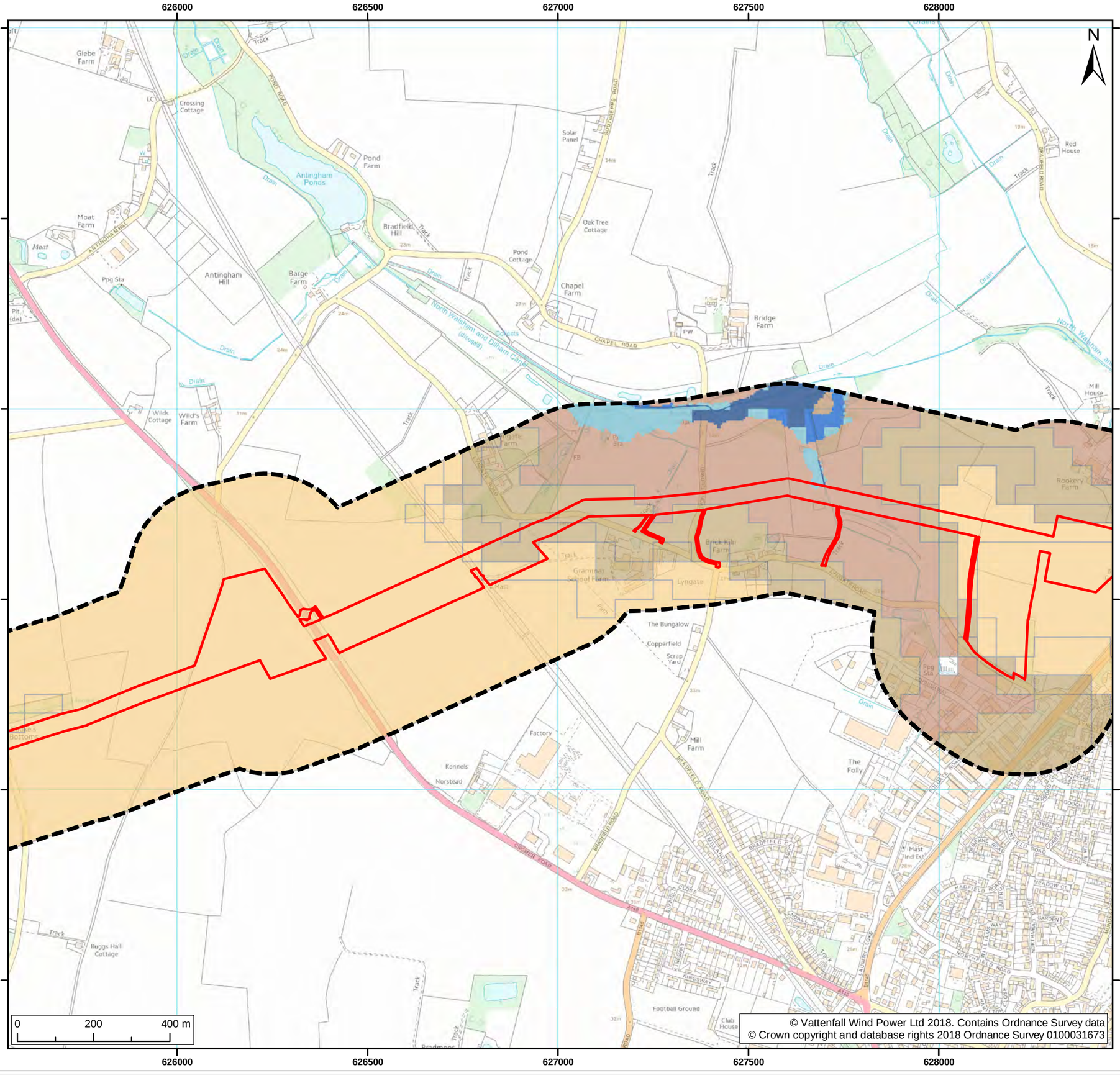

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 6 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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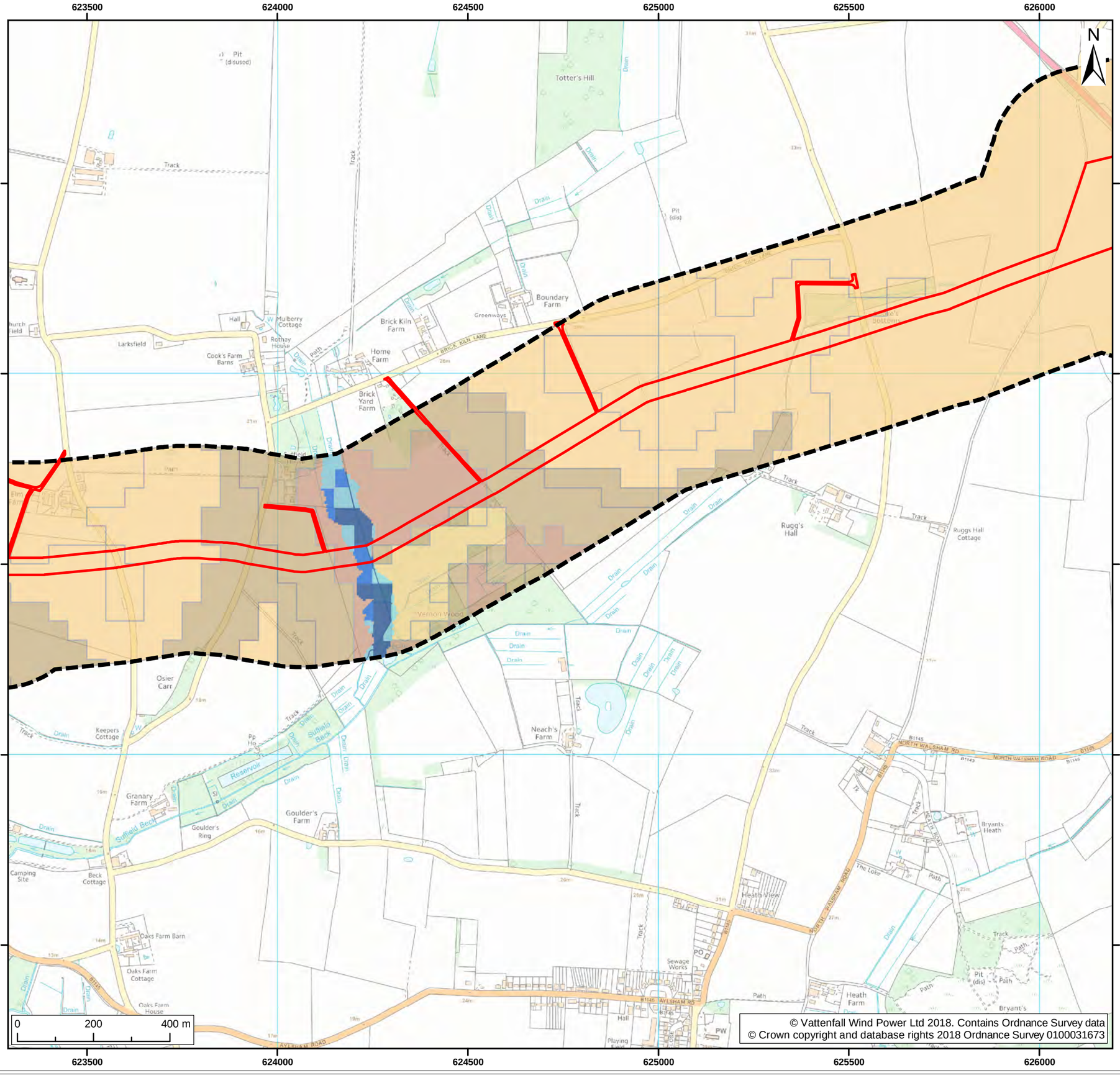

