Norfolk Vanguard Offshore Wind Farm

Appendix 23.2

Onshore Wintering Bird Surveys Report

Environmental Statement

Volume 3 - Appendices

Applicant: Norfolk Vanguard Limited
Document Reference: 6.2.23.2
RHDHV Document Reference: PB4476-005-0232
Pursuant to APFP Regulation: 5(2)(a)

Date: June 2018
Revision: Version 1
Author: APEM Ltd

Photo: Kentish Flats Offshore Wind Farm

Environmental Impact Assessment
Environmental Statement

Document Reference: PB4476-005-0232

June 2018

For and on behalf of Norfolk Vanguard Limited

Approved by: Ruari Lean, Rebecca Sherwood

Signed: [redacted]

Date: 8th June 2018

Final Report

Norfolk Vanguard Onshore Electrical Infrastructure:

Wintering Bird Surveys

Royal HaskoningDHV

APEM Ref P00001219

June 2017

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APEM (2017). *Norfolk Vanguard Onshore Electrical Infrastructure: Wintering Bird Surveys – Final Report*. APEM Scientific Report P00001219. Royal HaskoningDHV, April 2017, v2.0

Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
1.0	01/03/17	All	All	Creation of outline of report from interim report accounting for reduced scope	RB
1.1	03/04/17	3		Incorporation of field data and maps	RB
1.2	07/04/17	All	All	Final draft for issue to client	RB
1.3	30/05/2017	All	All	Final draft with feedback as track changes / comments from client	GC
2.0	06/06/2017	All	All	Final report	RB

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1. Introduction

1.1 Project background

Norfolk Vanguard is a proposed offshore wind farm being developed by Vattenfall Wind Power Limited (or an affiliate company), with a capacity of 1800MW, enough to power 1.3 million UK households[1]. The offshore wind farm comprises two distinct areas, Norfolk Vanguard East (NV East) and Norfolk Vanguard West (NV West) and will be connected to the shore by offshore export cables installed within the provisional offshore cable corridor. The project will also require onshore infrastructure in order to connect the offshore wind farm to the National Grid at the existing National Grid substation at Necton, which in summary will comprise:

- Landfall;
- Cable relay station (if required);
- Underground cables;
- Onshore substation; and
- Extension to the existing National Grid substation at Necton.

During the development of the project an onshore Scoping Area was initially defined that represented a broad area of search in which the onshore electrical infrastructure would be sited. The area of search underwent additional site selection to refine the locations of the onshore infrastructure. This took place in the period in which wintering bird surveys were undertaken (October 2016 to March 2017). This additional site selection work has identified locations for all of the key onshore electrical infrastructure required for the construction of Norfolk Vanguard offshore wind farm. Three landfall options, associated cable relay station search zones, as well as an onshore substation search zone in proximity to the existing Necton 400kV National Grid substation have been identified. A 200m wide cable corridor has been identified, within which the cable route will be located, and Horizontal Directional Drilling (HDD) Zones and Indicative Mobilisation Zones have been identified along the cable corridor. This refinement of infrastructure means that the areas being considered present a reduced footprint compared to the onshore Scoping Area that had initially identified the areas to be surveyed for wintering birds.

1.2 Aim of report

As Norfolk Vanguard is a Nationally Significant Infrastructure Project (NSIP) an Environmental Impact Assessment (EIA) is required as part of a Development Consent Order (DCO) application under the Planning Act 2008. The aim of this report is to provide baseline information on the wintering birds in relation to the proposed areas of infrastructure. The results of which will be consulted on with relevant stakeholders through the Evidence Plan Process, considered as part of the EIA, and reported in the Environmental Statement (ES) to be submitted as part of the DCO application.

[1] http://www.renewableuk.com/page/UKWEDExplained assuming a load factor of 34.88

1.3 Identification and refinement of survey scope

The area over which surveys took place underwent refinement in the course of the winter 2016 – 17 in response to the refinement of the locations of the onshore infrastructure.

The initial area over which surveys took place was identified based on the onshore Scoping Area that represented a broad area of search in which the onshore electrical infrastructure would be sited. This onshore Scoping Area was described in the Scoping Report for the EIA (RHDHV, 2016a) and illustrated in Figure 1.2 of that Scoping Report. Within that onshore Scoping Area there were seven areas identified for survey (listed alphabetically):

- Agricultural fields in North Walsham District
- Dereham Rush Meadows SSSI
- Mattishall Moor SSSI
- Mown Fen / Hundred Stream
- North Norfolk Coast between Eccles-on-Sea and Paston
- North Walsham and Dilham Canal
- Westwick Lakes SSSI

With the identification of the refined onshore electrical infrastructure location a review was undertaken of the risk of impacts on the areas initially identified for survey. Some sites were identified as no longer at risk of impact and they were removed from the scope of the surveys. These sites were:

- Mattishall Moor SSSI
- North Walsham and Dilham Canal
- Westwick Lakes SSSI

For two other sites the area that was surveyed was reduced in response to the identification of the refined onshore electrical infrastructure location. These sites were:

- Agricultural fields in North Walsham District
- Mown Fen / Hundred Stream

The survey area remained unaltered for two sites:

- Dereham Rush Meadows SSSI
- North Norfolk Coast between Eccles-on-Sea and Paston

These decisions were made in January 2017. The consequence was that all seven sites were surveyed between October 2016 and January 2017. In February and March 2017 only the following sites were surveyed:

- Agricultural fields in North Walsham District
- Dereham Rush Meadows SSSI
- Hundred Stream[2]
- North Norfolk Coast between Eccles-on-Sea and Paston

[2] This survey location was originally called Mown Fen / Hundred Stream but with the identification of the refined onshore electrical infrastructure location the survey area was reduced and Mown Fen was no longer included in the survey area.

The main text of this report presents the results of the surveys of those four sites (based on the reduced survey area where relevant) conducted over the period October 2016 to March 2017. The location and area of these four sites in relation to the refined onshore electrical infrastructure is illustrated in Figures 1 – 5 in Appendix: Figures.

The results of those surveys conducted over the period October 2016 to January 2017 that were of areas no longer relevant to the proposed project are presented in Appendix: Survey results no longer relevant to the proposed project.

1.4 Consultation over need for and scope of surveys

In advance of formal scoping of the environmental impact assessment (EIA) for the wind farm, an onshore ornithology desk study was prepared (RHDHV, 2016b). This provided the background information from which the scope of the wintering bird surveys could be developed and be subject to consultation with Natural England and Norfolk County Council. A draft of this desk study was issued to Natural England and Norfolk County Council in order to agree the approach and scope of the wintering bird surveys. Natural England and Norfolk County Council provided comments on 9th September 2016 which were incorporated into the final document, in order to determine the nature and scale of the surveys described within this report.

A Scoping Report for the EIA (RHDHV, 2016a) was submitted to the Secretary of State on 3rd October 2016 and the response in the form of a Scoping Report (PINS, 2016) published on 11th November 2016. That Scoping Report included the consultation responses of Natural England and Norfolk County Council.

When the refined onshore electrical infrastructure location was identified, further consultation took place on 24th January 2017 with Natural England and Norfolk County Council in order to agree any reductions in the scope of surveys that were appropriate for the refined area and any buffers placed around it. A paper was presented Natural England and Norfolk County Council (RHDHV, 2016c) that proposed a series of changes to the areas to be surveyed to ensure that they were relevant to the refined onshore electrical infrastructure location. Those changes were agreed by Natural England and Norfolk County Council.

1.5 The ornithological risk areas and the focal species

The report on the scope of the wintering bird surveys (RHDHV, 2016b) identified a series of 'Ornithological Risk Areas' related to the onshore Scoping Area and, based on these, a set of 'Ornithological Survey Locations' and associated focal species for each survey location. Those 'Ornithological Risk Areas', 'Ornithological Survey Locations' and focal species were re-assessed in RHDHV (2016c) to ensure that they remained relevant to the refined onshore electrical infrastructure location and a reduced set of survey areas was defined (as described in Section 1.3).

The 'Ornithological Risk Areas' related to the refined onshore electrical infrastructure location, with the reason why they were identified are:

- Broadland SPA and Ramsar Site (incorporating Sutton Fen RSPB Reserve)
  Supporting habitats outside of the protected site but both within 5km of the protected site boundary and within 300m of the refined onshore electrical infrastructure location

- Dereham Rush Meadow SSSI
  Protected site at or within 300m of the refined onshore electrical infrastructure location

Derived from these 'Ornithological Risk Areas' were 'Ornithological Survey Locations' (RHDHV, 2016b) and associated focal species (these relate to the interest features of the relevant 'Ornithological Risk Area' or designation). These, relevant to the refined onshore electrical infrastructure location, are as follows:

- Agricultural fields in North Walsham District
  Wintering swan and goose species associated with agricultural land ('ex-situ' supporting habitat) that are interest features of the Broadland SPA. The bird species[3] are:
  Bewick's Swan, Whooper Swan, Bean Goose, Greylag Goose, Pink-footed Goose and White-fronted Goose.

- Dereham Rush Meadows SSSI
  Wintering waterfowl (no species named), a notified feature of the SSSI.

- Hundred Stream
  Wintering bird species associated with 'ex-situ' floodplain habitats that are interest features of the Broadland SPA. The bird species are:
  Bittern, Cormorant, Great Crested Grebe, Bewick's Swan, Whooper Swan, Pink-footed Goose, Bean Goose, White-fronted Goose, Greylag Goose, Gadwall, Shoveler, Wigeon, Teal, Pochard, Tufted Duck, Coot, Hen Harrier, Marsh Harrier and Ruff.

- North Norfolk Coast between Eccles-on-Sea and Paston
  Wintering bird species associated with 'ex-situ' coastal habitats that are interest features of the Broadland SPA. The bird species are:
  Cormorant, Bewick's Swan, Whooper Swan, Bean Goose, Greylag Goose, Pink-footed Goose, White-fronted Goose, Marsh Harrier and Ruff.

[3] The scientific names of birds are given in the Appendix.

2. Methodology

2.1 Vantage Point Surveys

Vantage point (VP) surveys consist of a timed period of observation over a defined area of land or water from a particular location or locations to give a measure of the species and numbers of birds using that area. The generic method is described in Bibby *et al*. (2000). Note that the survey method is not a VP count as required for an onshore wind farm assessment (SNH, 2014) that includes the recording of birds in flight and their flight heights.

Set out below are the key elements of how the VP survey was delivered and bird information recorded at each 'Ornithological Survey Location'.

2.1.1 Dereham Rush Meadows SSSI

Key elements of survey delivery:

- Surveys will be conducted once a month from October 2016 to March 2017 inclusive.
- Surveys should not take place in heavy rain, poor visibility or strong wind.
- The total count period is of 3 hours duration but each hour is recorded separately.
- The SSSI is observed from a VP located at its southern end (grid ref TF 9750 1390) but within each hour of VP watch the site should also be viewed from a more northerly point (grid ref TF 9731 1421) by walking along the public right of way along its western edge. Figure 2 identifies the VP location in relation to the protected site boundary and the site is illustrated in Appendix: Site photographs.
- The limit of extent of the recording of bird locations and numbers by mapping is the SSSI boundary. Waterbirds flying over should be counted and the flight line mapped. Non-waterbirds occurring in the adjacent land or flying over should be recorded as a species list during each hour. In the event of any waterbirds occurring in the adjacent land, they should be counted and recorded on the map.
- Behaviour activity is also recorded, categorised as 'feeding activity' or 'not feeding activity'; the latter includes a whole range of behaviours including roosting, resting, preening, bathing and vigilance/alert. 'Feeding activity' should be recorded on the map by placing the species name and number in a box.
- Birds that fly in and land during the count period are recorded. Birds that have already been counted in the SSSI that fly off will already have been recorded. Non-waterbirds that that simply fly by or occur on the adjacent land are not counted (note their presence in a species list for each hour as described above).

Key elements of information recording:

- At the beginning of the VP watch details of observer, date, start time and weather were noted on the recording cover sheet (noting any subsequent significant changes during the 3 hour count period).
- The 3 hour watch was divided into three 1 hour recording periods.
- At the beginning of each 1 hour recording period on each set of bird recording maps the details of observer, date, which 1 hour period it is and start time were recorded.
- In each 1 hour recording period at least 20 minutes, concealed as far as is practical, was spent at the southern end before walking along the right of way (which carries the risk of disturbing waterfowl) to observe the SSSI from the northern end. The observer was not tied to any particular observation location.

- The SSSI was methodically scanned, all birds were counted and recorded in one of three categories dependent on their behaviour:
  1. Feeding;
  2. any another activity that is not feeding;
  3. or flying over.
- Waterbirds were recorded on the map using the BTO two letter code and behaviour notation and, in addition:
  1. Feeding waterbirds were identified on the map by placing their name and the count within a box.
  2. Waterbirds that flew over were identified by running an arrow showing the flight line through the record.
  3. Waterbirds that moved from one part of the site to another were identified by an arrow linking the two points.
- The number of birds was bound to change due to movements in and out of the section during each 1 hour recording period. As a result, if there was time for repeated scans then the approach was to note each 'repeat count' and then at the end of the 1 hour period, the maximum count for each species was transferred to the relevant 'max count' column of the recording form.
- If during the count period there was any activity or change in conditions that might have affected the count then that was recorded on the cover sheet in the space provided.
- At the end of the 3 hour period the finish time was recorded on the cover sheet and the observations summarised on the summary sheet.

2.1.2 North Norfolk Coast between Eccles-on-Sea and Paston

Key elements of survey delivery:

- Surveys will be conducted once a month from October 2016 to March 2017 inclusive.
- Surveys should not take place in heavy rain, poor visibility or strong wind.
- The count is around the low tide period specifically within the period 3 hours before or after low tide.
- The total count period is of 3 hours duration but each hour is recorded separately.
- The survey is of a 12 km stretch of the coast between Eccles-on-Sea and Paston, Norfolk. That 12 km stretch has been divided in to 6 x 2 km sections and a VP is located within each section.
- Following the first survey visit, at which the suitability of the boundaries was checked and adjusted (specifically the boundary between VP2 and VP3 due to the presence of a headland), the limit of each section has been fixed and the northern limit (NL) and southern limit (SL) and the optimal VP locations are at the following grid references:
  1. NL: TG 3968 3003; SL: TG 4129 2889; VP1: TG 4027 2962.
  2. NL: TG 3855 3087; SL: TG 3968 3003; VP2: TG 3898 3046.
  3. NL: TG 3648 3255; SL: TG 3855 3087; VP3: TG 3750 3177.
  4. NL: TG 3498 3363; SL: TG 3648 3255; VP4: TG 3576 3305.
  5. NL: TG 3313 3506; SL: TG 3498 3363; VP5: TG 3420 3421.
  6. NL: TG 3178 3629; SL: TG 3313 3506; VP6: TG 3242 3565.

