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Document 3.1 – ES Volume 2

Appendix 11.3: Ecological Baseline Surveys 2007- 2009

Wheelabrator Kemsley (K3 Generating Station) and Wheelabrator Kemsley North (WKN) Waste to Energy Facility DCO

September 2019 -Submission Version **PINS ref: EN010083**

11.3 Ecological Baseline Survey Data

Introduction

11.1 This appendix provides a description of the site pre-development (i.e. within the 'DCO boundary') taken from the original 2007 and 2009 surveys, upon which the mitigation (outlined in Appendix 11.4) was agreed. The survey work covered both the 'K3 site' and 'WKN site' prior to the commencement of construction of K3.

Baseline Methodology

Phase 1 Habitat Survey

2007 Survey

11.2 A Phase 1 Habitat survey was carried out on 6th September 2007 in accordance with standard methodology (JNCC, 2003). This comprised walking over the site area as delineated by the boundary of the existing planning consent (i.e. the 'K3 site' and 'WKN site') and recording the habitat types present and features associated with boundaries.

11.3 Dominant plant species observed within each habitat type were recorded. The naming of the plant species (nomenclature) follows that of Stace (1997).

2009 Survey

11.4 The Phase 1 Habitat survey of 2007 was updated in April 2009 in accordance with the standard methodology (JNCC, 2003).

11.5 Vascular plant nomenclature follows that of the BSBI checklist of the British and Irish Flora (BSBI, 2007) for vascular plants.

Invertebrates

11.6 The site was visited by Adonis Ecology Ltd on the 21st May 2009 and the value of invertebrate habitats estimated considering the following:

- for wetland habitats, the diversity of plant structures, water depths, bank margin angles, presence of areas of exposed mud and water;
- for grassland habitats, the diversity of vegetation height and structure, flowering species and seasonality of flower resource, bare ground patches, shelter and presence of adjacent scrub and other habitats;
- for scrub habitats, the diversity of vegetation height and shrub species, presence of ground flora and other habitats;
- for ephemeral habitats, the diversity of plant structures, flowering species and seasonality of flowering resource, soil structure and variation in moisture levels and shelter.

11.7 The presence of larger invertebrates and signs of invertebrate, e.g. bee burrows in the ground, were also used to assess the likely value of habitats.

11.8 The site was slowly walked around in weather suitable for bee, dragonfly/damselfly and butterfly activity (high temperatures, little wind, sunny). Areas within 5 m of the observer were checked for butterflies and dragonflies, and species recorded. Areas within 2 m of the observer were checked for bumblebee species and the species recorded.

11.9 It should be noted that although the survey was carried out in suitable conditions, since different invertebrate species are apparent as adults at different times of year (most dragonfly species in particular appear as adults in late June/July) the survey was likely to have recorded only a few of the bee, dragonfly and butterfly species that use the site during the summer.

11.10 Whilst this limitation on the survey data is noted, given the small size of the quality habitats that were present within the SEP site, it is considered unlikely that significant numbers of rare or protected invertebrate species were missed.

Reptiles

11.11 A reptile survey of a small area of the SEP site was undertaken in 2007 (the area surveyed is shown in Figure 11.3.1). The methodology for the survey followed Froglife (1999). On 6th September 2007 artificial refugia, sheets of roofing felt, were placed in likely basking spots, e.g. unshaded patches next to cover, in areas of long grass and next to potential hibernation sites, e.g. piles of rubble or logs or disused rabbit burrows.

11.12 A total of 20 refugia were laid around the suitable habitat within the eastern section of the SEP site. The sheets were then checked on seven separate occasions (each on a different day) for reptiles, which may use them for basking and sheltering underneath. Other natural refugia, e.g. fallen logs and large stones, were also checked for reptile presence.

11.13 Reptile activity is greatly influenced by weather conditions, with reptiles most likely to use refugia in temperatures of between 9ºC and 18ºC, in hazy or intermittent sunshine with light winds (Froglife, 1999). Visits were therefore timed to coincide with suitable weather conditions whenever possible. Any reptile seen basking on or sheltering underneath the refugia were noted, and their locations recorded.

11.14 In April-June 2009 the reptile survey was extended to other suitable habitat within the Site boundary. A total of c. 50 felts were laid around the suitable habitat on site. The methodology was as above.

Birds

11.15 Full details of the methodologies for bird surveys (both breeding and intertidal) can be found in Appendix 11.3.1 covering all bird work completed in 2009/2010.

Other Species

11.16 Habitat likely to support other species of conservation importance did not occur within the Site boundary and therefore surveys were not undertaken for any other species.

Baseline Survey Results

Phase 1 Habitat Survey

11.17 The Phase 1 Habitat Survey (in 2007 & 2009) covered the Generating Station site boundary and a large area of less disturbed habitat to the north.

11.18 The survey results are presented in the form of a map (Figure 11.3.2) with the habitat types and target notes marked. Descriptions of the habitat types found are provided below. Habitat descriptions are by broad habitat type, as listed in the Phase 1 Habitat Survey Manual (JNCC, 2003). Specific habitat types are underlined in the text below.