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 7 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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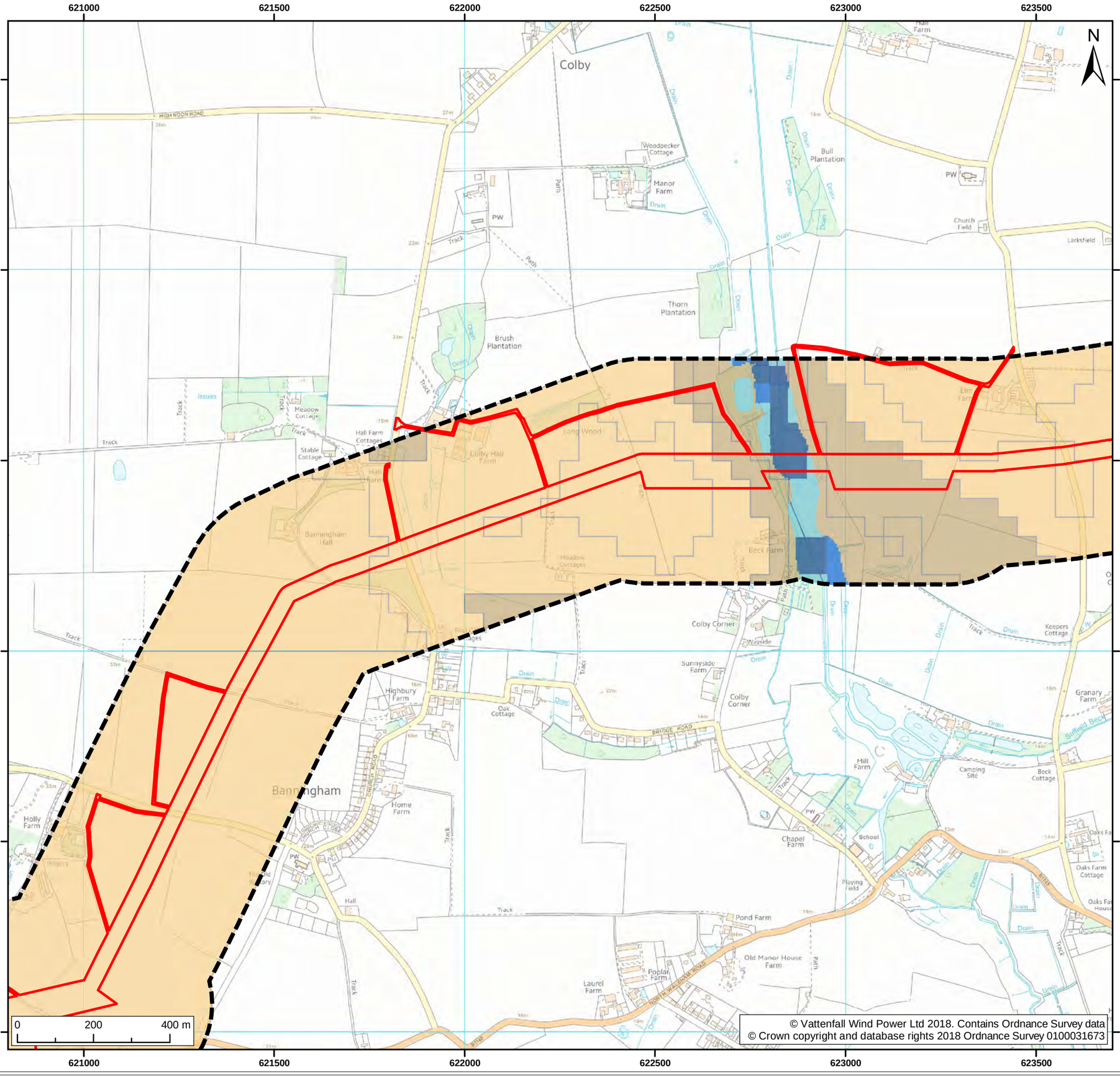

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 8 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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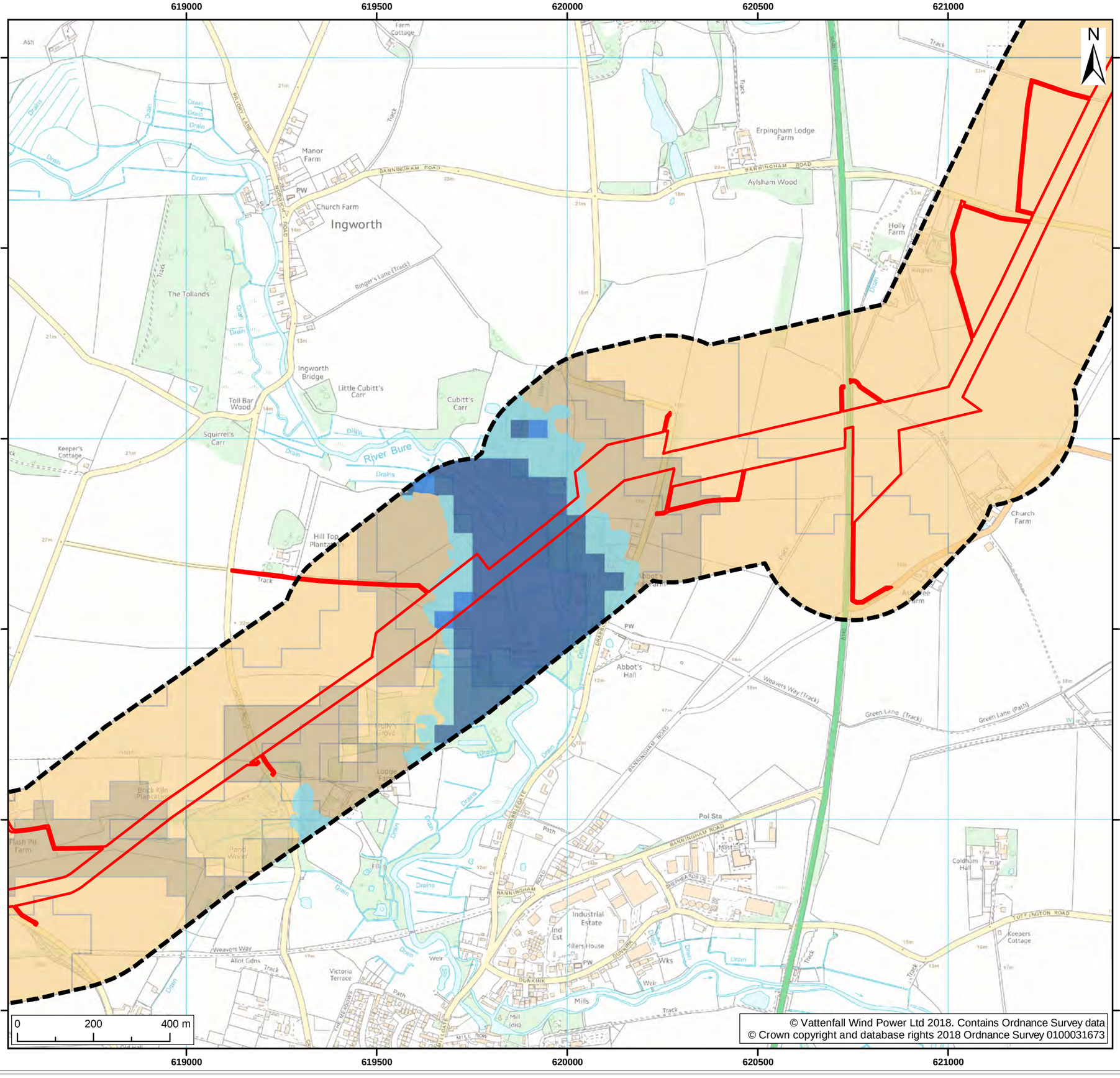

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 9 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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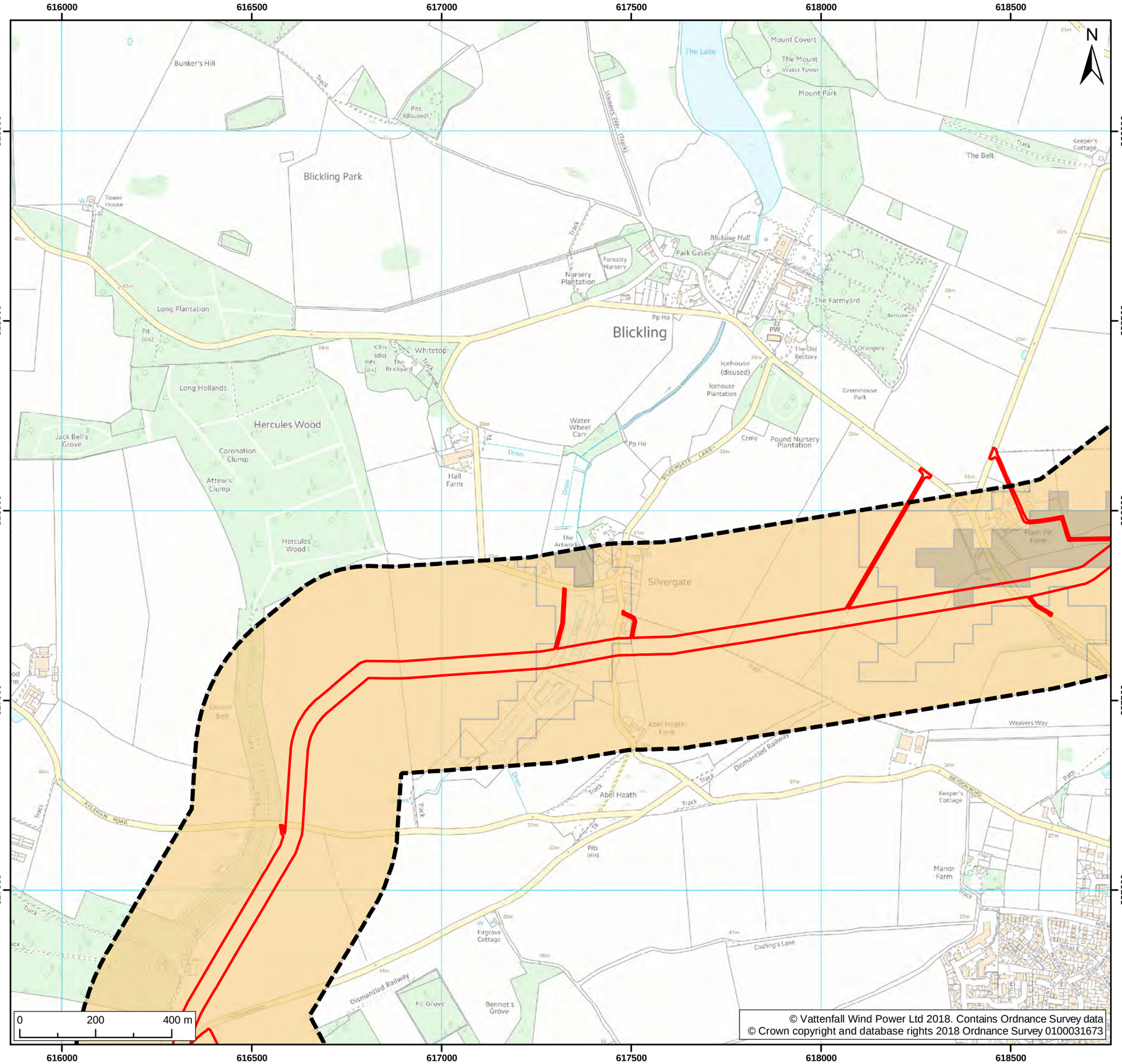