  Figure 3 identifies these sections and the VP locations and the view looking up and down the coast is illustrated in Appendix: Site photographs.
- The limits of extent of the count are within each specific coastal sector 1 – 6 and from the upper shore (limit of beach above high tide) out to sea to the limit of reasonable visibility and bird identification.
- All birds are counted that are using the shore or the sea. Birds flying by are ticked as present in the relevant column of the recording form but they are not counted. The

exceptions are divers and scoters which are counted even if just flying by. This is because they are interest features of the proposed Greater Wash SPA.

- Behaviour activity is also recorded, categorised as 'feeding activity' or 'not feeding activity'; the latter includes a whole range of behaviours including roosting, resting, preening, bathing and vigilance/alert.
- Birds that fly in and land during the count period are recorded. Birds that have already been counted on the shore or water that fly off will already have been recorded. Birds that simply fly by are not counted (note their presence as described above) other than divers and scoters.
- In each 1 hour recording period methodically 'work' the stretch of coast that has been allocated. For some sections this can be done from one or two locations by scanning up or down the 2 km section counting all birds and recording them in one of two categories dependent on their behaviour ('feeding' or any another activity that is not feeding), with birds flying past (other than divers or scoters) not counted but recorded as present. For other sections due to the curve of the coast and the frequent sea defence groynes the best coverage is achieved by walking up and down the allocated section to high points or other spots giving sufficient view, ensuring that both ends have been observed at least once within the hour.
- The observer is not tied to the optimal VP. As described above some sections require them to be walked for part of their length in order to see, identify and count birds at either end of the count section. That is part of the method and why this method does not copy the static VP method used for wind turbine impact assessment.

Key elements of information recording:

- At the beginning of the VP watch details of observer, VP number, date, start time, low tide time and weather were noted on the recording cover sheet (noting any subsequent significant changes during the 3 hour count period).
- The 3 hour watch was divided into three 1 hour recording periods.
- At the beginning of each 1 hour recording period on each species sheet the details of observer, VP number, date, which 1 hour period it was and start time were recorded.
- The number of birds was bound to change due to movements in and out of the section during each 1 hour recording period. As a result, if there was time for repeated scans then the approach was to note each 'repeat count' and then at the end of the 1 hour period, the maximum count for each species was transferred to the relevant 'max count' column of the recording form.
- If during the count period there was any activity or change in conditions that might have affected the count then that was recorded on the cover sheet in the space provided.
- If marine mammals were incidentally recorded (this was not the primary function of these surveys), the maximum number was recorded on the cover sheet.
- At the end of the 3 hour period the finish time was recorded on the cover sheet.

2.2 Transect Surveys

Transect surveys consist of a timed period of observation made over a defined route to give a measure of the species and numbers of birds using the land or water on and alongside that route. The generic method is described in Bibby *et al*. (2000).

Set out below are the key elements of how the transect survey was delivered and bird information recorded at each 'Ornithological Survey Location'.

2.2.1 Agricultural fields in North Walsham District

Key elements of survey delivery:

- Surveys will be conducted once a month from October 2016 to March 2017 inclusive.
- Surveys should not take place in heavy rain, poor visibility or strong wind.
- The period of observation on site should be around 120-150 minutes and potentially could be longer if there are many large flocks of geese feeding in the area.
- The survey is of a defined area of farmland that lies in a zone of overlap between a 300m buffer projected from the onshore cable route and a 5km buffer projected from the Broadland SPA. Figure 4 identifies this survey area and example locations are illustrated in Appendix: Site photographs.
- All swan and goose species should be recorded. In addition Lapwing and Golden Plover should also be recorded as, although not interest features of an 'Ornithological Risk Area' or designation, they can occur in nationally important numbers on agricultural land outside of designated sites.
- The swans and geese are counted using a road transect method in order to provide efficient coverage of the large survey area. A transect route and the regular stop and scan points were selected to minimise the possibility that birds might be present in part of a field that was out of sight because of local topography or trees obscuring the view.
- The limit of extent of the recording of bird locations and numbers by mapping is the area defined by the intersection of buffers extended from the Broadland SPA and the scoping area.
- Swans and geese flying over should be counted and the flight line mapped. Non-waterbirds occurring on the farmland or flying over should be recorded as a species list. Note that parts of this survey area will also have been visited as part of other surveys. Those observers have been supplied with relevant maps to record any relevant observations.
- Behaviour activity is also recorded, categorised as 'feeding activity' or 'not feeding activity'; the latter includes a whole range of behaviours including roosting, resting, preening, bathing and vigilance/alert. 'Feeding activity' should be recorded on the map by placing the species name and number in a box.
- Birds that fly in and land during the count period are recorded. Birds that have already been counted that fly off will already have been recorded.

Key elements of information recording:

- At the beginning of the transect details of observer, date, start time and weather were noted on the recording cover sheet (noting any subsequent significant changes during the transect).
- The survey area was driven in a methodical fashion to cover the ground most efficiently, fields were scanned and stops made when necessary (in a safe fashion) and the relevant species counted and mapped. The route taken for the transect was recorded on the overview map.

- The location, number and behaviour of each species of swan, goose, Lapwing and Golden Plover was recorded on the relevant detailed A3 map, using the BTO two letter code and behaviour notation and, in addition:
  1. Feeding waterbirds were identified on the map by placing their name and the count within a box.
  2. Waterbirds that flew over were identified by running an arrow showing the flight line through the record.
  3. Waterbirds that moved from one part of the site to another were identified by an arrow linking the two points.
- The number of birds was bound to change due to movements in and out of the site during the transect, potentially as a result of flushing by agricultural activity. As a result, a tally was kept for each species (seeking to avoid double counting) and the total count for each species recorded in the relevant 'total number' column of the summary form.
- If during the count period there was any activity or change in conditions that might have affected the count then that was recorded on the cover sheet in the space provided.
- At the end of the transect the finish time was recorded on the cover sheet and the observations summarised on the summary sheet.

2.2.2 Hundred Stream

Key elements of survey delivery:

- Surveys will be conducted once a month from October 2016 to March 2017 inclusive.
- Surveys should not take place in heavy rain, poor visibility or strong wind.
- The transects is of floodplain habitats in a valley that is outside of, but runs from, part of the Broadland SPA. Figure 5 identifies this survey area and example locations are illustrated in Appendix: Site photographs.
- The transect should be walked at a steady pace to ensure that birds can be recorded effectively. The limited access to the floodplain means that it is walked and/or observed in a series of short sections with movement between them assisted by use of a car.
- The duration of the transect survey can last up to 2 hours.
- The transect is conducted using public rights of way and minor roads.
- The limit of extent of the recording of bird locations and numbers by mapping is the floodplain habitats that might be used by waterbirds i.e. woodland is excluded as is any habitat outside the floodplain. Waterbirds flying over should be counted and the flight line mapped. Non-waterbirds occurring in the floodplain or flying over should be recorded on a species list for the transect. A broad definition of waterbirds should be used and include such species as Barn and Short-eared Owl, Kingfisher, Cetti's Warbler and Reed Bunting, all species that use floodplain habitats.
- Swans, geese, Lapwing and Golden Plover on farmland outside the floodplain should have their numbers and location recorded on the transect maps and that data transferred to the records compiled for the swan and goose transect.
- Behaviour activity is also recorded for waterbirds, categorised as 'feeding activity' or 'not feeding activity'; the latter includes a whole range of behaviours including roosting, resting, preening, bathing and vigilance/alert. 'Feeding activity' should be recorded on the map by placing the species name and number in a box.
- Birds that fly in and land during the count period are recorded. Birds that have already been counted in the floodplain that fly off will already have been recorded. Non-waterbirds that simply fly by or occur in the non-floodplain habitats are not counted (note their presence in a species list as described above).

Key elements of information recording:

- At the beginning of the transect details of observer, transect, date, start time and weather were noted on the recording cover sheet (noting any subsequent significant changes during the transect).
- Throughout the transect the floodplain was methodically scanned for waterbirds, all waterbirds were counted and their location recorded on the map. All waterbirds were recorded in one of three categories dependent on their behaviour:
  1. Feeding;
  2. any another activity that is not feeding;
  3. or flying over.
- Waterbirds were recorded on the map using the BTO two letter code and behaviour notation and, in addition:
  1. Feeding waterbirds were identified on the map by placing their name and the count within a box.
  2. Waterbirds that flew over were identified by running an arrow showing the flight line through the record.
  3. Waterbirds that moved from one part of the site to another were identified by an arrow linking the two points.
- Birds that were outside the floodplain were recorded on the species list. Geese, swans, Lapwing and Golden Plover outside the floodplain were recorded and the information transferred to the specific goose and swan survey maps.
- If during the count period there was any activity or change in conditions that might have affected the count then that was recorded on the cover sheet in the space provided. This might include, for instance, low flying aircraft and bird scaring gas bangers.
- At the end of the transect the finish time was recorded on the cover sheet.

2.3 Surveyor experience and competencies

All surveyors who undertook the wintering bird surveys hold at least five years' experience of standard bird survey methods such as vantage point counts, line transects and intertidal counts, and at least 10 years' experience in the identification of British waterbirds. The lead surveyor in each team / survey pair had, in addition, experience in the application of the survey techniques in professional ecological surveys designed to inform impact assessment.

The surveyors were (listed alphabetically by surname):

Dr Roger Buisson CEnv MCIWEM

Andrew Chick ACIEEM

Rachel Coombes

Mike Crewe

Steve Holloway

Dr Mark Rehfisch MBOU

Scott Reid

Richard Thewlis

Those surveyors who took on the role of lead surveyor for groups of surveys are identified above in bold.

3. Survey Results

This section provides the results of the full six months of surveys from October 2016 to March 2017 inclusive. The surveys are referred to in the tables by visit number i.e. Visit 1 to Visit 6.

For each survey, information is provided in a standard format on when the individual monthly surveys took place; the weather conditions under which the survey took place; the observers conducting the survey; the peak count of the focal species observed on each survey; and where relevant a commentary on the counts and any limitations to the delivery of the survey. Limitations that are common to all or a specific category of survey have already been described in the methodology section above.

3.1 Agricultural fields in North Walsham District

3.1.1 Survey visits

Table 1 lists the survey dates and the weather conditions for the visits.

Table 1 Agricultural fields in North Walsham District: Survey dates and weather conditions

Visit	Date	Weather
1	11/11/2016	Wind SE 2; cloud 1/8; bright, sunny, temp ~7 C.
2	29/11/2016	Wind 0; cloud 1/8; bright, sunny, cold, temp ~0 C.
3	15/12/2016	Wind SW 2; cloud 8/8; temp ~9 C.
4	10/01/2017	Wind SW 3; cloud 4/8; temp ~7 C.
5	07/02/2017	Wind 0; cloud 8/8; temp ~5 C.
6	02/03/2017	Wind W 3; cloud 6/8; temp ~9 C.

Table 2 lists the observers and the survey duration for each of the visits. Note that Visits 5 and 6 were to survey the reduced area defined by the refined onshore electrical infrastructure location and as a result were of a shorter duration.

Table 2 Agricultural fields in North Walsham District: Observers and survey duration

Visit	Observer	Date	Start time (GMT)	Finish time (GMT)
1	S Holloway & A Chick	11/11/2016	08.10	11.00
2	R Coombes, R Thewlis, A Chick & S Holloway [2 cars]	29/11/2016	14.55	16.00
3	S Reid & R Thewlis	15/12/2016	12.10	14.20
4	S Reid & M Crewe	10/01/2017	12.10	14.30
5	S Holloway & R Thewlis	07/02/2017	11.35	13.30
6	S Reid & R Coombes	02/03/2017	11.15	12.30

3.1.2 Observations

Table 3 lists the peak count of waterbird species observed on the agricultural fields during each of the visits. For this survey the focal species were Bewick's Swan, Whooper Swan, Bean Goose, Greylag Goose, Pink-footed Goose and White-fronted Goose but other

waterbird species using the agricultural fields were also recorded. As this was a transect survey in which different areas were observed sequentially, the peak count is the total number of each species observed along the transect (accounting for any known duplicate observations). The Table lists only those species observed.

Table 3 Agricultural fields in North Walsham District: Peak count of waterbird species on each visit

Waterbird species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Golden Plover	-	-	-	-	-	120
Lapwing	-	-	-	-	-	197
Black-headed Gull	-	-	-	-	28	192
Common Gull	-	-	-	-	23	74

None of the focal species were observed using the agricultural fields on any of the visits. The Golden Plover, Lapwing and gulls observed on the agricultural fields were primarily feeding. Those observations are illustrated on Figures 6 - 11.

Counts were made of Pink-footed Goose (a focal species) flying near to the survey area on Visit 3 during the transect surveys of nearby floodplain habitats and on Visit 4 of this survey. On Visit 3 a flock of 140 Pink-footed Geese was observed flying south-east between Honing and East Ruston and a flock of 75 flying south-east close to Ridlington Street. On Visit 4 a flock of ~2,000 was observed flying eastwards in a zone between East Ruston and the survey area.

The counts of waterbirds recorded are not of a scale to be of national or greater importance or to be a significant component of the Broadland SPA or its constituent SSSIs.

3.1.3 Limitations

As described in the methodology section, this survey uses public roads from which to view fields that have the potential to be used by feeding swans and geese. There remains the possibility that birds might have been present in part of a field that was out of sight because of local topography or trees obscuring the view. The selection of the transect route and the regular stop and scan points were designed to avoid this. In addition, the vocal nature of a large goose flock and their regular movements across adjacent fields means that such a large goose flock would not have been missed.

Visit 2 started in mid-afternoon and in order to ensure that the full area was covered before dusk, two teams of observers in two cars were used. This provided both appropriate area coverage and duration in the field to avoid any significant limitation caused by impending failing light.

The first of the programme of surveys, recommended by Natural England to be in October 2016 (RHDHV, 2016a), was started on 31st October 2016. It was not possible to start the surveys earlier in October due to landowner access requirements and the need to ensure that the correct health and safety procedures were in place for the survey teams. The majority of the programme planned for October was undertaken in the first third of November 2016 and the subsequent two visits planned for November and December 2016 were spaced evenly over the remaining weeks of 2016.

There were no other limitations to the conduct of the surveys.

3.2 Dereham Rush Meadows SSSI

3.2.1 Survey visits

Table 4 lists the survey dates and the weather conditions for the visits. The survey area remained the same for the full duration of the winter period surveyed.

Table 4 Dereham Rush Meadows SSSI: Survey dates and weather conditions

Visit	Observer	Date	Start time (GMT)	Finish time (GMT)
1	S Holloway	11/11/2016	12.35	15.35
2	R Coombes & S Holloway	30/11/2016	09.45	12.45
3	S Reid & S Holloway	16/12/2016	09.20	12.20
4	R Coombes & S Holloway	12/01/2017	08.35	11.35
5	S Reid & M Crewe	07/02/2017	10.05	13.05
6	S Holloway & R Thewlis	02/03/2017	10.05	13.05

Table 5 lists the observers and the survey duration for each of the visits.