Scrub

11.19 Areas of dense scrub containing frequent bramble *Rubus fruticosus* agg, hawthorn *Crataegus monogyna* and dog rose *Rosa canina* agg. were present across the site.

11.20 On the western edge of the Site was a small area of dense scrub (S1) with occasional hawthorn, and single specimens of hazel *Corylus avellana*, sycamore *Acer pseudoplatanus* and a large Leylandii *Cupressus* x *leylandii*. A small stand of poplar *Populus* species was also present to the south of this area.

11.21 In the south of the Site was an area which contained a mosaic of dense scrub and unimproved neutral grassland (S2). Abundant species included hawthorn, oxeye daisy *Leucanthemum vulgare,* false fat-grass *Arrhenatherum elatius*, cocksfoot *Dactylis glomerata,* creeping bent *Agrostis stolonifera* and common couch *Elytrigia repens*. Frequent species included common bird's-foot-trefoil *Lotus corniculatus* and creeping cinquefoil *Potentilla reptans.*

11.22 Areas of scattered scrub were present within the northern half of the site consisting of frequent bramble, hawthorn and silver birch *Betulus pendula*. The scattered scrub to the north of the site also had occasional gorse *Ulex europaeus.*

Grassland

11.23 Areas of unimproved neutral grassland were present across the site (G1-G3). G1 was relatively species-rich. Abundant species included kidney vetch *Anthyllis vulneraria,* common restharrow *Ononis repens,* false oat-grass, cocksfoot, creeping bent and common couch. Frequent species included common bird's-foot-trefoil and creeping cinquefoil. Occasional species included oxeye daisy and ribwort plantain *Plantago lanceolata.*

11.24 Area G2 was relatively short and more species-rich than G1 and G3. Abundant species included common bird's-foot-trefoil, creeping bent, frequent cock's-foot and occasional common ragwort *Senecio jacobaea*, grass vetchling *Lathyrus nissolia,* wild carrot *Daucus carota carota*, dove's-foot crane's-bill *Geranium molle*, common toadflax *Linaria vulgaris* and yarrow *Achillea millefolium.*

11.25 Area G3 contained abundant false oat-grass, cocksfoot, creeping bent, common couch. Frequent species included common bird's-foot-trefoil and creeping cinquefoil. Occasional species included oxeye daisy and ribwort plantain.

Tall herb

11.26 Areas of tall ruderal vegetation were present across the Site with a large area present to the east of the Site. These areas contained abundant greek dock *Rumex cristatus*, white mignonette *Reseda alba*, bristly oxtongue *Picris echioides*, hawkweed oxtongue *Picris*

hieracioides and hedge mustard *Sisymbrium officinale.* Frequent species included Yorkshire-fog, creeping bent, oxeye daisy and Canadian fleabane *Conyza canadensis.*

Swamp

11.27 To the north of the site was a large expanse (>3 ha) of swamp habitat, dominated by common reed with scattered scrub including elder *Sambucus nigra* and hawthorn.

11.28 A drainage ditch which runs approximately north-south on the western boundary of the site was heavily overgrown with common reed and contained very shallow water (<50mm).

11.29 The area south of the reedbed was dominated by bare ground that has recently been manually built up to level parts of the site. This bare ground consists of a soil and stone aggregate.

Waste tips

11.30 Spoil piles of soil and building material dominated the centre of the site. These areas contained frequent long-headed poppy *Papaver dubium,* Oxford ragwort *Senico squalidus,* common field speedwell *Veronica persica* and opium poppy *Papaver somniferum*.

Cultivated/disturbed land

11.31 Areas of ephemeral / short perennial vegetation were present around the area of spoil heaps. These areas were dominated by bare ground with frequent hawkweed oxtongue, bristly oxtongue, perennial ryegrass *Lolium perenne*, annual meadow-grass *Poa annua*, colt's-foot *Tussilago farfara*, spear thistle *Cirsium vulgare.* Long-headed poppy, Oxford ragwort, cornflower *Centaurea cyanus* (Target note 1, Figure 11.3.2) and annual beard-grass *Polypogon monspeliensis*. (Target note 2, Figure 11.3.2) were also recorded. The latter two species are listed on Section 41 of the NERC Act (2006) and nationally scarce species, respectively.

Invertebrate survey

Invertebrate habitat

11.32 A map of the invertebrate habitats on site and their likely value at a local scale is given in Figure 11.3.3.

11.33 Habitat 1 consisted of concrete hardstanding with occasional small patches of ruderal and grass. The very limited structural diversity and vegetation present meant that the likely value of this area to important invertebrate species was negligible.

11.34 Habitat 2 consisted of patches of grass, ruderal and scrub growing around the fringes of the hardstanding. The combination of vegetation gave more structural and botanical variety, but this habitat combination is common and widespread and unlikely to be significant for rarer invertebrates.