Legend:

- Norfolk Boreas red line boundary
- Study area

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 10 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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Royal HaskoningDHV
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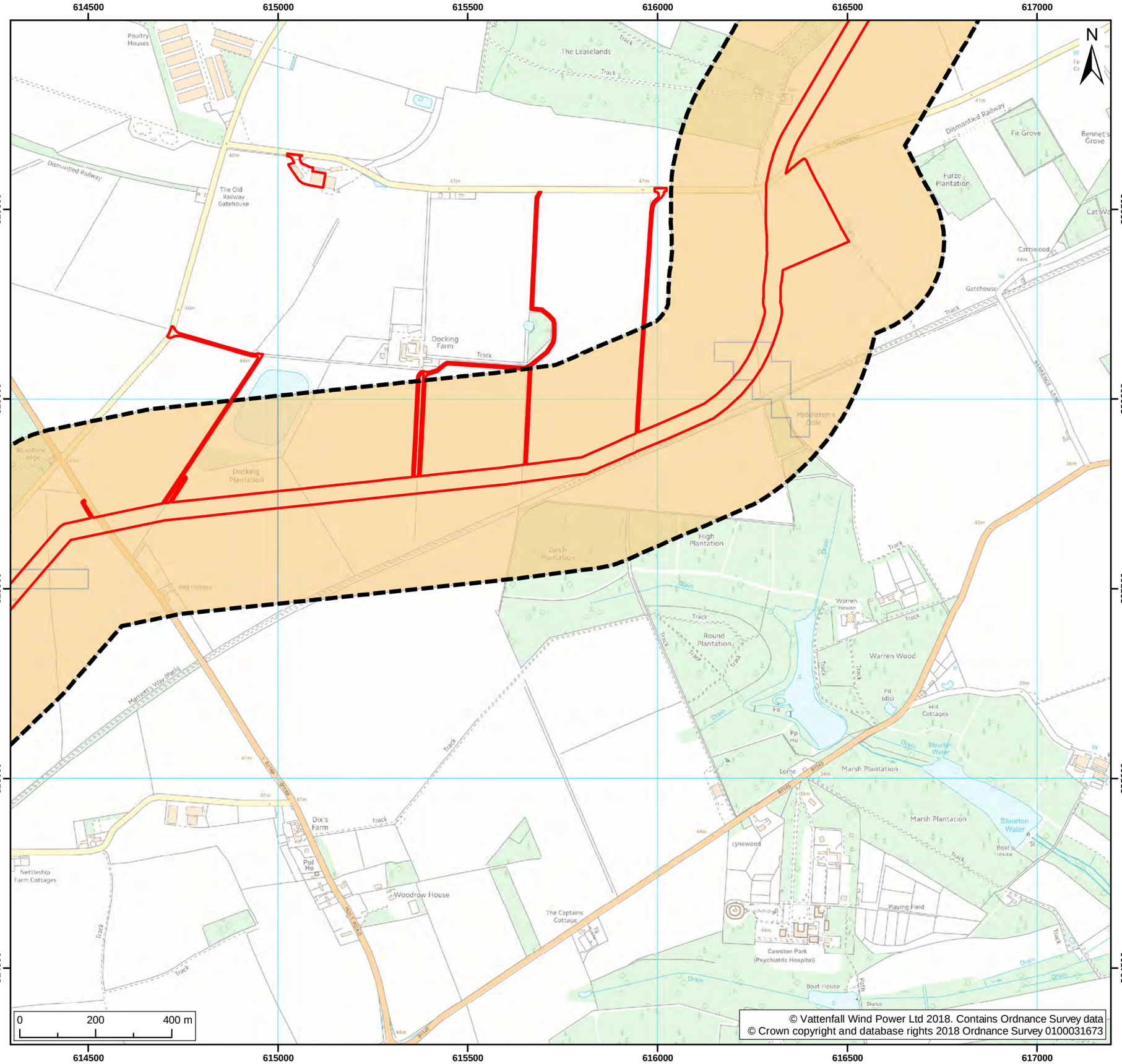

Legend:

- Norfolk Boreas red line boundary
- Study area

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 11 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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Royal HaskoningDHV
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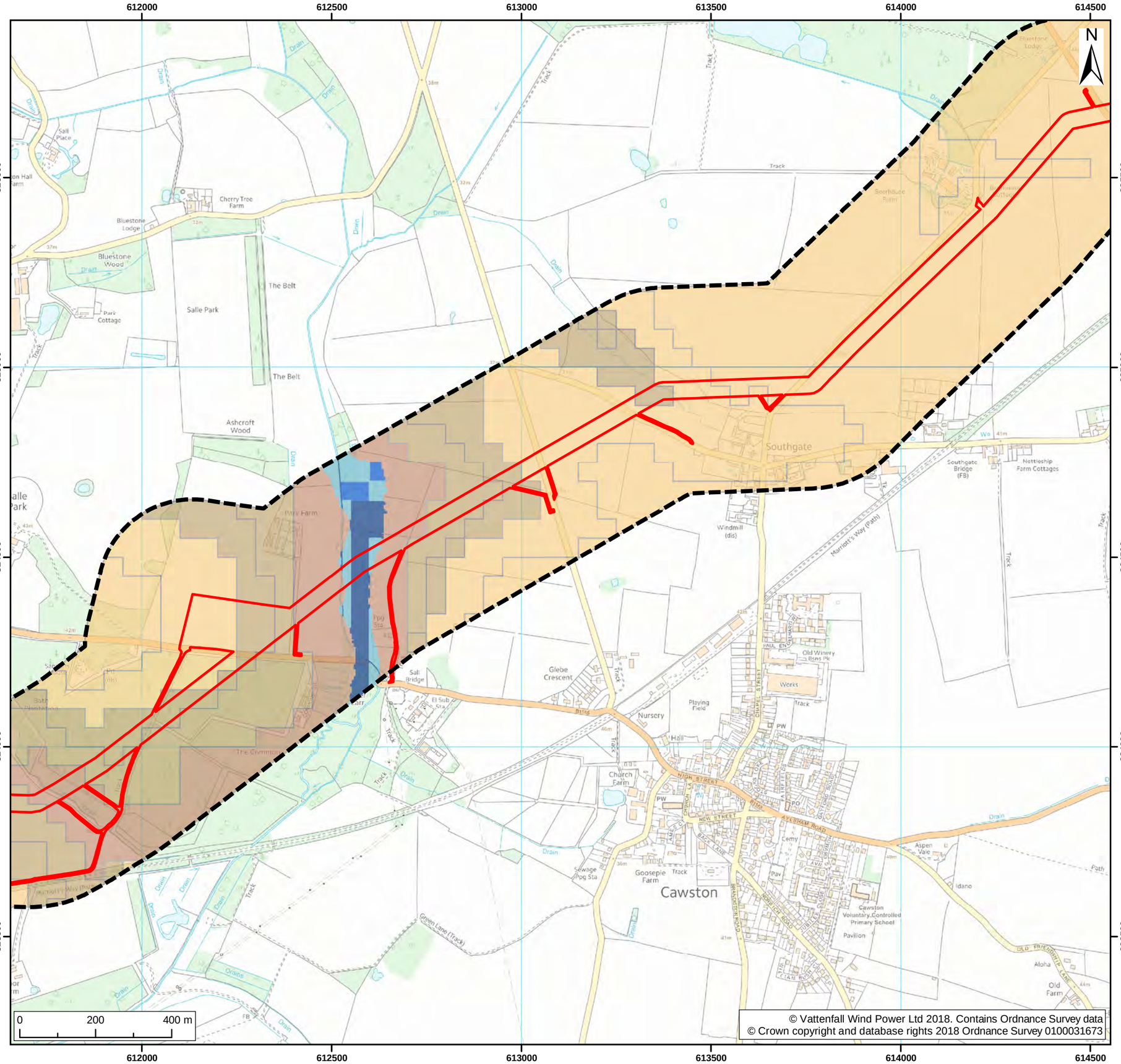