Table 5 Dereham Rush Meadows SSSI: Observers and survey duration

Visit	Date	Weather
1	11/11/2016	Wind 0; cloud 3/8; sunny spells, temp ~10 C.
2	30/11/2016	Wind 0; cloud 0/8; sunny, ground frozen, temp ~1 C.
3	16/12/2016	Wind 2; cloud 7/8; overcast with bright periods, temp ~7 C.
4	12/01/2017	Wind SW 2; cloud 8/8; temp ~7 C.
5	07/02/2017	Wind 0; cloud 8/8; temp ~5 C.
6	02/03/2017	Wind W 3; cloud 6/8; temp ~9 C.

3.2.2 Observations

Table 6 lists the peak count of each focal species for each of the visits. For this survey the focal species were wintering waterfowl (shaded light blue in the Table). As this was a VP survey in which the same area was recorded over three separate hours, the peak count is the highest number of each species observed in any one hour. The Table lists only those waterbird or wetland species observed.

Table 6 Dereham Rush Meadow SSSI: Peak count of focal species on each visit

Bird species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Egyptian Goose	-	2	-	-	-	2
Teal	-	-	3	-	-	-
Mallard	4		5	-	4	-
Little Egret	-	1	1	2	3	-
Grey Heron	-	1	-	1	-	-
Water Rail	1	-	2	2	-	2
Moorhen	-	-	-	-	2	1

Bird species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Snipe		1	1	-	-	-
Black-headed Gull	29	23	32	77	64	62
Common Gull	3	2	1	5	32	6
Lesser Bk-bd Gull	-	-	-	1	-	-
Herring Gull	-	1	3	6	-	5
Pied Wagtail	1	2	-	-	-	-
Grey Wagtail	1	-	1	-	-	-
Meadow Pipit	9	-	1	-	-	2
Reed Bunting	-	-	3	3	1	-

The gulls were associated with the adjacent sewage treatment works rather than the habitats of the SSSI and all counts related to birds flying over the SSSI but not landing on it. The passerines have been listed as, although not wildfowl or wading birds, they are species associated with wetland habitats. The observations of the birds that are using the SSSI and the adjacent wetland habitats are illustrated on Figures 12 - 17. Birds that were observed only flying over, such as the gulls, are not illustrated on these figures.

The counts of wintering waterfowl, other waterbirds and birds of wetland habitats recorded are not of a scale to be of national or greater importance or to be a significant component of the SSSI.

3.2.3 Limitations

The absence of flooding over the period spanned by the visits probably limited the potential for the site to attract significant numbers of wintering waterfowl. The surveys provide a robust measure of waterbird use in a dry winter.

The first of the programme of surveys, recommended by Natural England to be in October 2016 (RHDHV, 2016a), was started on 31st October 2016. It was not possible to start the surveys earlier in October due to landowner access requirements and the need to ensure that the correct health and safety procedures were in place for the survey teams. The majority of the programme planned for October was undertaken in the first third of November 2016 and the subsequent two visits planned for November and December 2016 were spaced evenly over the remaining weeks of 2016.

There were no other limitations to the conduct of the surveys.

3.3 Hundred Stream

3.3.1 Survey visits

Table 7 lists the survey dates and the weather conditions for the visits.

Table 7 Hundred Stream: Survey dates and weather conditions

Visit	Date	Weather
1	10/11/2016	Wind 2; cloud 4/8; light showers early, then dry, temp ~10 C.
2	29/11/2016	Wind NE 1; cloud 0/8; sunny, temp ~2 C.
3	15/12/2016	Wind SW 2; cloud 8/8; temp ~6 C.
4	10/01/2017	Wind SW 3; cloud 4/8; temp ~7 C.
5	07/02/2017	Wind 0; cloud 8/8; temp ~5 C.
6	02/03/2017	Wind W 3; cloud 6/8; temp ~9 C.

Table 8 lists the observers and the survey duration for each of the visits.

Table 8 Hundred Stream: Observers and survey duration

	Observer	Date	Start time (GMT)	Finish time (GMT)
1	S Holloway	10/11/2016	14.00	16.10
2	S Holloway	29/11/2016	09.45	13.45
3	S Holloway	15/12/2016	09.55	14.00
4	S Holloway	10/01/2017	09.55	13.55
5	S Holloway & R Thewlis	07/02/2017	10.00	11.25
6	S Reid & R Coombes	02/03/2017	09.25	11.05

3.3.2 Observations

Table 9 lists the peak count of each focal species for each of the visits. For this survey the focal species were Bittern, Cormorant, Great Crested Grebe, Bewick's Swan, Whooper Swan, Pink-footed Goose, Bean Goose, White-fronted Goose, Greylag Goose, Gadwall, Shoveler, Wigeon, Teal, Pochard, Tufted Duck, Coot, Hen Harrier, Marsh Harrier and Ruff (shaded light blue in the Table). As this was a transect survey in which different areas were observed sequentially, the peak count is the total number of each species observed along the transect (accounting for any known duplicate observations). The Table lists only those waterbird or wetland species observed.

Table 9 Hundred Stream: Peak count of focal species on each visit

Bird species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Pink-footed Goose	-	-	75	-	-	-
Mallard	-	2	-	4	-	3
Black-headed Gull	-	-	47	1	4	2

None of the focal species were observed using the floodplain habitats on any of the visits. Pink-footed Goose, a focal species, was observed flying over the floodplain habitats within

the survey area on Visit 3 (flock of 75 flying south-east as listed in the table above) and to the south of the survey area, also on Visit 3 (140 flying south-east between Honing and East Ruston, not listed on the table as it was outside the survey area). Some of the observations of Mallard and all of the observations of Black-headed Gull were flying over the floodplain habitats. Only those observations of birds using the floodplain habitats are illustrated on Figures 18 - 23.

The counts of waterbirds recorded are not of a scale to be of national or greater importance or to be a significant component of the Broadland SPA or its constituent SSSIs.

3.3.3 Limitations

As described in the methodology section, this survey uses public highways (roads and footpaths) from which to view the floodplain habitats that have the potential to be used by birds that are interest features of the Broadland SPA. As a result coverage of those floodplain habitats is totally dependent on the location of such public highways in relation to the floodplain. A transect route was selected that gave the best views of the floodplain habitats but because of the distance to the floodplain, local topography and/or screening trees not all parts of the floodplain could be viewed. It is considered that a large and significant flock of wildfowl in the floodplain would not have been missed but that the more 'cryptic' species such as Bittern, Snipe and Water Rail, if present, will not have been recorded.

The first of the programme of surveys, recommended by Natural England to be in October 2016 (RHDHV, 2016a), was started on 31st October 2016. It was not possible to start the surveys earlier in October due to landowner access requirements and the need to ensure that the correct health and safety procedures were in place for the survey teams. The majority of the programme planned for October was undertaken in the first third of November 2016 and the subsequent two visits planned for November and December 2016 were spaced evenly over the remaining weeks of 2016.

There were no other limitations to the conduct of the surveys.

3.4 North Norfolk Coast between Eccles-on-Sea and Paston

3.4.1 Survey visits

Table 10 lists the survey dates and the weather conditions for the visits.

Table 10 Coast between Eccles-on-Sea and Paston: Survey dates and weather conditions

Visit	Date	Low tide	Weather
1	31/10/2016 01/11/2016	13.24 13.55	Wind SE 1; cloud 3/8; visibility ~1 km; temp ~18 C. Wind NE 4; cloud 8/8; visibility excellent; temp ~12 C.
2	28/11/2016	12.25	Wind SE 2; cloud 4/8; visibility excellent; temp ~10 C.
3	14/12/2016	13.05	Wind S 1; cloud 8/8; variable visibility with fog banks.
4	11/01/2017	12.05	Wind NW 4; cloud 1/8; visibility excellent; temp ~9 C.
5	08/02/2017	11.20	Wind E 4; cloud 8/8; visibility good (>2km); temp ~4 C.
6	01/03/2017	14.55	Wind SW 3; cloud 5/8; visibility excellent; temp ~9 C.

Table 11 lists the observers and the survey duration for each of the visits.

Table 11 Coast between Eccles-on-Sea and Paston: Observers and survey duration

Visit	Observers	Date	Start time (GMT)	Finish time (GMT)
1	R Coombes, M Rehfisch & R Buisson R Coombes, R Thewlis & R Buisson	31/10/2016 01/11/2016	13.00 13.00	16.00 16.00
2	R Coombes, S Holloway, M Crewe, R Thewlis, A Chick & R Buisson	28/11/2016	12.15	15.15
3	R Coombes, S Holloway, M Crewe, R Thewlis, S Reid & R Buisson	14/12/2016	12.45	15.45
4	R Coombes, S Holloway, M Crewe, R Thewlis, S Reid & R Buisson	11/01/2017	10.00	13.00
5	R Coombes, S Holloway, M Crewe, R Thewlis, S Reid & R Buisson	08/02/2017	10.00	13.00
6	R Coombes, S Holloway, M Rehfisch, R Thewlis, S Reid & R Buisson	01/03/2017	13.00	16.00

3.4.2 Observations

Table 12 lists the peak count of each species for each of the visits. For this survey the focal species were Cormorant, Bewick's Swan, Whooper Swan, Bean Goose, Greylag Goose, Pink-footed Goose, White-fronted Goose, Marsh Harrier and Ruff (shaded light blue in Table 12; the light orange shading relates to species that are interest features of the proposed Greater Wash SPA). The Table lists only those species observed.

This survey consists of six VP locations each of which was observed for three hours. As a result a specific approach was required as to the definition of the peak count. At each VP location the individual VP peak count was identified as the highest number of each species observed in any one hour. The identification of the whole survey peak count was then determined based on the behaviour of the bird species being recorded, in particular the potential that there was for multiple recording should those birds be moving along the coast and be recorded at several VP locations. The two alternate approaches were:

1. For bird species that were considered to be relatively static i.e. they would stay within a single VP location (taken to be waders, feeding and roosting gulls, feeding auks and passerines based on their general behaviour and the specific observations made during the surveys) then the individual VP peak counts were summed.
2. For bird species that were considered to be relatively mobile i.e. they would move between VP locations and in the case of passage seabirds would pass across all VP locations (taken to be divers, passage seabirds and wildfowl), then the largest of the individual VP peak counts was selected.

Table 12 Coast between Eccles-on-Sea and Paston: Peak count of focal species on each visit

Bird Species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Red-throated Diver	5	11	3	16	14	17
Black-throated Diver	-	-	1	1	2	-
Great Northern Diver	-	-	-	1	-	-
Great Crested Grebe	-	1	-	-	-	-
Cormorant	15	-	-	-	-	6
Gannet	2	1	-	2	7	70
Dark-bellied Brent Goose	4	-	1	-	-	-
Wigeon	-	-	11	-	-	-
Teal	14	-	-	-	-	-
Mallard	-	2	4	-	-	-
Shoveler	-	-	1	-	-	-
Eider	-	11	-	-	-	-
Common Scoter	14	53	-	3	15	-
Goldeneye	4	-	-	-	-	-
Red-breasted Merganser	-	4	-	-	-	-
Kestrel	-	1	-	-	-	-
Oystercatcher	-	-	-	2	-	3
Ringed Plover	-	8	12	1	5	3
Sanderling	-	7	2	3	2	-
Dunlin	-	2	-	-	-	-
Purple Sandpiper	-	1	-	-	-	-
Turnstone	30	38	26	26	29	49
Mediterranean Gull	1	2	2	1	2	2
Little Gull	-	-	-	1	-	-
Black-headed Gull	1,479	1,269	3,530	189	143	664
Common Gull	256	500	1,106	26	54	207
Lesser Black-backed Gull	4	7	1	1	2	3
Herring Gull	150	355	172	125	110	218
Great Black-backed Gull	110	568	79	41	16	47
Glaucous Gull	-	-	-	-	2	-
Kittiwake	-	-	-	-	-	8
Guillemot	10	7	16	20	10	1
Razorbill	-	2	2	2	2	-
Puffin	-	-	-	1	-	-
Auk sp	1	-	-	1	-	-
Great Skua	1	2	-	-	-	1
Kingfisher	-	2	-	-	-	-
Carrion Crow	13	3	11	8	8	8
Jackdaw	8	-	1	-	-	-
Pied Wagtail	1	2	8	5	2	11
Meadow Pipit	-	2	3	-	-	3
Rock Pipit	-	-	-	-	-	2

Bird Species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Wren	-	-	1	-	-	-
Stonechat	-	1	-	-	-	-
Black Redstart	1	-	-	-	-	-
Starling	-	42	8	16	27	48
Snow Bunting	1	7	-	-	-	-
House Sparrow	-	-	1	-	-	1

The counts of waterbirds recorded are not of a scale to be of national or greater importance or to be a significant component of the Broadland SPA or its constituent SSSIs. With respect to the proposed Greater Wash SPA the mean of peak non-breeding population for Red-throated Diver is 1,511, for Common Scoter 3,463 and for Little Gull is 1,303 (Natural England and JNCC, 2016). One percent of these populations are 15, 35 and 13 respectively. The peak counts for Red-throated Diver are at around this 1% level and for Little Gull they are below this level. The peak count for Common Scoter, on Visit 2, related to birds flying past and not feeding in the offshore area. The peak count of birds on the water on this visit was two.

The large numbers of gulls were recorded as they came in to roost on the sea.

The passerines have been listed as, although not wildfowl or shorebirds, they are species associated with coastal habitats or observed feeding on the upper shore or intertidal zone.

3.4.3 Limitations

As described in the methodology section, some of the 2 km stretches of coast could not be observed by staying at a single location as the local topography limited some views along the coast. The full extent of the coastal zone was observed by moving within each hour of observation between two nearby locations. This approach of moving between points will have resulted in the full population of coastal birds being recorded but in the process of moving some passage migrant seabirds passing offshore will have been missed as a telescope will not have been used during those times. Such passage migrant seabirds were not focal species and any under-recording was not a limitation of the results obtained.

The observations during Visit 3 were limited to a range of around 400 m for short periods by reduced visibility caused by banks of fog that were rolling across the coast. At one VP the visibility fell to around 100 m and the recording at this VP was temporarily halted (for 15 minutes) and resumed once visibility improved. The lost time was added on at the end to maintain consistency of VP duration.

The first visit, recommended by Natural England to be in October 2016 (RHDHV, 2016a), was delivered split between the last day of October and the first day of November 2016. It was not possible to start the surveys earlier in October due to the need to ensure that the correct health and safety procedures were in place for the survey teams. This split over two days was not considered a limitation and was accounted for in the manner in which the peak counts were derived (as described above). The subsequent two visits planned for November and December 2016 were delivered by a team of six on a single day and the visits were spaced evenly over the remaining weeks of 2016.

There were no other limitations to the conduct of the surveys.