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 12 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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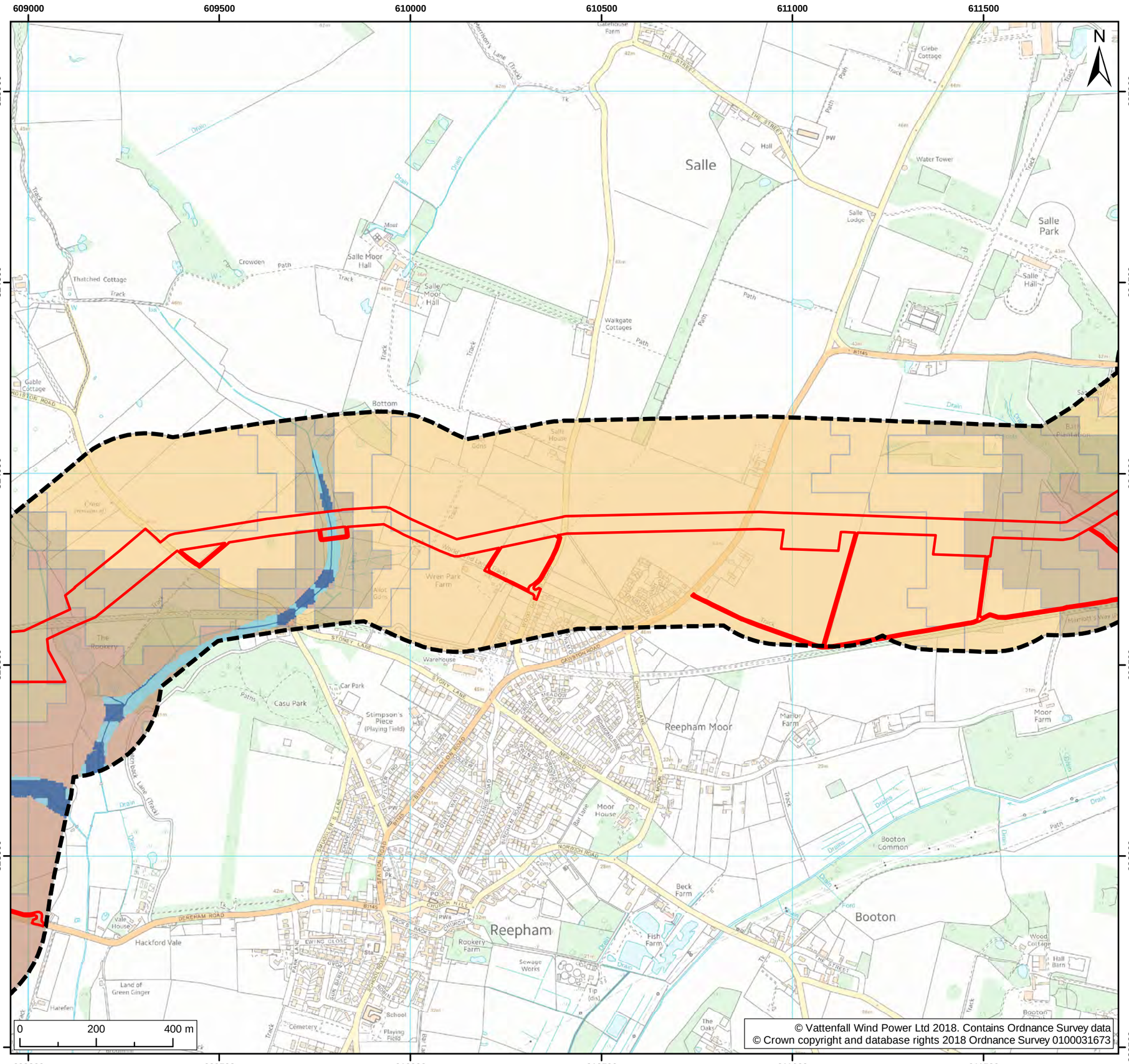
Royal HaskoningDHV
Enhancing Society Together



Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

Project:	Report:
Norfolk Boreas	Land Quality Phase 1 Preliminary Risk Assessment

Title:

Groundwater and Surface water Flood Risk (Map 13 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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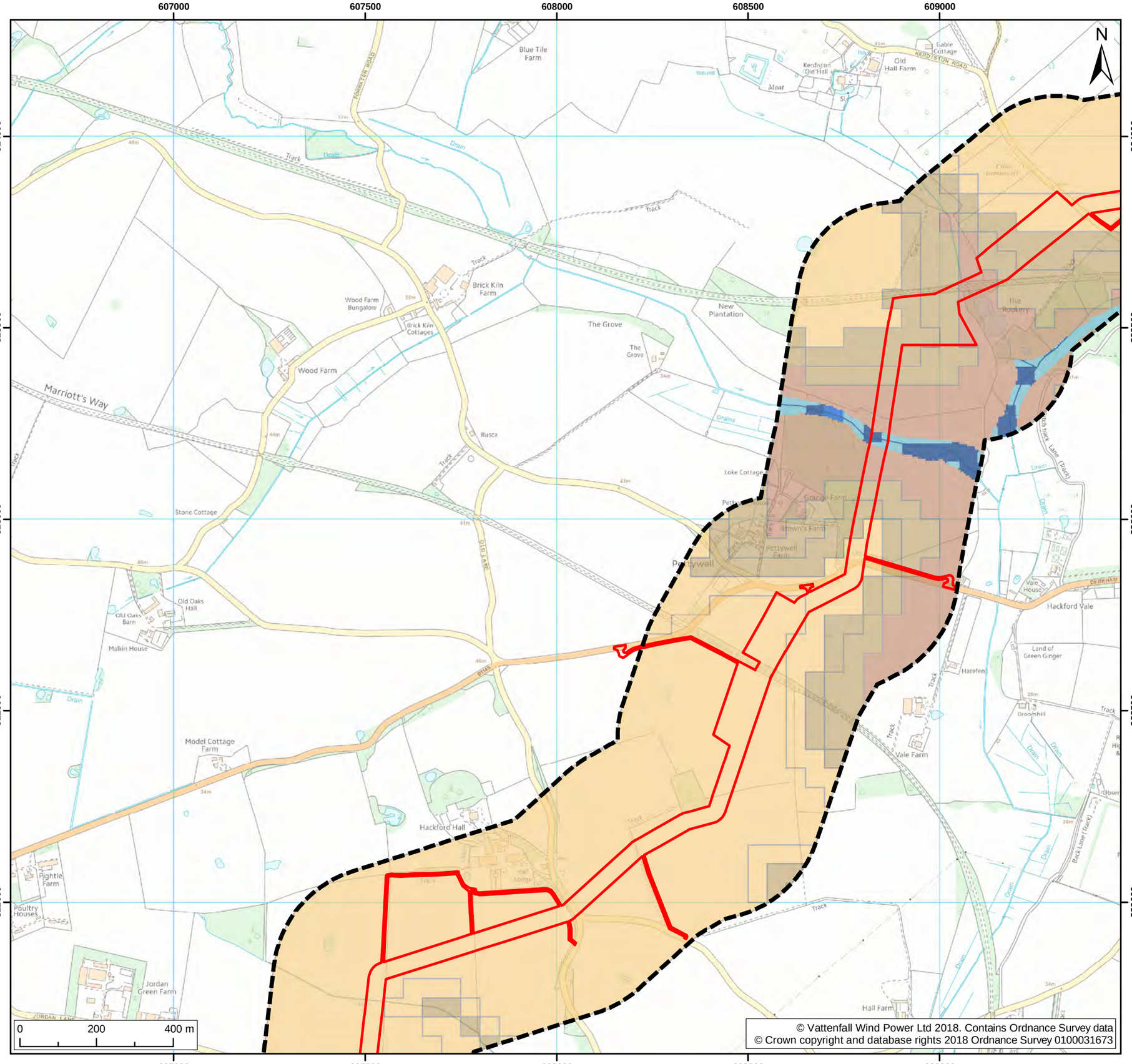