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Appendix: Scientific names of birds

English vernacular name	Scientific name	Species code used on maps
Mute Swan	*Cygnus olor*	MS
Bewick's Swan	*Cygnus columbianus*	BS
Whooper Swan	*Cygnus cygnus*	WS
Bean Goose	*Anser fabalis*	BE
Pink-footed Goose	*Anser brachyrhynchus*	PG
White-fronted Goose (European)	*Anser albifrons*	WG
Greylag Goose	*Anser anser*	GJ
Canada Goose	*Branta canadensis*	CG
Barnacle Goose	*Branta leucopsis*	BY
Brent Goose (dark-bellied)	*Branta bernicla*	BG
Egyptian Goose	*Alopochen aegyptiaca*	EG
Shelduck	*Tadorna tadorna*	SU
Wigeon	*Anas penelope*	WN
Gadwall	*Anas strepera*	GA
Teal	*Anas crecca*	T.
Mallard	*Anas platyrhynchos*	MA
Pintail	*Anas acuta*	PT
Shoveler	*Anas clypeata*	SV
Pochard	*Aythya ferina*	PO
Tufted Duck	*Aythya fuligula*	TU
Goldeneye	*Bucephala clangula*	GN
Red-breasted Merganser	*Mergus serrator*	RM
Goosander	*Mergus merganser*	GD
Smew	*Mergellus albellus*	SY
Red-throated Diver	*Gavia stellata*	RH
Black-throated Diver	*Gavia arctica*	BV
Great Northern Diver	*Gavia immer*	ND
Little Grebe	*Tachybaptus ruficollis*	LG
Great Crested Grebe	*Podiceps cristatus*	GG
Cormorant	*Phalacrocorax carbo*	CA
Little Egret	*Egretta garzetta*	ET
Bittern	*Botaurus stellaris*	BI
Grey Heron	*Ardea cinerea*	H.
Spoonbill	*Platalea leucorodia*	NB
Crane	*Grus grus*	AN
Hen Harrier	*Circus cyaneus*	HH
Marsh Harrier	*Circus aeruginosus*	MR
Kestrel	*Falco tinnunculus*	K.
Water Rail	*Rallus aquaticus*	WA
Moorhen	*Gallinula chloropus*	MH
Coot	*Fulica atra*	CO
Oystercatcher	*Haematopus ostralegus*	OC
Jack Snipe	*Lymnocryptes minimus*	JS
Snipe	*Gallinago gallinago*	SN
Woodcock	*Scolopax rusticola*	WK
Golden Plover	*Pluvialis apricaria*	GP
Lapwing	*Vanellus vanellus*	L.

English vernacular name	Scientific name	Species code used on maps
Ruff	*Philomachus pugnax*	RU
Black-tailed Godwit	*Limosa limosa*	BW
Curlew	*Numenius arquata*	CU
Redshank	*Tringa totanus*	RK
Green Sandpiper	*Tringa ochropus*	GE
Common Sandpiper	*Actitis hypoleucos*	CS
Great Skua	*Stercorarius skua*	NX
Mediterranean Gull	*Larus melanocephalus*	MU
Little Gull	*Hydrocoloeus minutus*	LU
Black-headed Gull	*Chroicocephalus ridibundus*	BH
Common Gull	*Larus canus*	CM
Lesser Black-backed Gull	*Larus fuscus*	LB
Herring Gull	*Larus argentatus*	HG
Great Black-backed Gull	*Larus marinus*	GB
Glaucous Gull	*Larus hyperboreus*	GZ
Kittiwake	*Rissa tridactyla*	KI
Guillemot	*Uria aalge*	GU
Razorbill	*Alca torda*	RA
Puffin	*Fratercula arctica*	PU
Barn Owl	*Tyto alba*	BO
Short-eared Owl	*Asio flammeus*	SE
Kingfisher	*Alcedo atthis*	KF
Bearded Tit	*Panurus biarmicus*	BR
Cetti's Warbler	*Cettia cetti*	CW
Wren	*Troglodytes troglodytes*	WR
Stonechat	*Saxicola torquatus*	SC
Black Redstart	*Phoenicurus ochruros*	BX
Pied Wagtail	*Motacilla alba*	PW
Grey Wagtail	*Motacilla cinerea*	GL
Meadow Pipit	*Anthus pratensis*	MP
Rock Pipit	*Anthus petrosus*	RC
Water Pipit	*Anthus spinoletta*	WI
Starling	*Sturnus vulgaris*	SG
Reed Bunting	*Emberiza schoeniclus*	RB
Snow Bunting	*Plectrophenax nivalis*	SB
House Sparrow	*Passer domesticus*	HS

Appendix: Figures

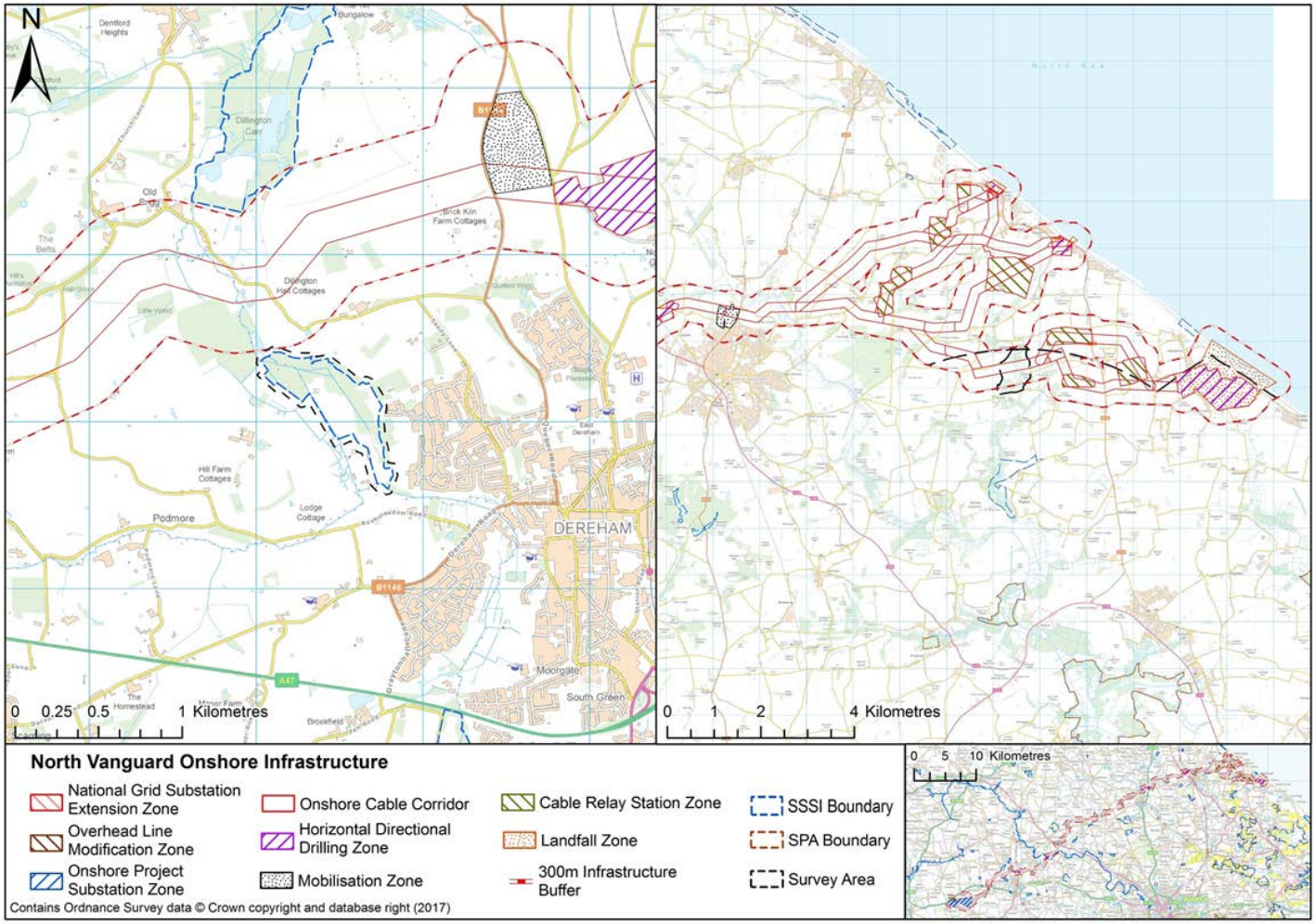

Figure 1 Refined onshore electrical infrastructure location and ornithological risk areas

Figure 2 Dereham Rush Meadow SSSI: Survey area and VP location

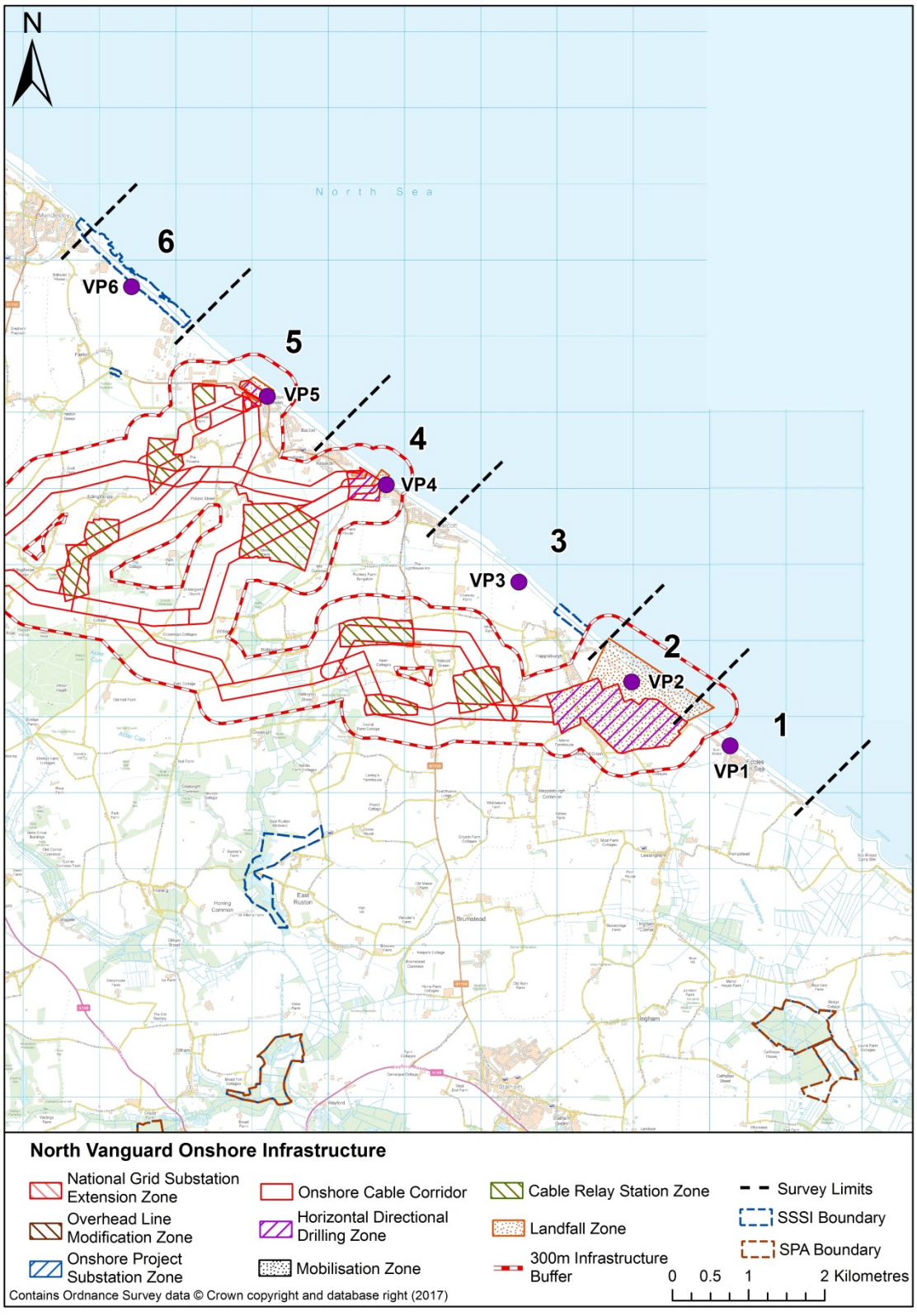

Figure 3 North Norfolk Coast between Eccles-on-Sea and Paston: Survey sections and VP locations

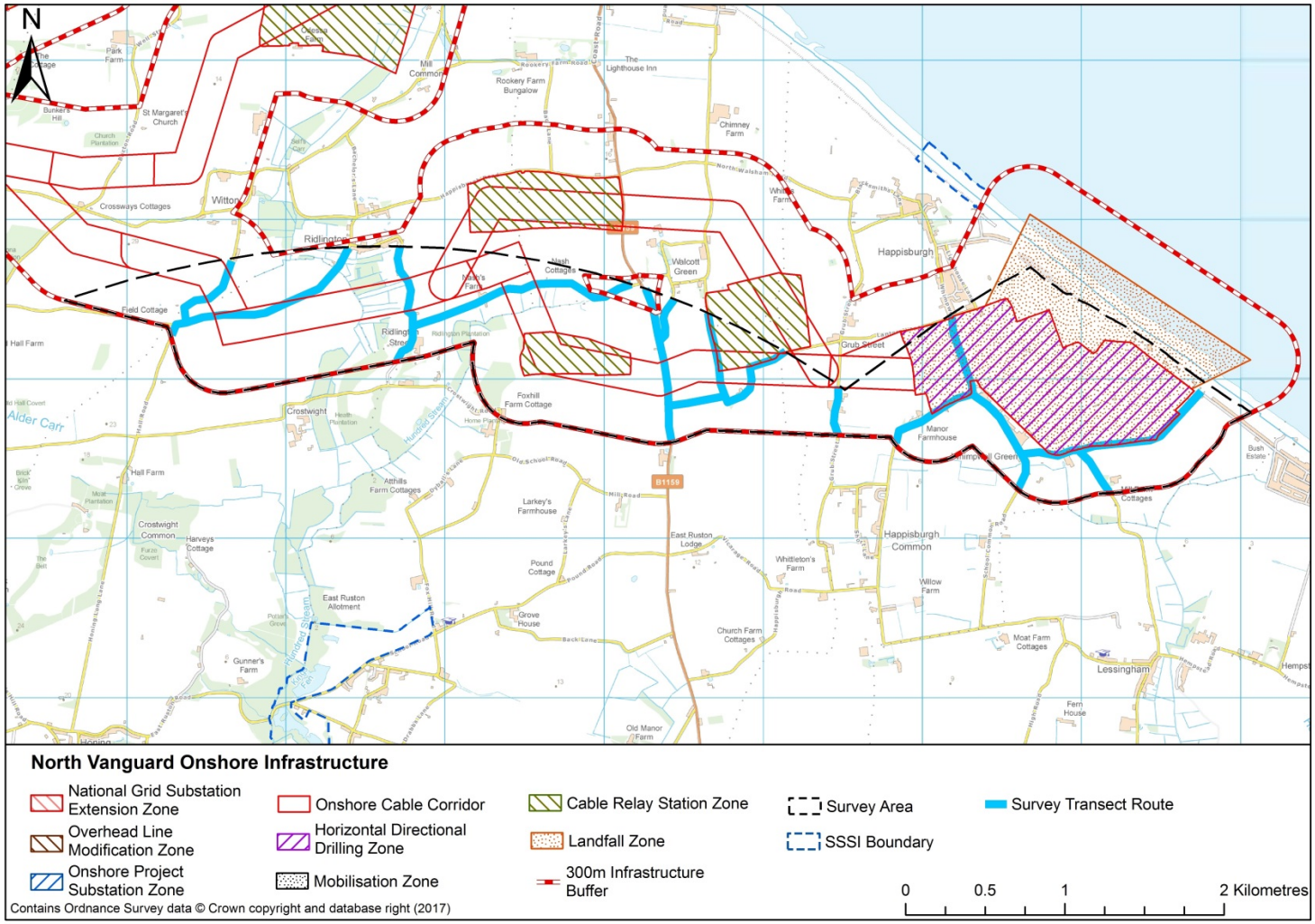

Figure 4 Agricultural fields in North Walsham District: Survey area and transect route

Figure 5 Hundred Stream: Survey area and transect route

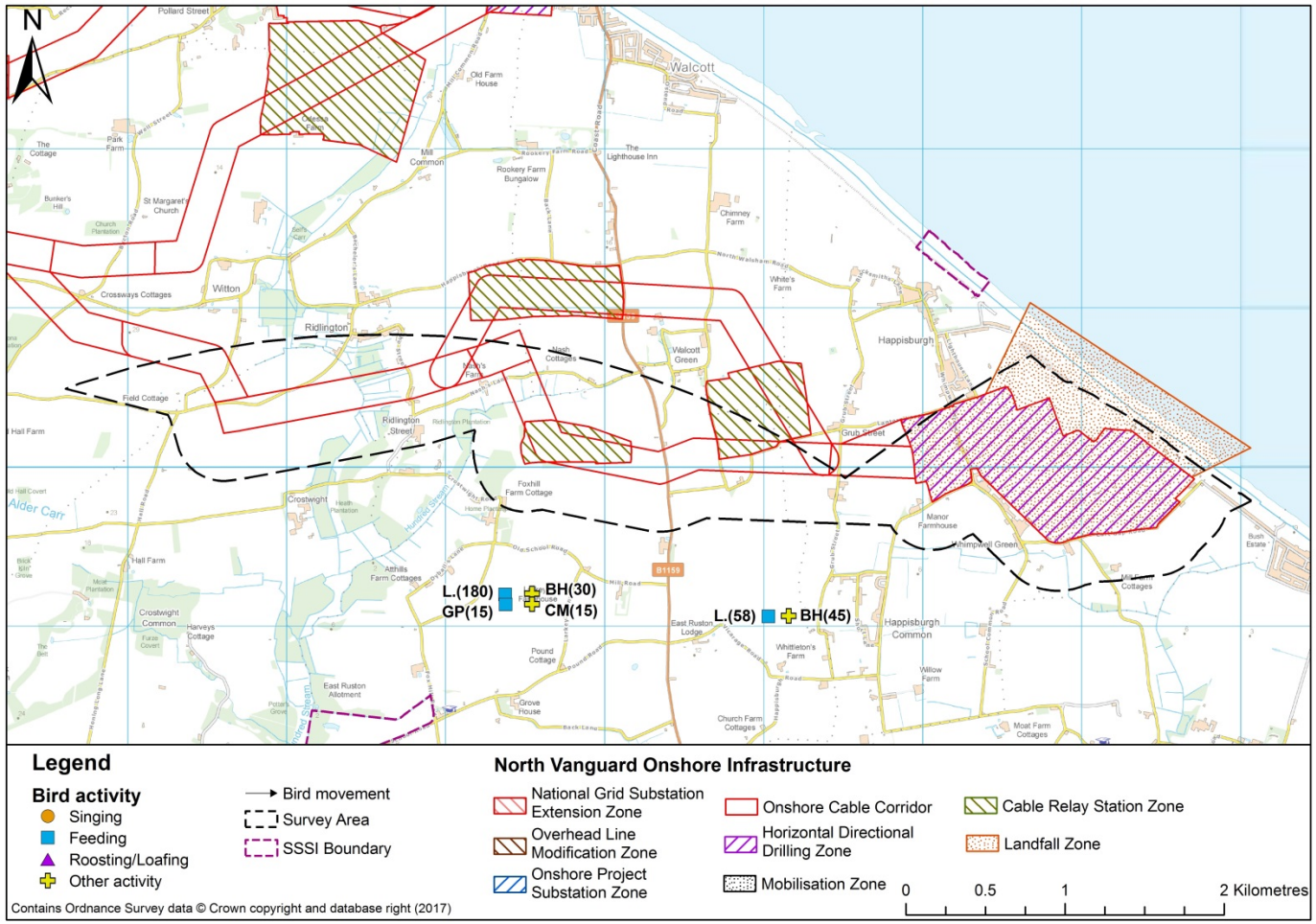

Figure 6 Waterbird observations across agricultural fields in North Walsham District on visit 1

Bird '2-letter code' notation: BH – Black-headed Gull; CM – Common Gull; GP – Golden Plover; L. – Lapwing.

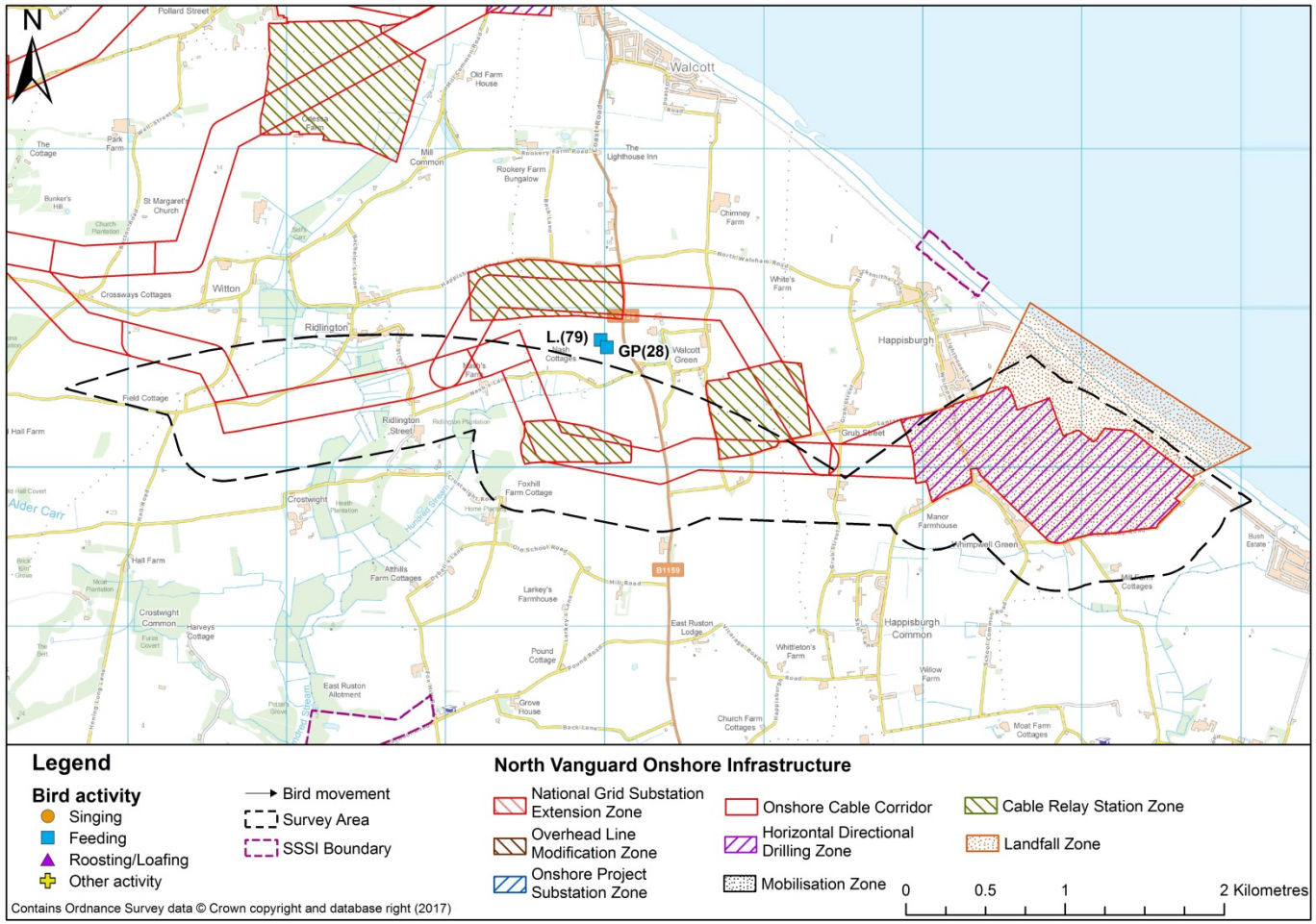

Figure 7 Waterbird observations across agricultural fields in North Walsham District on visit 2

Bird '2-letter code' notation: GP – Golden Plover; L. – Lapwing.

No observations within or adjacent to the survey area

Figure 8 Waterbird observations across agricultural fields in North Walsham District on visit 3

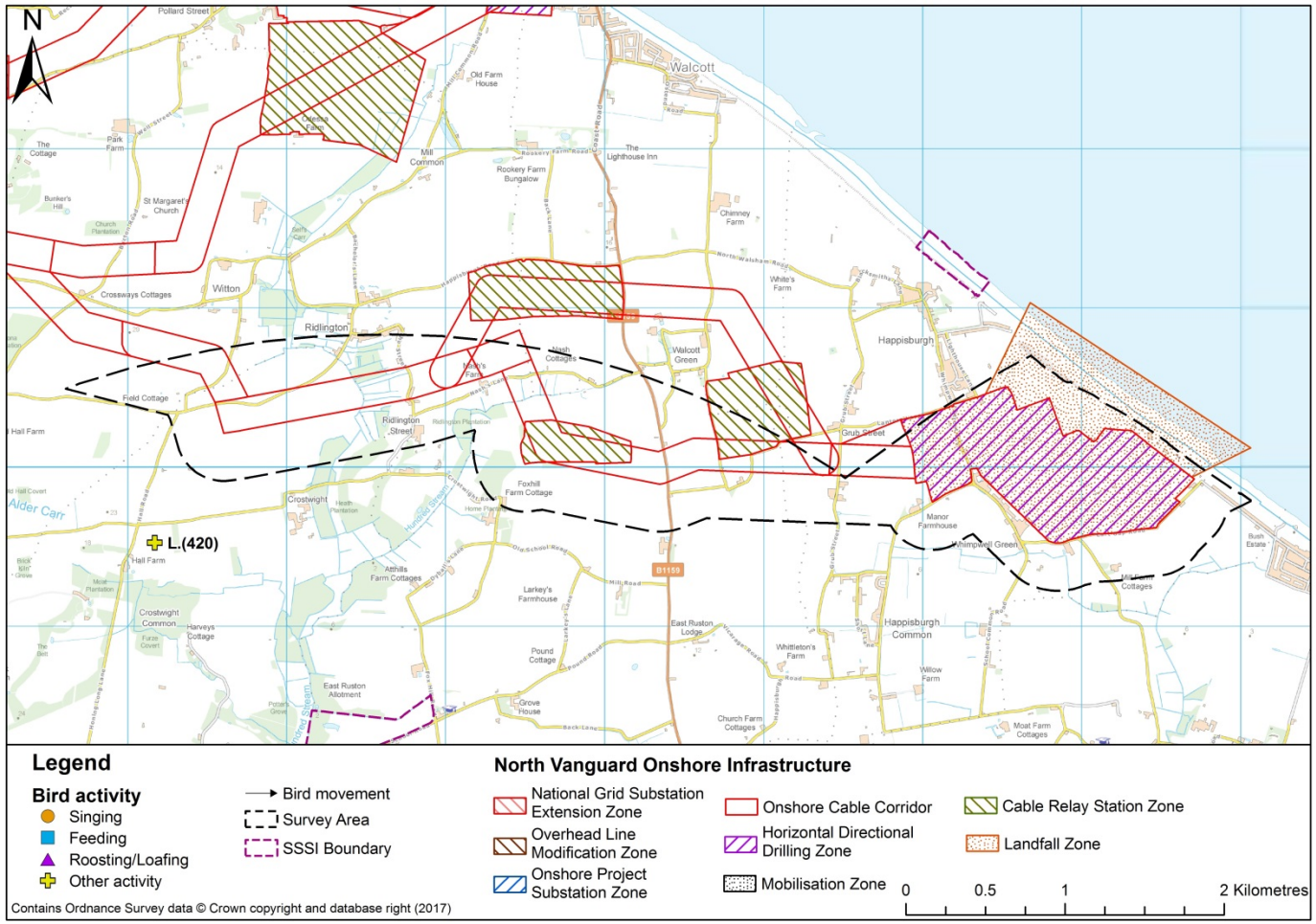

Figure 9 Waterbird observations across agricultural fields in North Walsham District on visit 4

Bird '2-letter code' notation: L. – Lapwing.