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

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Groundwater and Surface water Flood Risk
(Map 14 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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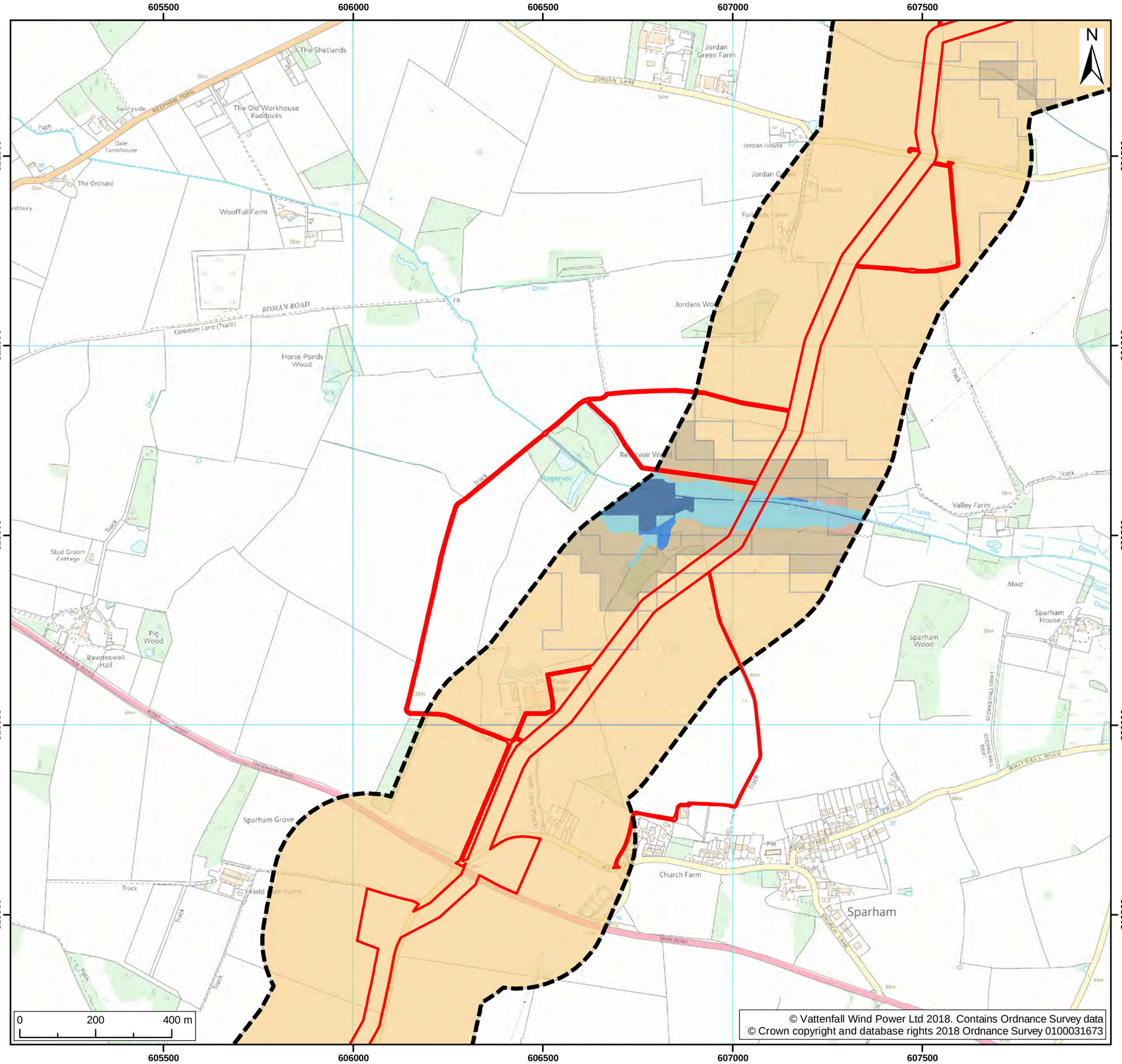

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

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Groundwater and Surface water Flood Risk (Map 15 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

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01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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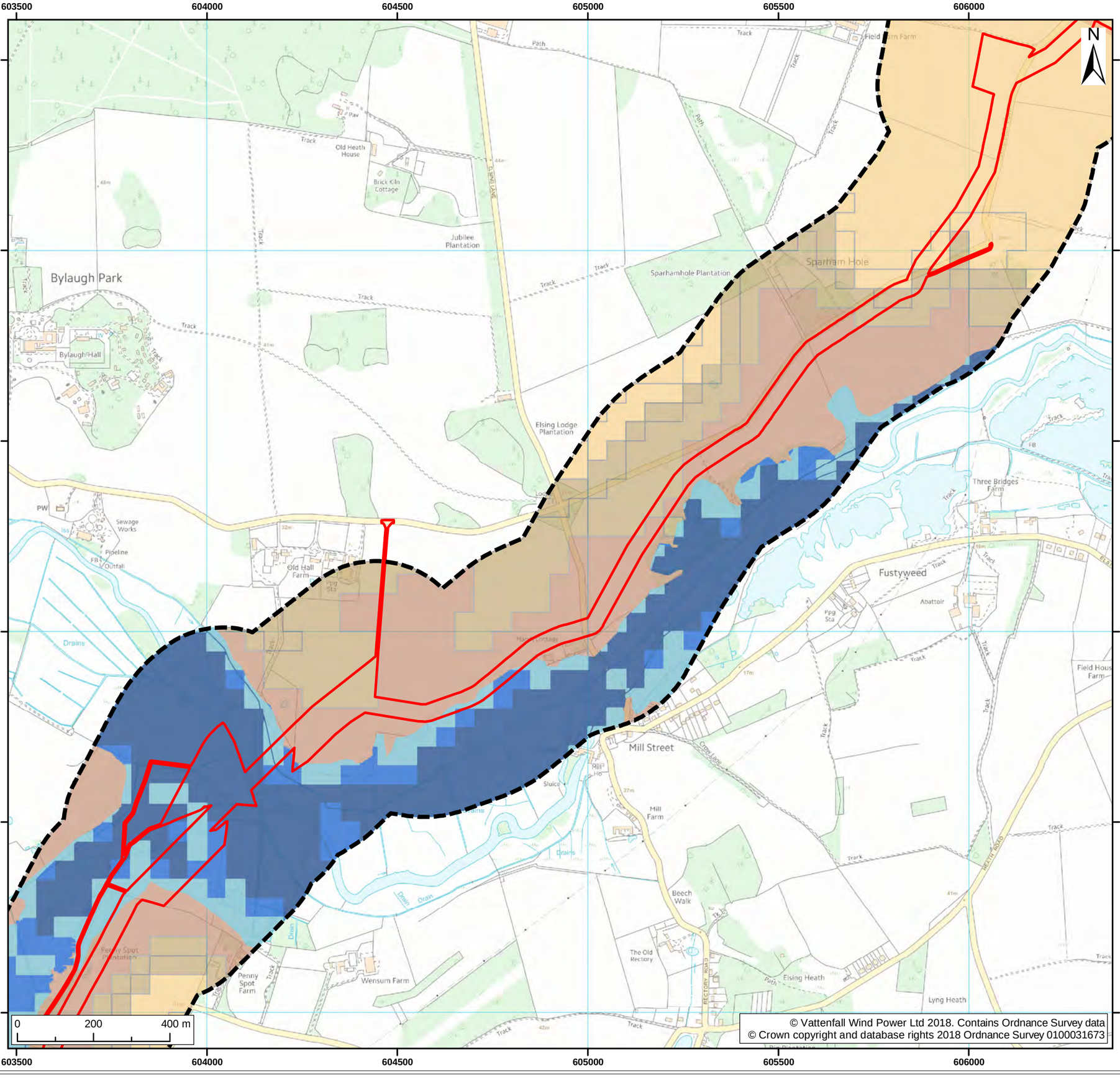