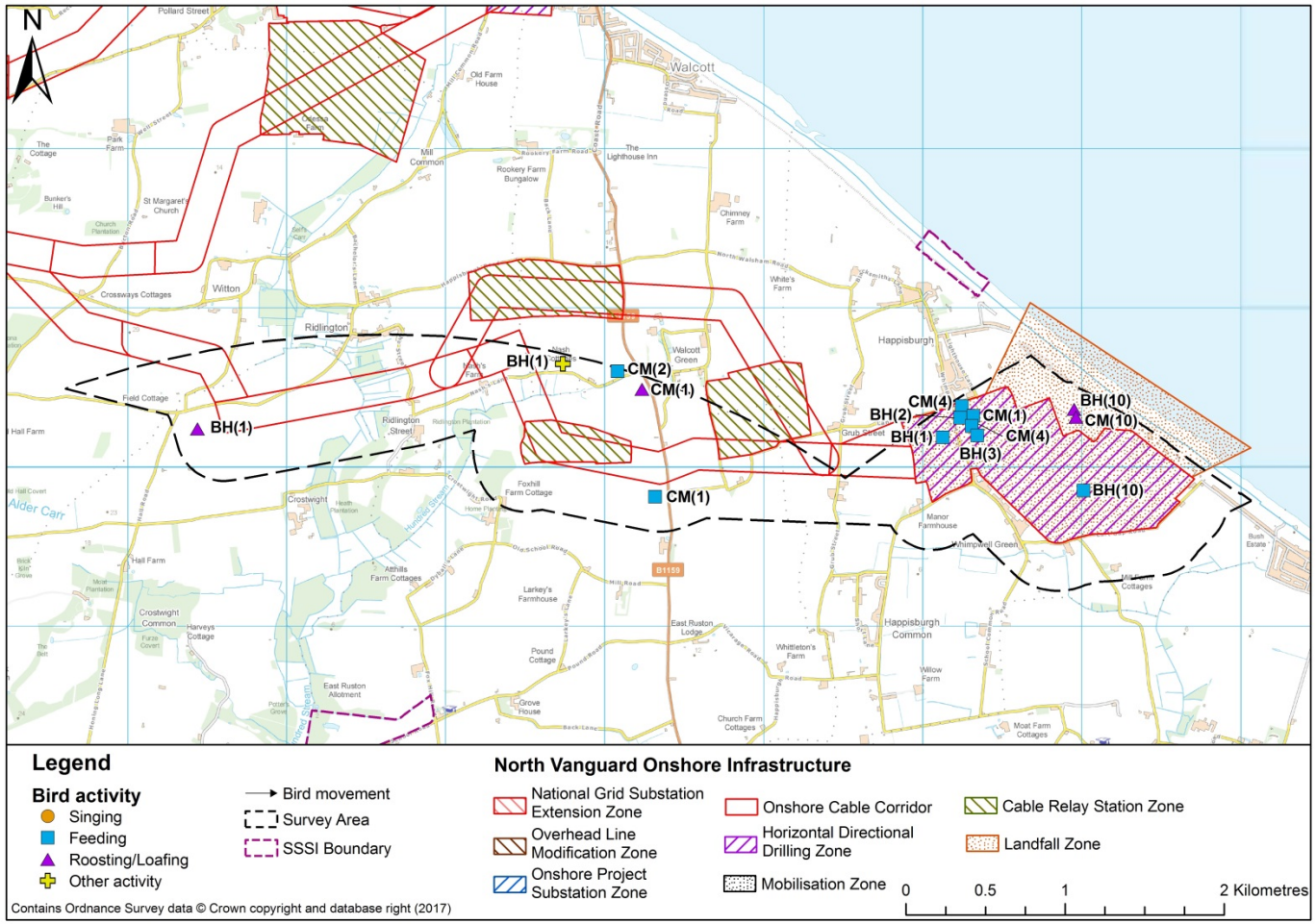

Figure 10 Waterbird observations across agricultural fields in North Walsham District on visit 5

Bird '2-letter code' notation: BH – Black-headed Gull; CM – Common Gull.

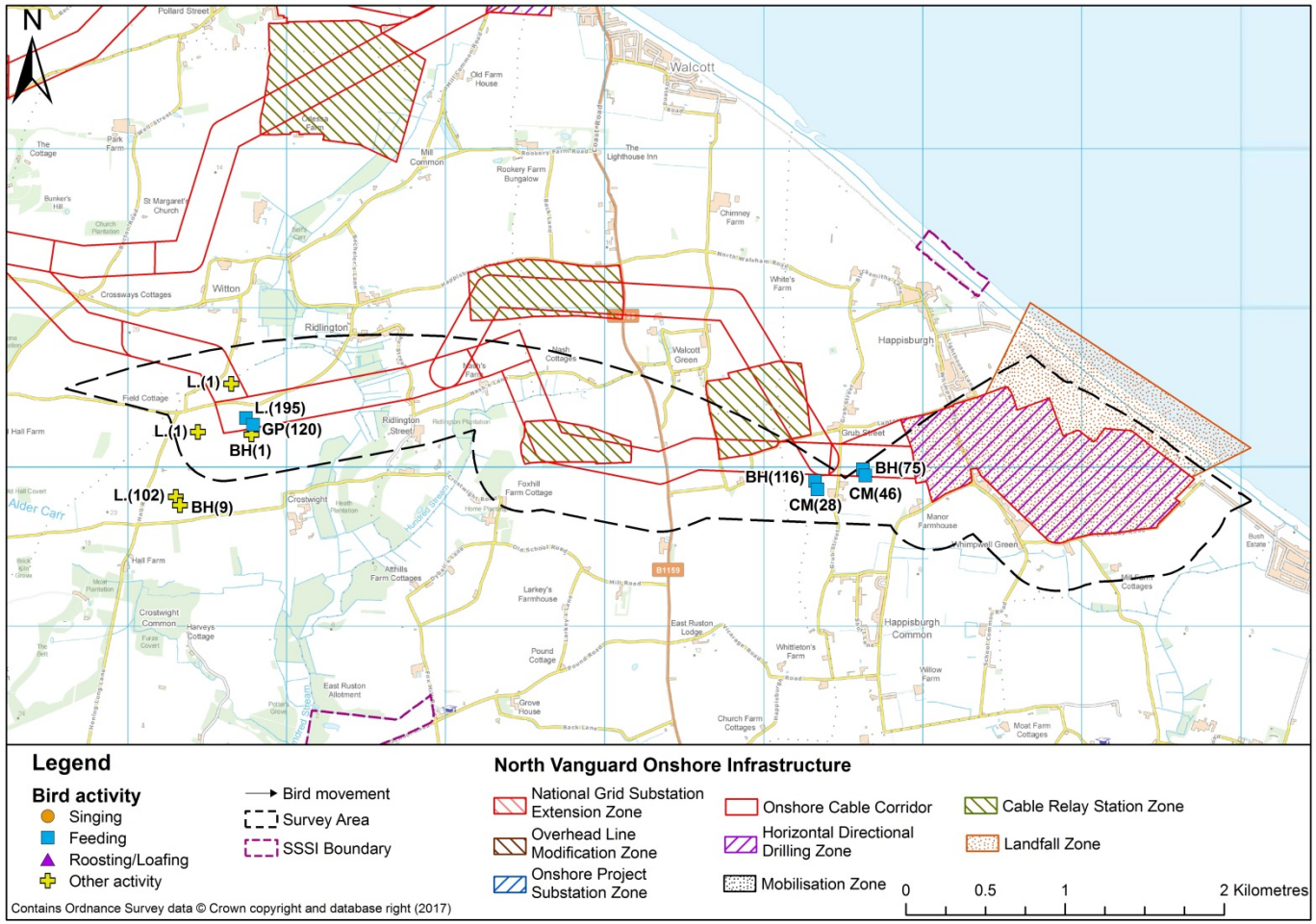

Figure 11 Waterbird observations across agricultural fields in North Walsham District on visit 6

Bird '2-letter code' notation: BH – Black-headed Gull; CM – Common Gull; GP – Golden Plover; L. – Lapwing.

Figure 12 Waterbird observations at Dereham Rush Meadow SSSI on visit 1

Bird '2-letter code' notation: BH – Black-headed Gull; WA – Water Rail.

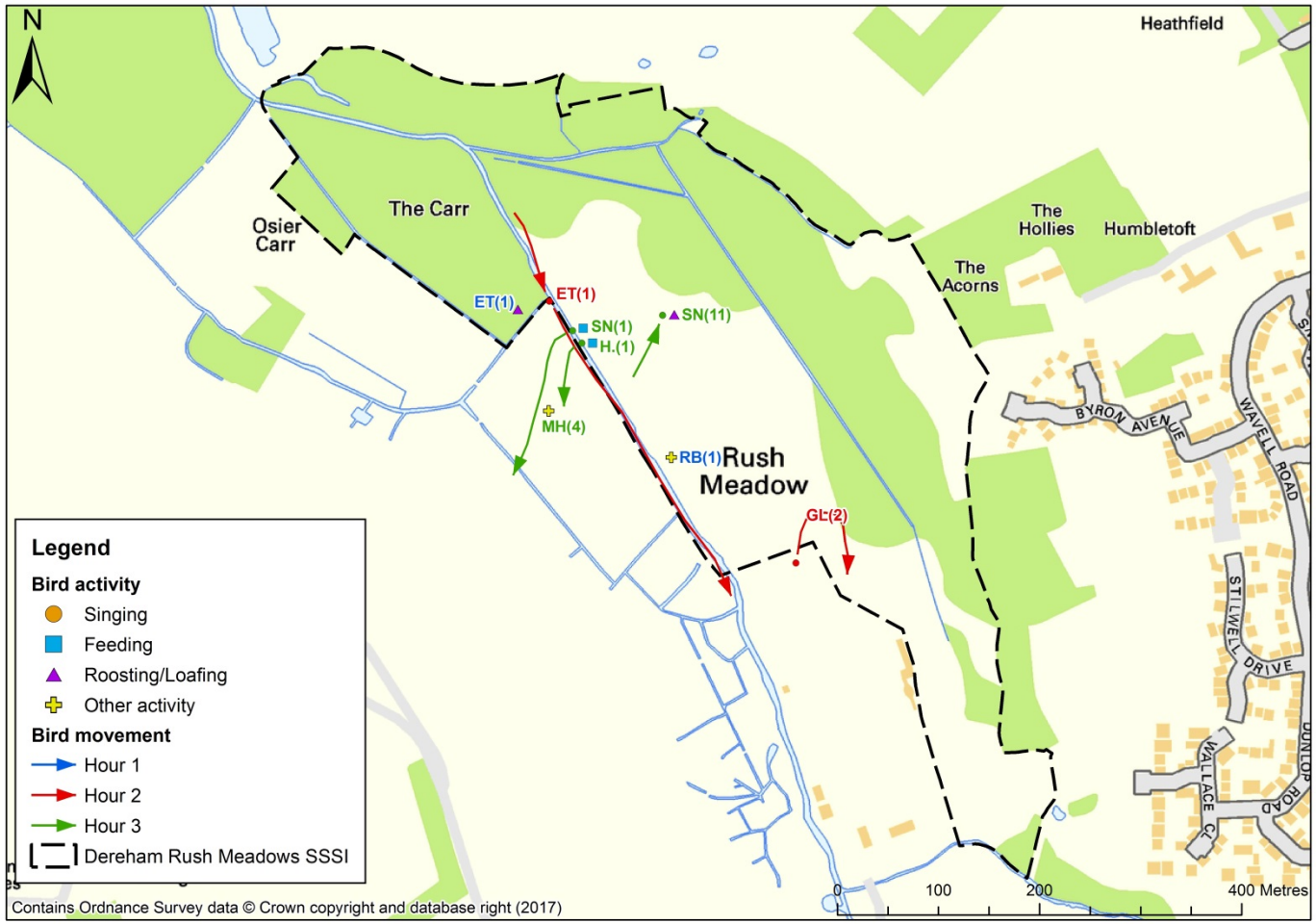

Figure 13 Waterbird observations at Dereham Rush Meadow SSSI on visit 2

Bird '2-letter code' notation: ET – Little Egret; GL – Grey Wagtail; H. – Grey Heron; MH – Moorhen; RB – Reed Bunting; SN – Snipe; WA – Water Rail.

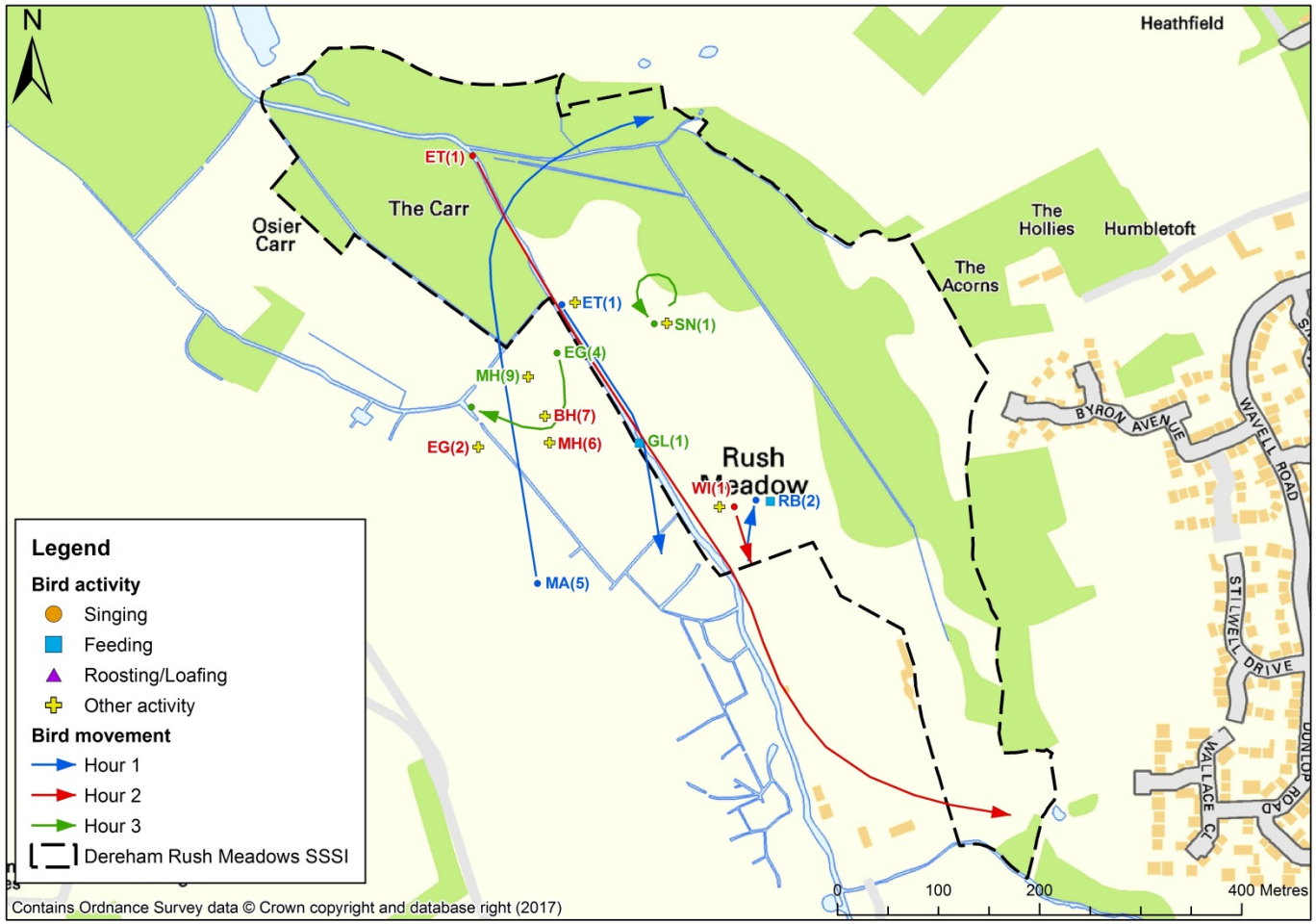

Figure 14 Waterbird observations at Dereham Rush Meadow SSSI on visit 3

Bird '2-letter code' notation: BH – Black-headed Gull; EG – Egyptian Goose; ET – Little Egret; GL – Grey Wagtail; H. – Grey Heron; MA – Mallard; MH – Moorhen; RB – Reed Bunting; SN – Snipe; WA – Water Rail.