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

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Groundwater and Surface water Flood Risk (Map 16 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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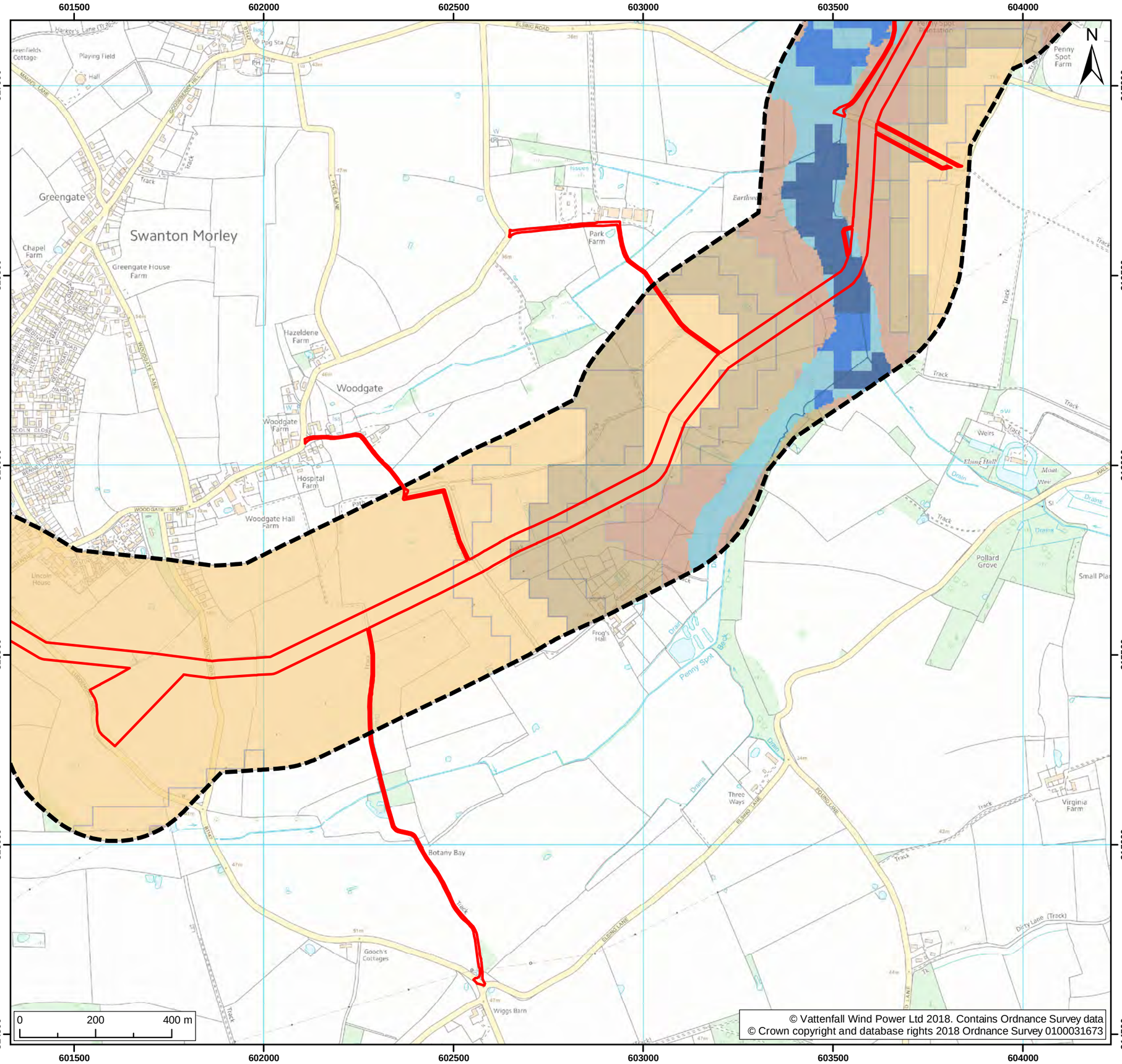

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

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Groundwater and Surface water Flood Risk
(Map 17 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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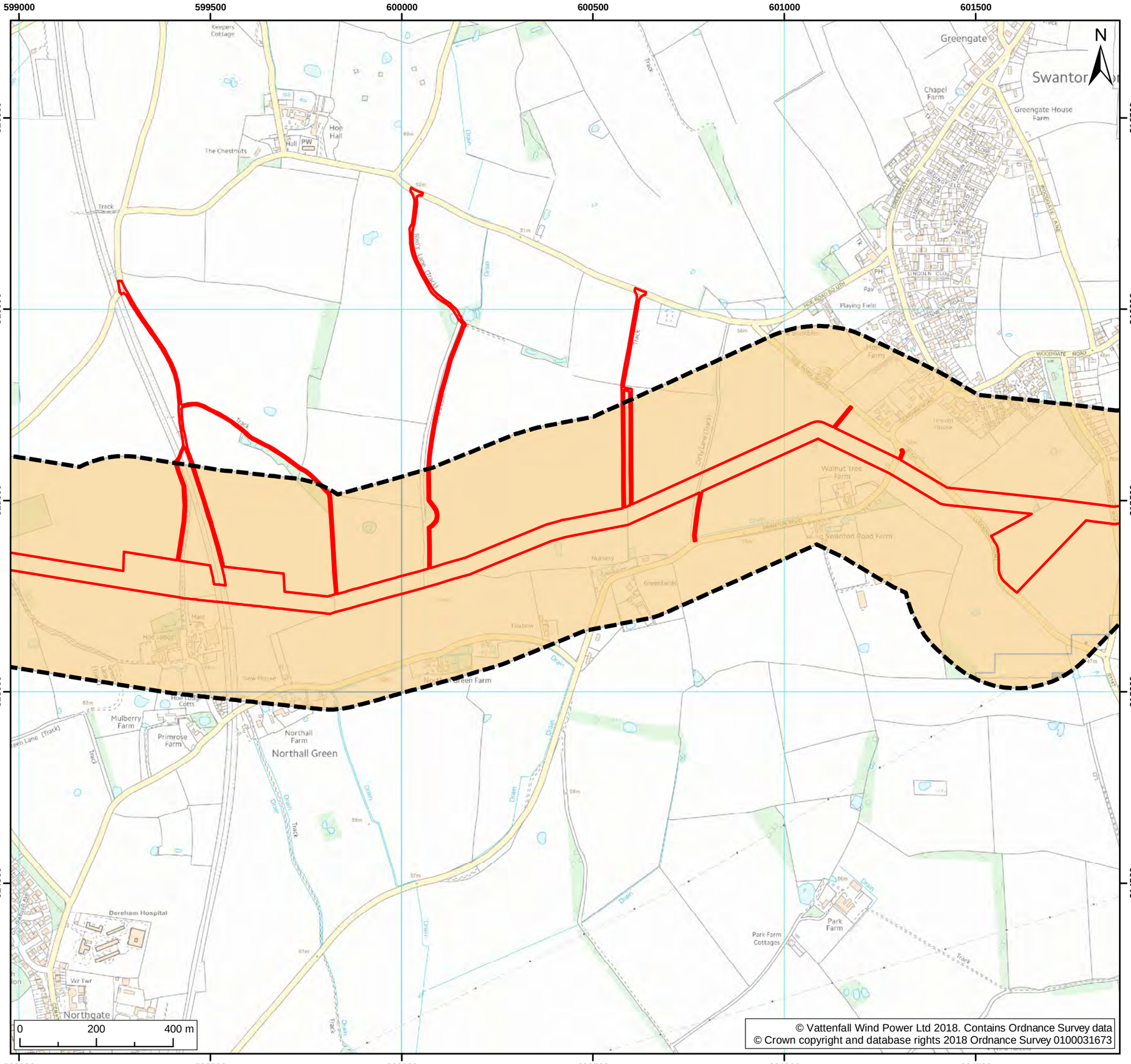

Legend:

- Norfolk Boreas red line boundary
- Study area

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level

[1] Envirocheck, 2018.

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Groundwater and Surface water Flood Risk (Map 18 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

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01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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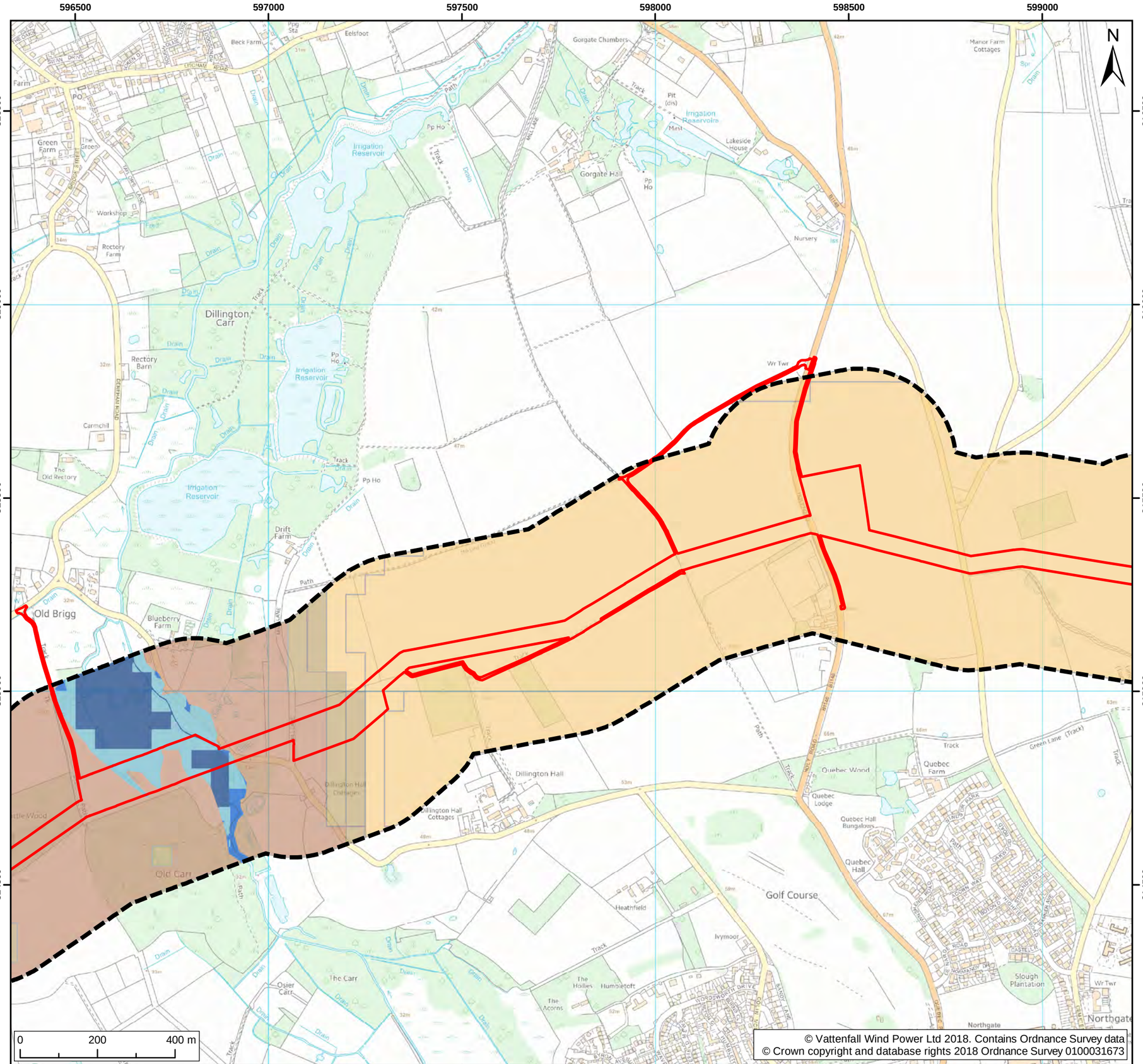

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

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Title:

Groundwater and Surface water Flood Risk (Map 19 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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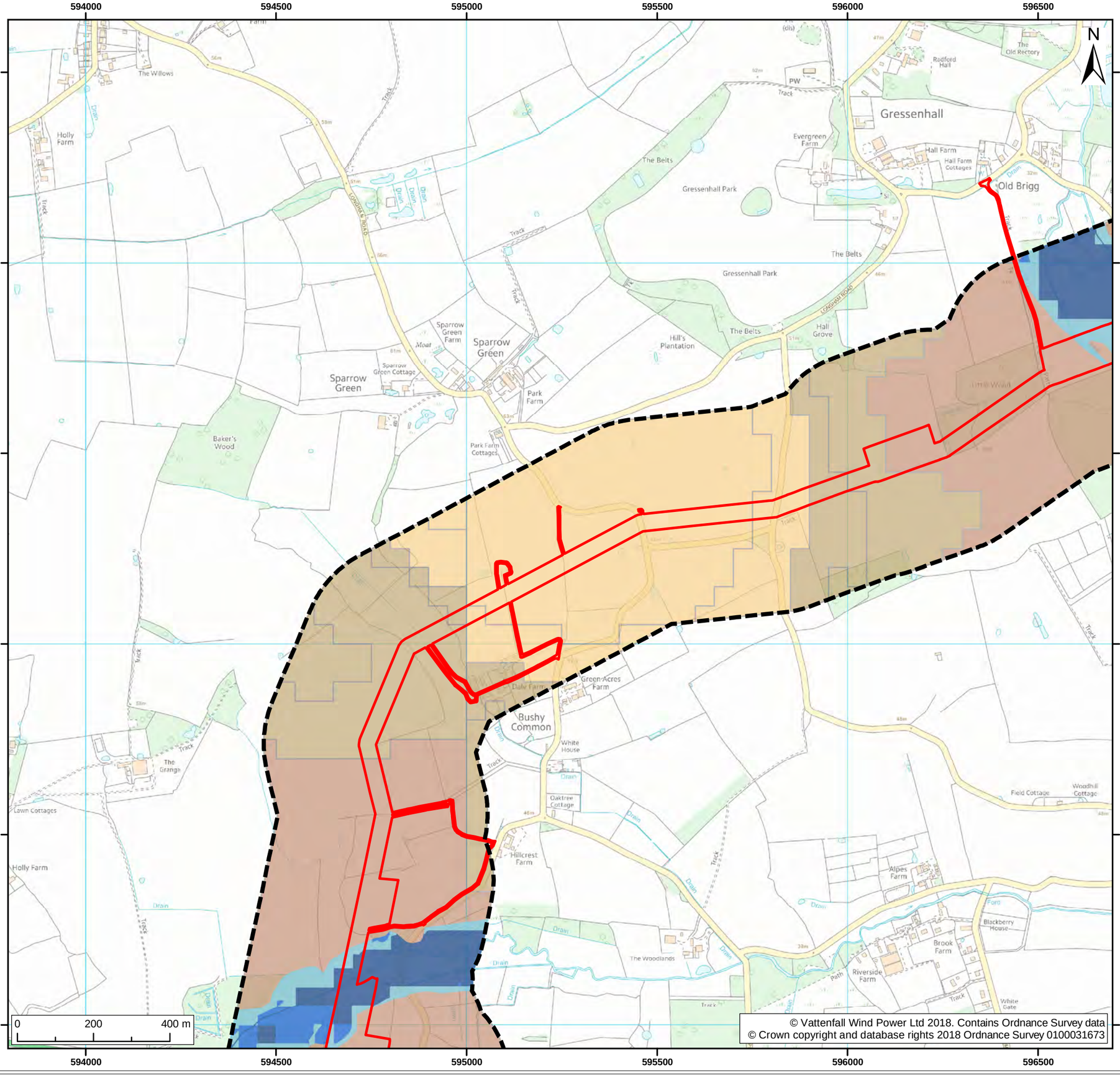

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

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Title:

Groundwater and Surface water Flood Risk
(Map 20 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

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02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

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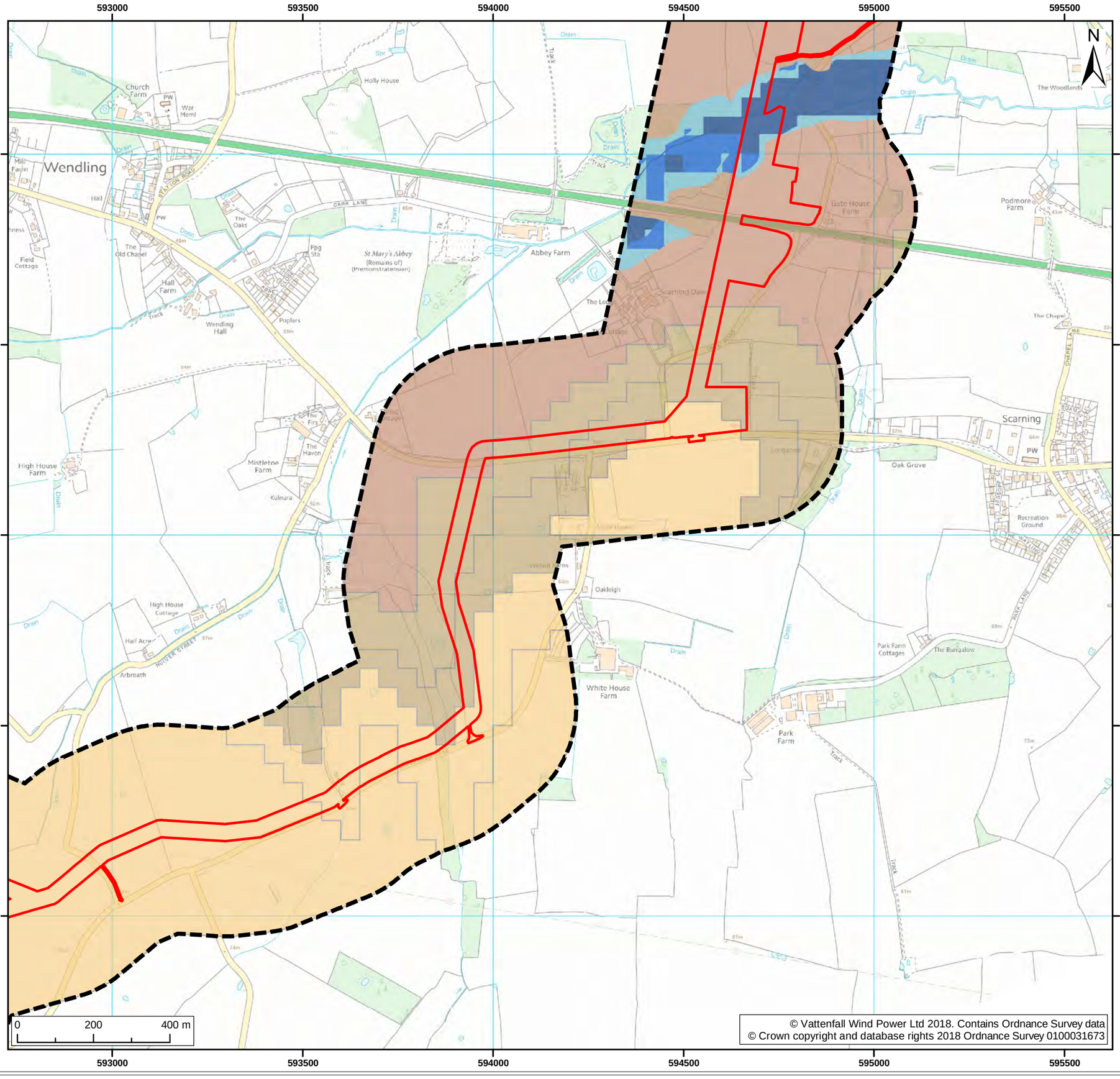

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

[1] Envirocheck, 2018.