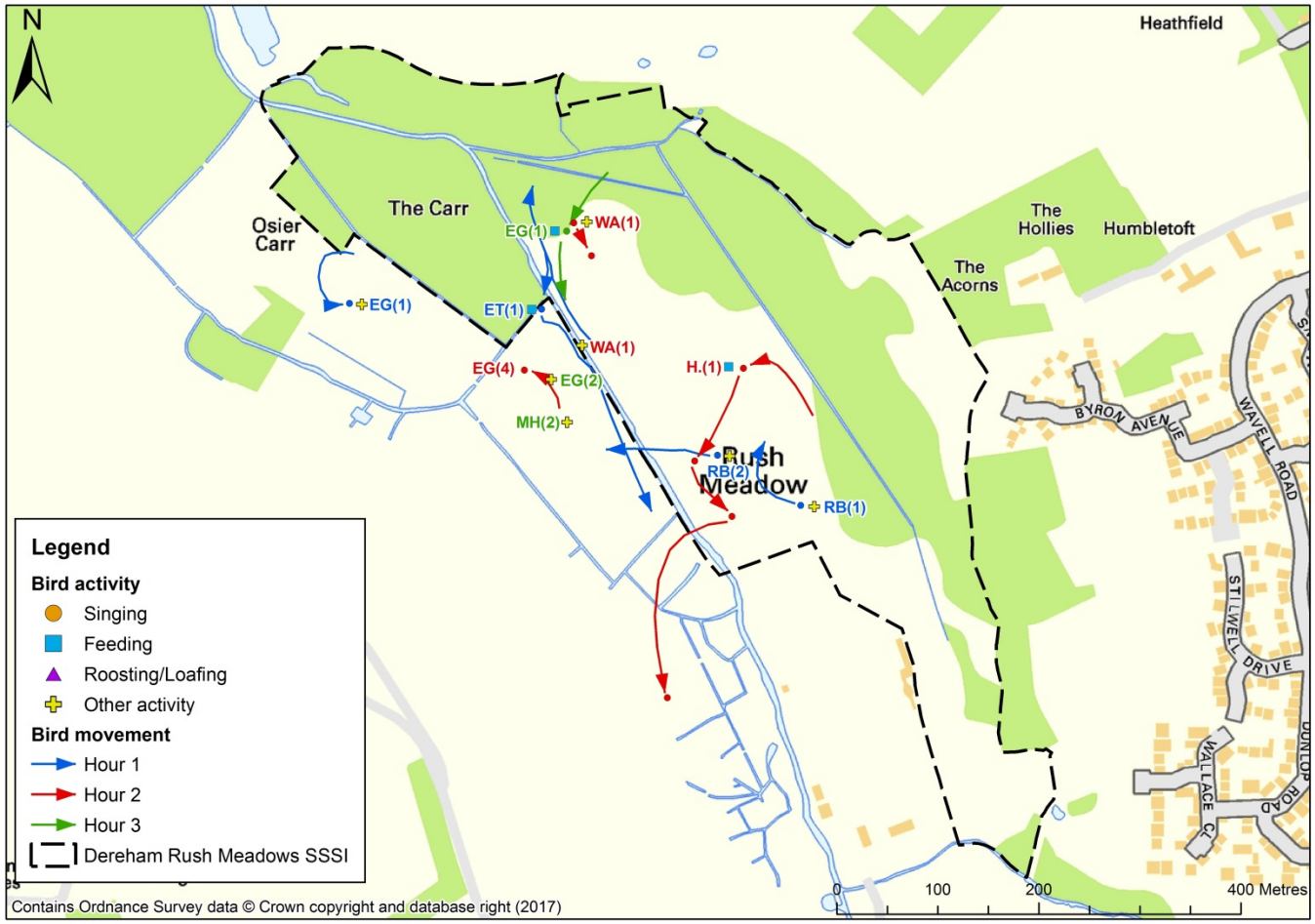

Figure 15 Waterbird observations at Dereham Rush Meadow SSSI on visit 4

Bird '2-letter code' notation: EG – Egyptian Goose; ET – Little Egret; H. – Grey Heron; MH – Moorhen; RB – Reed Bunting; WA – Water Rail.

Figure 16 Waterbird observations at Dereham Rush Meadow SSSI on visit 5

Bird '2-letter code' notation: ET – Little Egret; MH – Moorhen; RB – Reed Bunting.

Figure 17 Waterbird observations at Dereham Rush Meadow SSSI on visit 6

Bird '2-letter code' notation: MH – Moorhen; MP – Meadow Pipit; RB – Reed Bunting; WA – Water Rail.

No observations within or adjacent to the survey area

Figure 18 Waterbird observations at Hundred Stream on visit 1

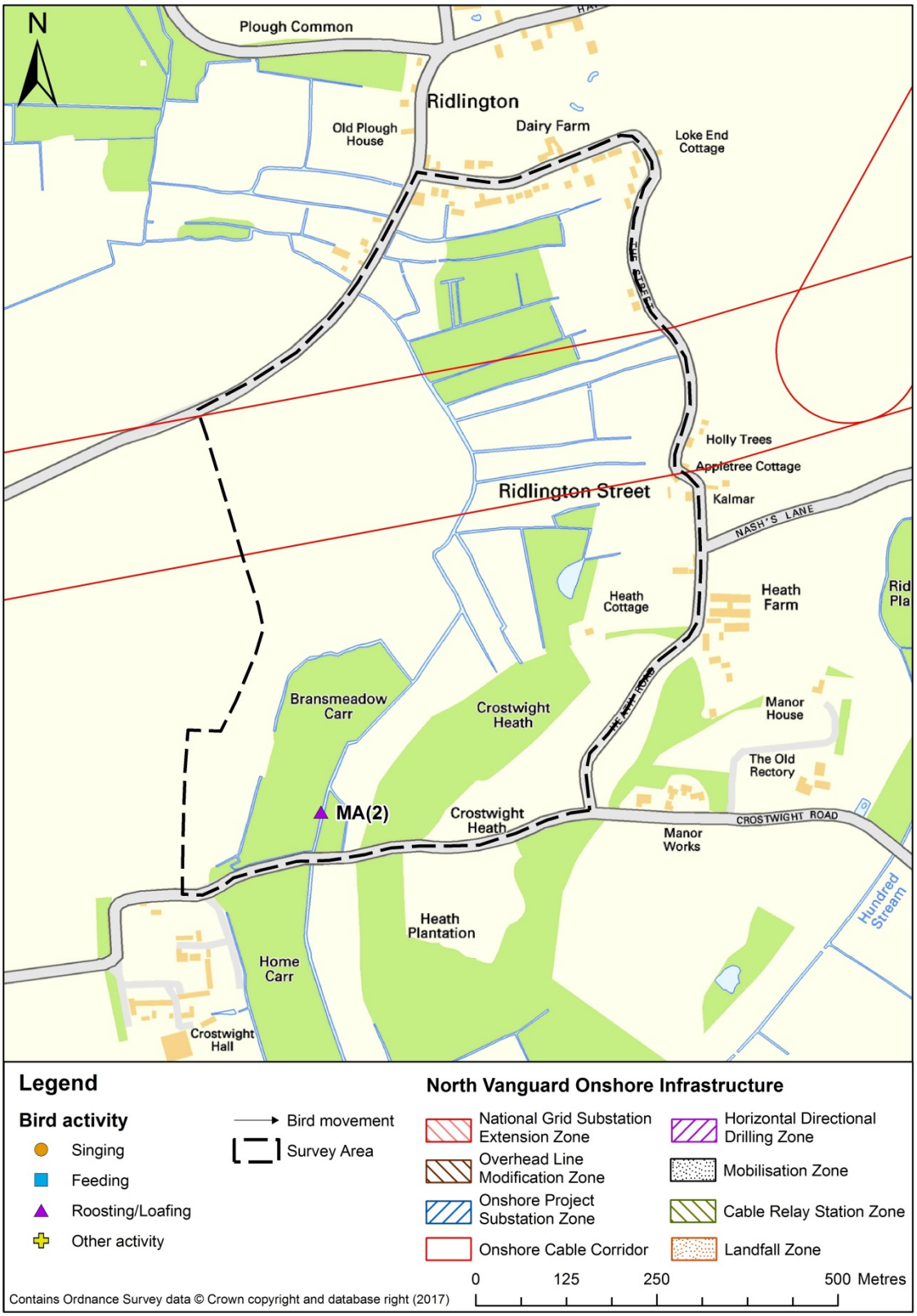

Figure 19 Waterbird observations at Hundred Stream on visit 2

Bird '2-letter code' notation: MA - Mallard.

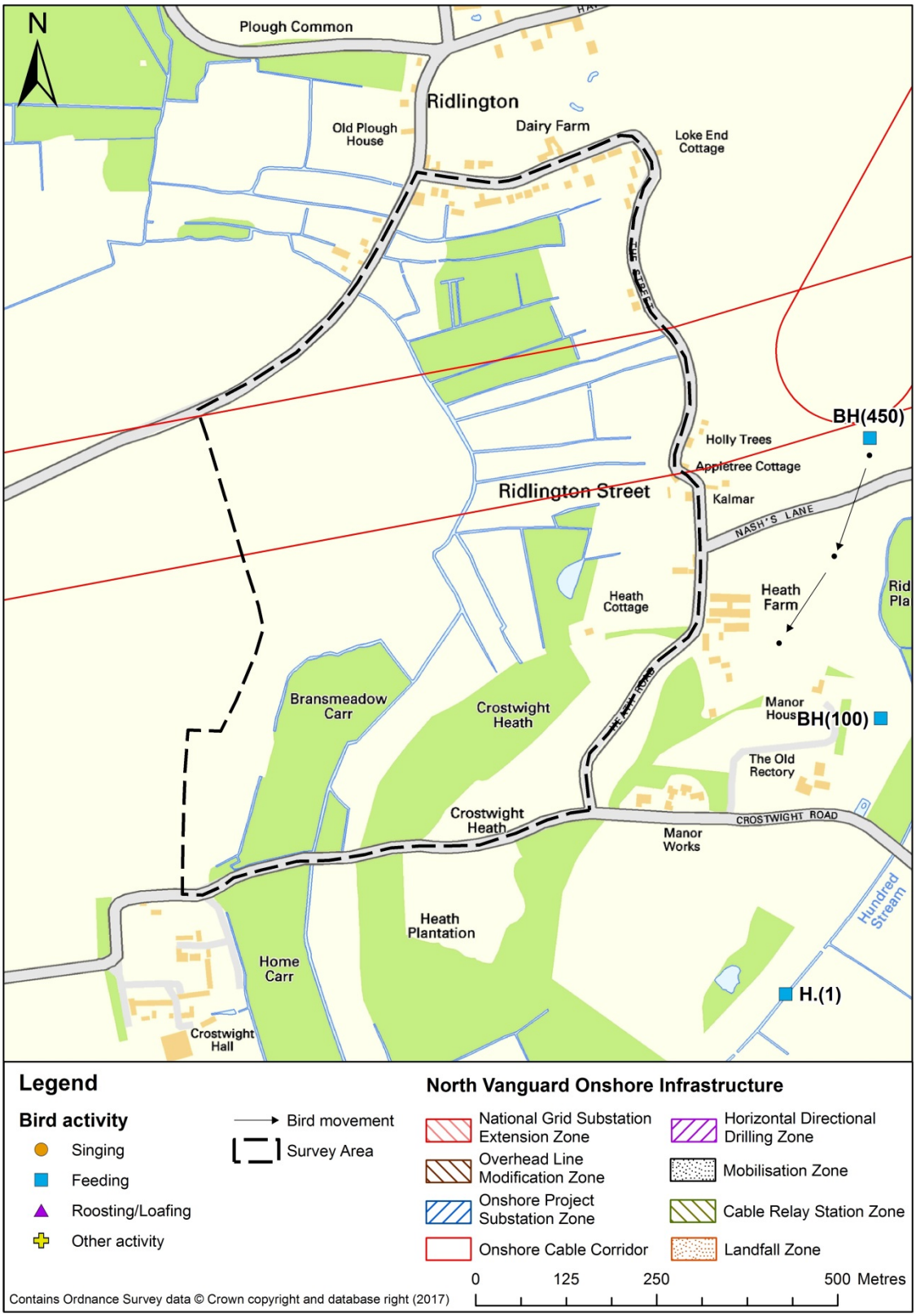

Figure 20 Waterbird observations at Hundred Stream on visit 3

Bird '2-letter code' notation: BH – Black-headed Gull.

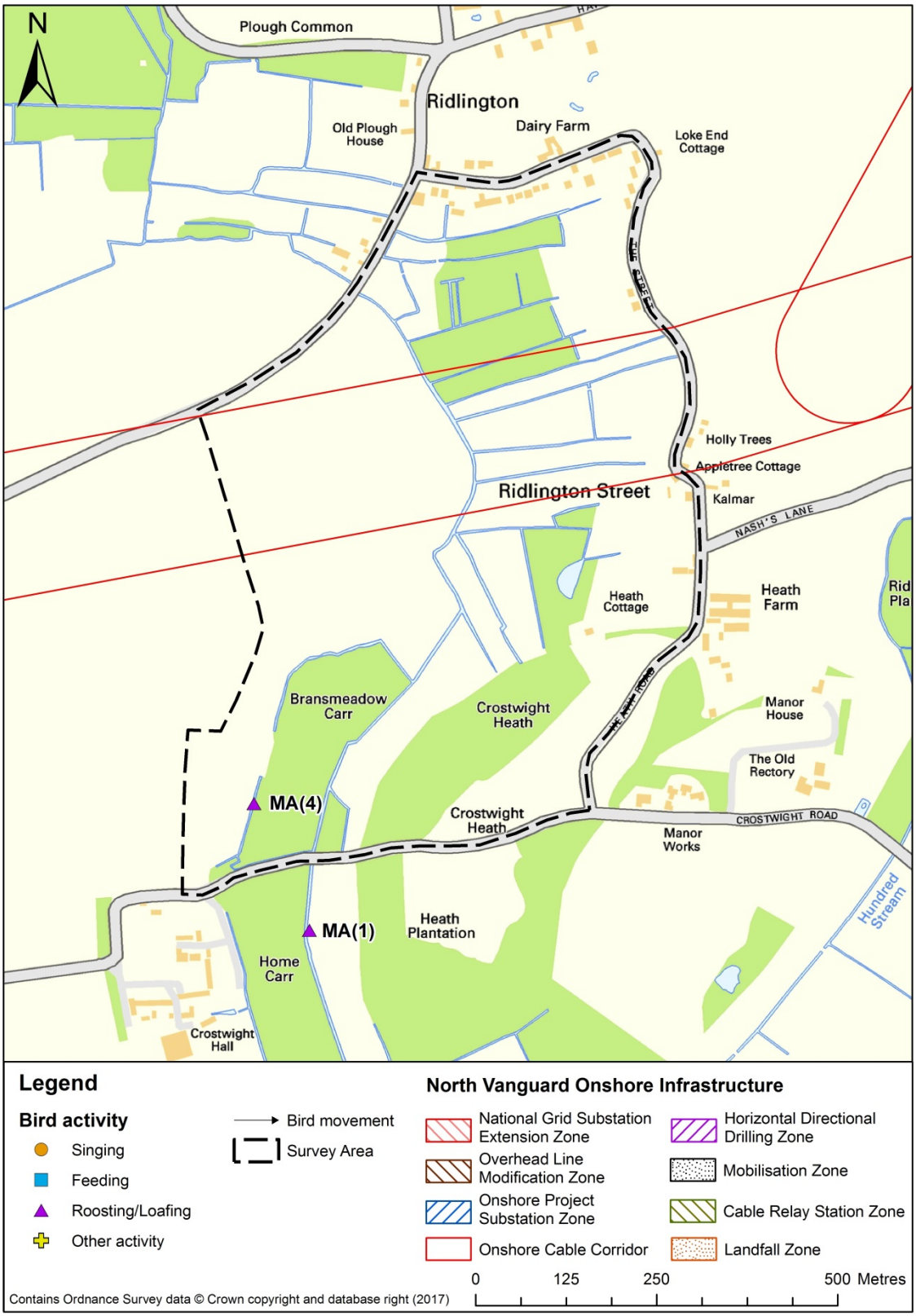

Figure 21 Waterbird observations at Hundred Stream on visit 4

Bird '2-letter code' notation: MA - Mallard.

No observations within or adjacent to the survey area

Figure 22 Waterbird observations at Hundred Stream on visit 5

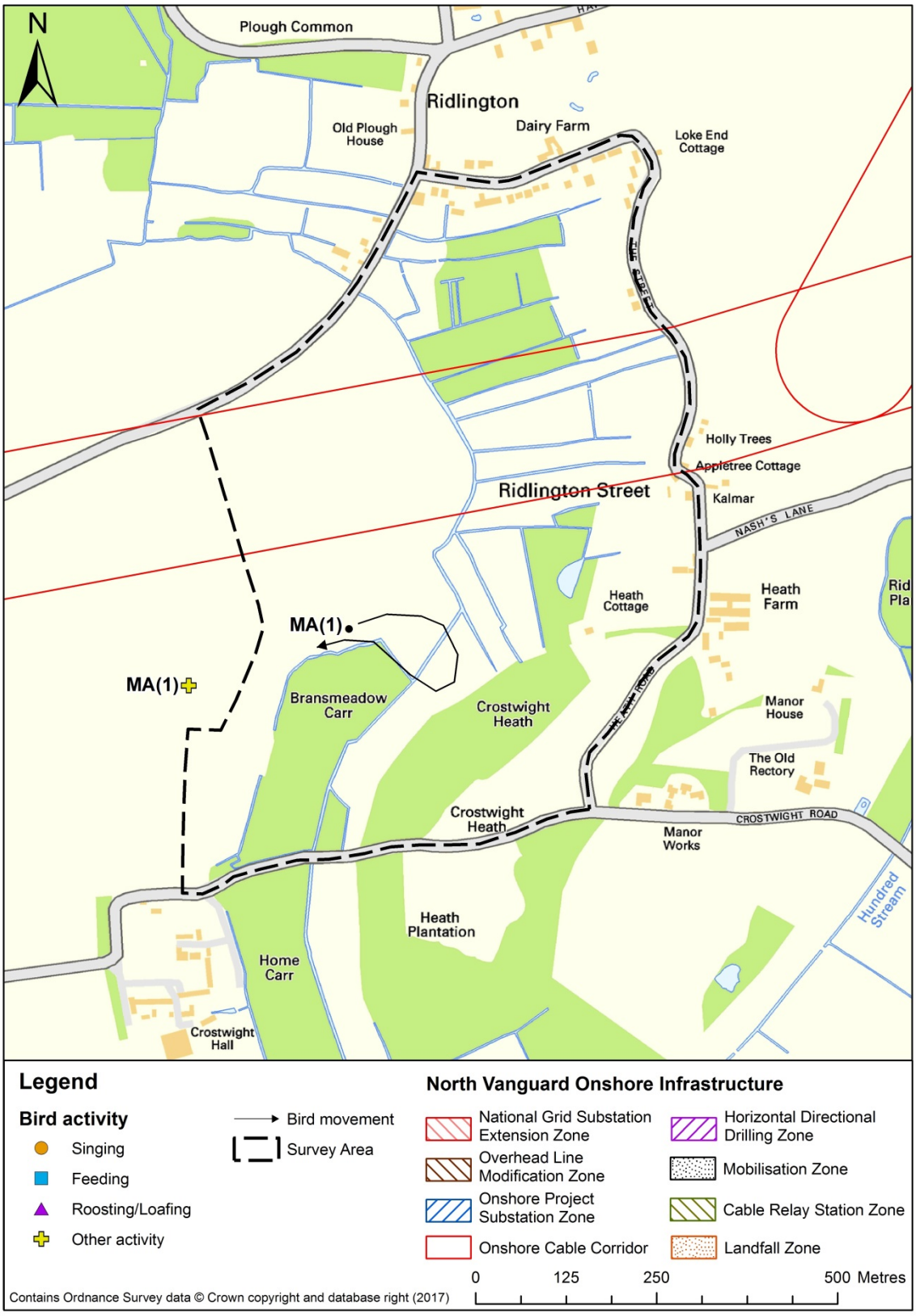

Figure 23 Waterbird observations at Hundred Stream on visit 6

Bird '2-letter code' notation: MA - Mallard.

Appendix: Site photographs

Dereham Rush Meadow SSSI

Looking east from Vantage Point

Looking north from Vantage Point

North Norfolk Coast between Eccles-on-Sea and Paston

Looking south from Vantage Point 3

Looking north from Vantage Point 3

North Norfolk Coast between Eccles-on-Sea and Paston (contd)

Looking south from Vantage Point 4

Looking north from Vantage Point 4

North Norfolk Coast between Eccles-on-Sea and Paston (contd)

Looking south from Vantage Point 5

Looking north from Vantage Point 5

North Norfolk Coast between Eccles-on-Sea and Paston (contd)

Looking south from Vantage Point 6

Looking north from Vantage Point 6

Agricultural fields in North Walsham District

Fields between Whimpwell Green and Happisburgh looking north east

Fields between Whimpwell Green and Happisburgh looking south west

Hundred Stream

Ridlington Street looking west

Crostwight Heath looking north west

Appendix: Survey results no longer relevant to the proposed project

This Appendix presents the results of those surveys conducted over the period October 2016 to January 2017 that were of areas no longer relevant to the proposed project.

The results relate to the following surveys areas in their entirety:

- Mattishall Moor SSSI
- North Walsham and Dilham Canal
- Westwick Lakes SSSI

The results relate to the following sites that were surveyed over a larger area prior to the refinement of the onshore electrical infrastructure location (the main body of this report presents results only from the reduced area that was relevant to the proposed project):

- Agricultural fields in North Walsham District
- Mown Fen / Hundred Stream

Results of the transect survey of agricultural fields in North Walsham District

Peak count of wetland species on each visit.

Waterbird species	Visit 1	Visit 2	Visit 3	Visit 4
Golden Plover	15	-	-	
Lapwing	238	-	-	60
Black-headed Gull	75	-	-	
Common Gull	15	60	-	

None of the focal species were observed using the agricultural fields on any of the visits. On Visit 3 a flock of 140 Pink-footed Geese was observed flying south-east between Honing and East Ruston and a flock of 75 flying south-east close to Ridlington Street. On Visit 4 a flock of ~2,000 was observed flying eastwards in the East Ruston area.

Details of survey dates, duration, observers and weather conditions can be found in the main body of this report.

Results of the transect survey of Mattishall Moor SSSI

Survey dates and the weather conditions for the four visits.

Visit	Date	Weather
1	11/11/2016	Wind SE 2; cloud 2/8; bright, sunny, temp ~8 C.
2	30/11/2016	Wind NE 2; cloud 4/8; sunny, clear, temp ~5 C.
3	16/12/2016	Wind 0; cloud 8/8; light mist, temp ~7 C.
4	12/01/2017	Wind SW 2; cloud 8/8; light rain at end, temp ~7 C.

Observers and the survey duration for the four visits.

Visit	Observer	Date	Start time (GMT)	Finish time (GMT)
1	A Chick	11/11/2016	12.45	14.00
2	R Coombes & S Holloway	30/11/2016	14.05	15.05
3	S Reid & S Holloway	16/12/2016	13.20	14.15
4	R Coombes & S Holloway	12/01/2017	12.15	13.15

For this survey the focal species was Snipe (shaded light blue in the table of wetland bird counts). As this was a transect survey in which different areas were observed sequentially, the peak count is the total number of each species observed along the transect (accounting for any known duplicate observations). The Table lists only those species observed.

Peak count of wetland species on each visit.

Bird species	Visit 1	Visit 2	Visit 3	Visit 4
Grey heron	-	-	-	1
Mallard	1	-	-	-
Snipe	1	-	-	-
Woodcock	1	1	-	1
Black-headed Gull	2	1	4	47
Common Gull	-	-	1	1
Reed Bunting	1	3	-	-

The passerines have been listed as, although not wildfowl or shorebirds, they are species associated with wetland habitats.

Results of the transect survey of Mown Fen / Hundred Stream

Peak count of wetland species on each visit.

Bird species	Visit 1	Visit 2	Visit 3	Visit 4
Mute Swan	2	2	6	6
Gadwall	-	-	7	11
Teal	-	-	-	3
Mallard	3	5	20	33
Shoveler	-	-	1	2
Goosander	1	-	-	-
Water Rail	-	3	-	2
Moorhen	-	3	-	2
Black-headed Gull	14	2	-	150
Common Gull	1	2	-	1
Barn Owl	-	-	1	
Kingfisher	-	-	2	
Cetti's Warbler	-	-	-	1

Bird species	Visit 1	Visit 2	Visit 3	Visit 4
Meadow Pipit	1	-	-	

Details of survey dates, duration, observers and weather conditions can be found in the main body of this report.

Results of the transect survey of North Walsham and Dilham Canal

Survey dates and the weather conditions for the four visits.

Visit	Date	Weather
1	10/11/2016	Wind SE 2; cloud 4/8; temp ~6 C.
2	29/11/2016	Wind 0; cloud 0/8; bright, cold, temp ~4 C.
3	15/12/2016	Wind SW 2; cloud 8/8; temp ~6 C.
4	10/01/2017	Wind NW 1; cloud 2/8; temp ~7 C.

Observers and the survey duration for the four visits.

Visit	Observer	Date	Start time (GMT)	Finish time (GMT)
1	A Chick	10/11/2016	13.24	16.00
2	A Chick	29/11/2016	09.40	14.10
3	R Coombes	15/12/2016	10.00	14.30
4	R Thewlis	10/01/2017	10.30	14.05

For this survey the focal species were Bittern, Cormorant, Great Crested Grebe, Bewick's Swan, Whooper Swan, Pink-footed Goose, Bean Goose, White-fronted Goose, Greylag Goose, Gadwall, Shoveler, Wigeon, Teal, Pochard, Tufted Duck, Coot, Hen Harrier, Marsh Harrier and Ruff (shaded light blue in the table of wetland birds). As this was a transect survey in which different areas were observed sequentially, the peak count is the total number of each species observed along the transect (accounting for any known duplicate observations). The table lists only those species observed.

Peak count of wetland species on each visit

Bird species	Visit 1	Visit 2	Visit 3	Visit 4
Mute Swan	1	17	-	8
Gadwall	-	-	-	2
Teal	1	3	-	
Mallard	7	5	4	
Little Grebe	-	1	1	3
Cormorant	1	-	-	
Grey Heron	2	4	2	
Marsh Harrier	-	-	1	
Water Rail	-	1	-	1
Moorhen	3	5	2	5
Coot	-	-	1	-

Bird species	Visit 1	Visit 2	Visit 3	Visit 4
Snipe	-	2	-	-
Lapwing	-	4	-	-
Black-headed Gull	33	40	-	-
Common Gull	4	60	-	-
Lesser Black-backed Gull	1	-	-	-
Barn Owl	1	2	1	-
Kingfisher	-	1	1	-
Cetti's Warbler	-	-	-	2
Pied Wagtail	-	-	-	1
Meadow Pipit	2	2	-	1
Reed Bunting	-	1	-	-

Barn Owl and selected passerines have been listed as, although not wildfowl or shorebirds, they are species associated with floodplain and wetland habitats.

To gain access to the southern end of the transect, an area of floodplain grassland further to the south and outside of the survey area was traversed. This area was found to hold additional species not seen on the transect itself including Hen Harrier that is an interest feature of the Broadland SPA. As this land was further to the south it was further from the refined onshore electrical infrastructure location.

Results of the vantage point survey of Westwick Lakes SSSI

Survey dates and the weather conditions for the four visits.

Visit	Date	Weather
1	10/11/2016	Wind W 1; cloud 4/8; heavy rain AM interrupted VP, temp ~10 C.
2	29/11/2016	Wind 0; cloud 1/8; dry, cold, temp -2 - +4 C over duration.
3	16/12/2016	Wind 0; cloud 8/8; overcast, misty, temp ~5 C.
4	04/01/2017	Wind NW2; cloud 6/8; sunny spells, temp ~7 C.

Observers and the survey duration for the four visits.

Visit	Observer	Date	Start time (GMT)	Finish time (GMT)
1	R Buisson	10/11/2016	10 & 13.30	11 & 15.30
2	R Coombes	29/11/2016	12.15	13.15
3	R Coombes & R Thewlis	16/12/2016	10.00	13.00
4	R Coombes & R Thewlis	04/01/2017	09.20	12.20

For this survey the focal species were wintering wildfowl (shaded light blue in the table of wetland bird counts). As this was a VP survey in which the same area was recorded over three separate hours, the peak count is the highest number of each species observed in any one hour. The table lists only those species observed.

Peak count of wetland species on each visit.

Bird species	Visit 1	Visit 2	Visit 3	Visit 4
Teal	14	8	12	6
Mallard	69	65	44	49
Shoveler	2	6	15	14
Little Grebe	3	-	-	-
Grey Heron	-	-	-	1
Cormorant	1	-	-	-
Moorhen	1	-	1	-
Woodcock	1	-	5	-
Green Sandpiper	1	-	-	-

No passerines associated with wetland habitats were recorded (all the waterbodies are fringed by woodland).

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