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Groundwater and Surface water Flood Risk
(Map 21 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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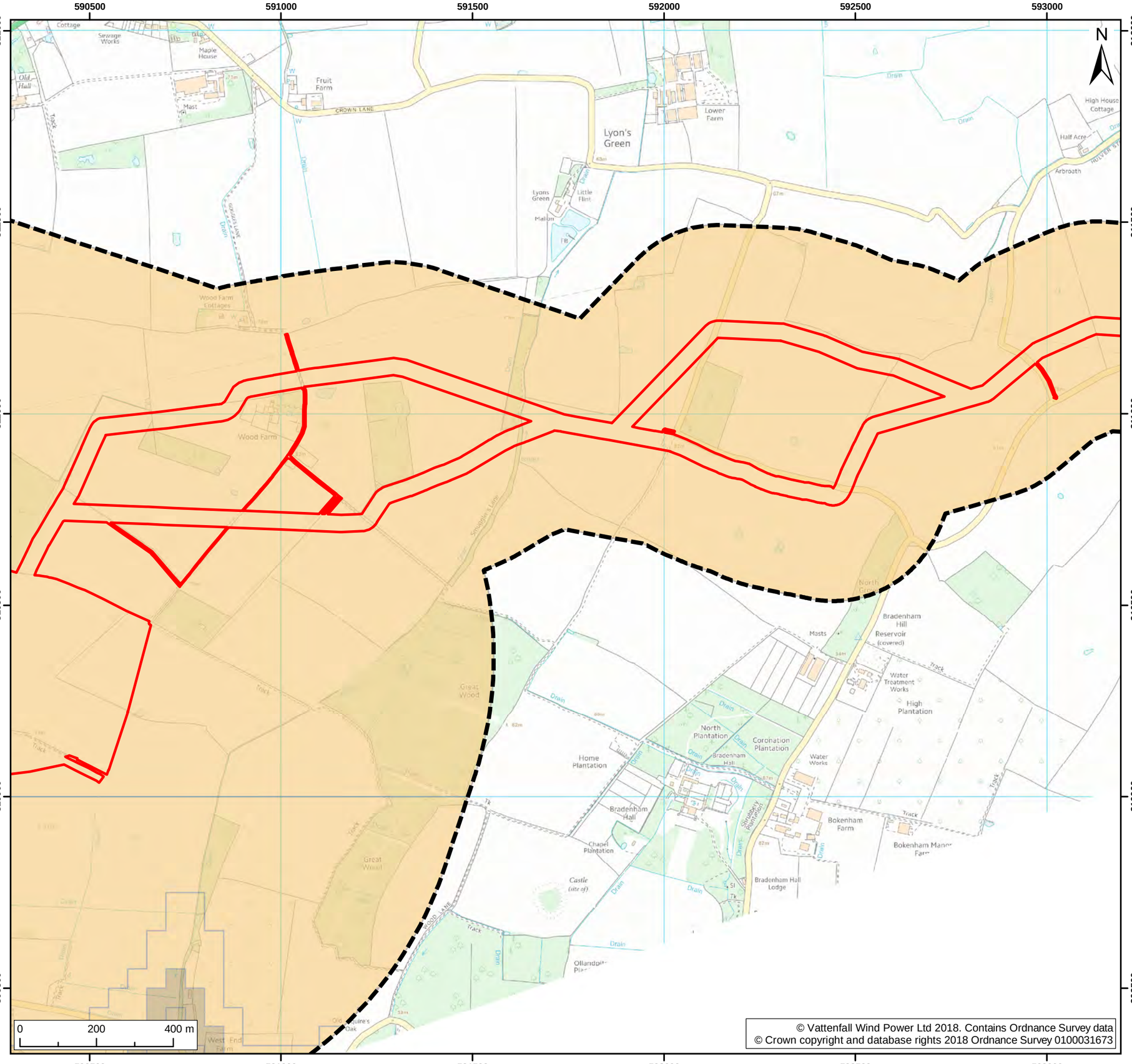

Legend:

- Norfolk Boreas red line boundary
- Study area

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level

[1] Envirocheck, 2018.

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Groundwater and Surface water Flood Risk (Map 22 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

Co-ordinate system: British National Grid **EPSG:** 27700

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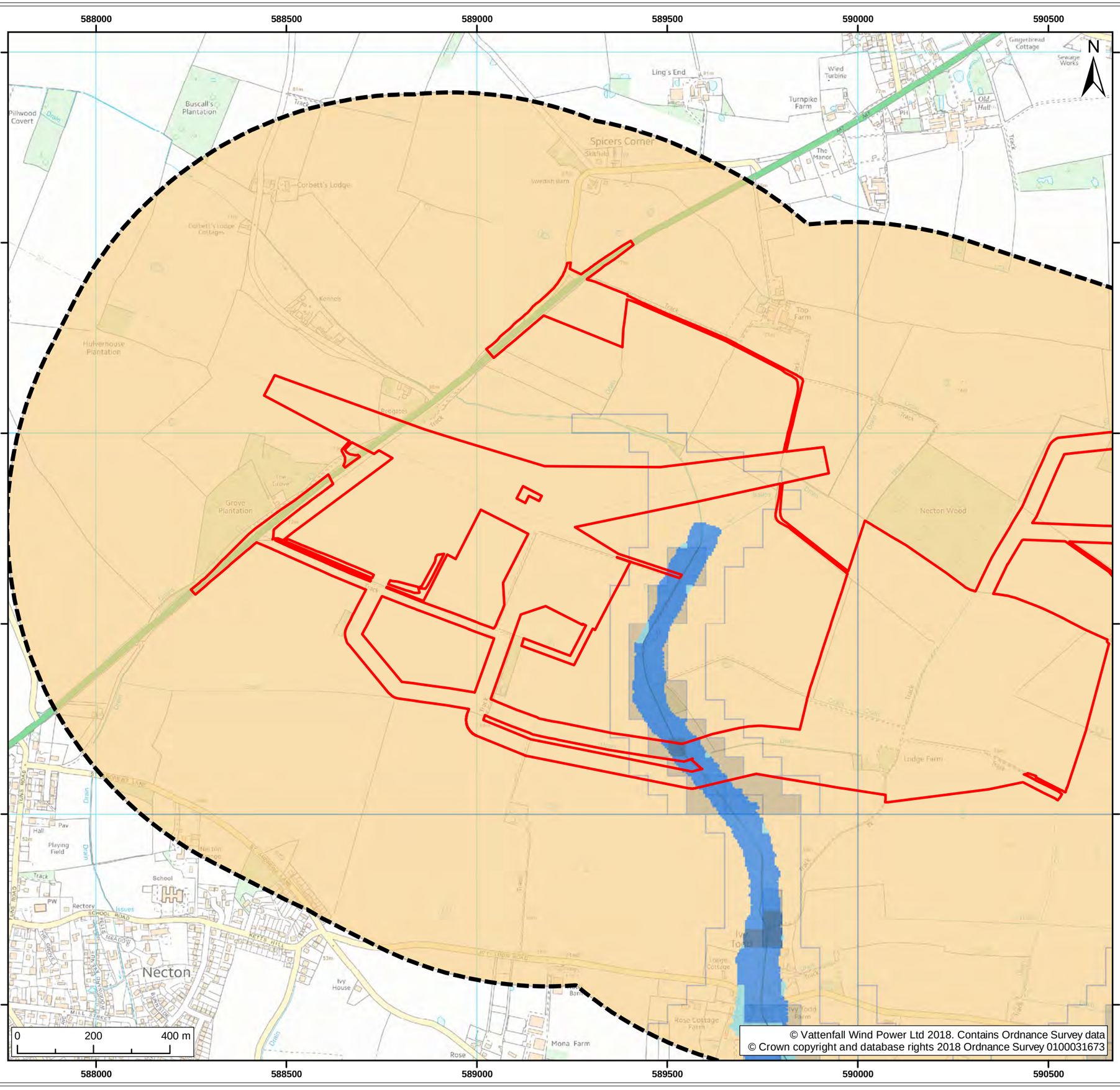

Legend:

- Norfolk Boreas red line boundary
- Study area

Risk of Flooding from Rivers and Seas[1]

- High
- Medium
- Low

Groundwater Flood Susceptibility[1]

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding Below Ground Level

[1] Envirocheck, 2018.

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Groundwater and Surface water Flood Risk (Map 23 of 23)

Figure: 19.2.6 | Drawing No: PB5640-005-0192-006

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02	23/07/2018	JT	MW	A3	1:10,000
01	27/06/2018	LB	MW	A3	1:10,000

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