11.35 Habitat 3 consisted of a small patch of grassland largely surrounded by scrub. The grassland varied in structure and had a number of patches of flowering species present, as well as invading scrub. The combination of shelter, habitat and structural diversity and flowering species meant that this area would be suitable as a breeding ground for some species of Lepidoptera and Coleoptera, Diptera including Tephritidae, and other species. The area would

also form part of the local foraging resource for adult Odonata, Aculeate Hymenoptera and Lepidoptera.

11.36 Habitat 4 consisted of flower rich grassland with a diversity of flowering plants (dominated at the time of survey by common vetch *Vicia sativa* and ox-eye daisy). A diversity of vegetation heights within the sward, patches of bare ground and tarmac, with scattered wetland species such as common reed and sedge *Carex* species within the southern part of the grassland. The adjacent areas of scrub also provided shelter. These combinations of features would be suitable as breeding ground for a wide variety of butterflies and moths (Lepidoptera) and beetles (Coleoptera), true flies (Diptera) including fruit flies (Tephritidae), and other species. The area would also form a potentially significant part of the local foraging resource for adult dragonflies and damselflies (Odonata), bees, wasps and ants (Aculeate Hymenoptera) and butterflies and moths (Lepidoptera).

11.37 Habitat 5 consisted of native scrub of varying heights and species with adjacent reed-filled ditches and the flower-rich grassland. This would make this habitat suitable as a breeding ground for certain Lepidoptera in particular and provide shelter for invertebrates associated with the adjacent flower-rich grassland.

11.38 Habitat 6 consisted of an extensive area of tall scrub with limited variation in height and an extensive area of tall grassland with relatively few flowers. The value of this area for significant invertebrates was therefore considered fairly limited as the habitats and habitat combination is fairly widespread and common.

11.39 Habitat 7 consisted of an area of recently deposited piles of soil and bare ground being colonised by ruderal species. The quality of the invertebrate habitat was considered similar to an arable field and was therefore of likely very low value for invertebrate conservation.

11.40 Habitat 8 consisted of an area of common reed with almost no clear water or mud apparent with adjacent ruderal and some tall grass. The structural diversity of the habitats was limited and the value of the area was therefore considered to be low.

11.41 Habitat 9 consisted of a combination of ephemeral/short perennial, patches of bare ground, extensive patches of bird's-foot trefoil and grass of varying heights. This combination was considered suitable as a potential breeding and foraging habitat for particularly ground nesting bees, wasps and ants (Aculeate Hymenoptera) and beetles (Coleoptera) such as ground beetles (Carabidae) and weevils (Curculionidae). The value of this area was considered medium.

11.42 Habitat 10 consisted of extensive areas of scrub, ephemeral/short perennial and grassland. The scrub consisted largely of bramble all of a similar height (1.5m) with occasional elder. The grassland was relatively species poor and consisted of tall grass and ruderal with few flowering species. The ephemeral/short perennial had bare ground, but very little structure to give shelter and relatively few flowering species. This area was therefore considered of very low value for invertebrate conservation.

Invertebrate species

11.43 The larger invertebrate species recorded during the Site visit of 21st May 2009 are given in Table 11.3.1. The weather conditions were 20 degrees centigrade, wind 1-2 on Beaufort Scale, 25% cloud cover.

11.44 The majority of the butterflies and bees, including the UK BAP priority species brown-banded carder bee, were recorded from the flower-rich grassland (area 4 on Figure 11.3.3) with some numbers also present around area 9 on Figure 11.3.3. The Nationally Scarce hairy hawker *Brachytron pretense* was seen passing north to south over the hardstanding area (area 1 in Figure 11.3.3).

Table 11.3.1 Larger Invertebrate Species recorded on 21st May 2009.

Scientific name	Common name	Status
Lasiommata megera	wall brown	Declining S41 listed
Polyommatus icarus	common blue	Common & widespread
Pieris napi	green-veined white	Common & widespread
Tyria jacobaeae	cinnabar moth	S41 listed
Coenonympha pamphilus	small heath	S41 listed
Lycaena phlaeas	small copper	Common & widespread
Pieris rapae	small white	Common & widespread
Inachis io	peacock butterfly	Common & widespread
Bombus pascuorum	common carder bee	Common & widespread
Bombus humilis	brown banded carder bee	S41 listed
Bombus pratorum	early bumblebee	Common & widespread
Bombus lapidarius	red-tailed bumblebee	Common & widespread
Bombus hortorum	garden bumblebee	Common & widespread
Brachytron pretense	hairy hawker	Notable
Coenagrion puella	azure blue damselfly	Common & widespread

Reptiles

11.45 Reptile surveys were undertaken in 2007 and 2009. The location of refugia for these surveys is provided in Figure 11.3.1.

2007 survey

11.46 Common lizards were recorded during surveys undertaken in 2007. Table 11.4 shows the dates on which reptile refugia were surveyed, the weather conditions at the time of survey and any reptile findings on those days.

Table 11.4 Results from reptile survey 2007.

Date	Weather conditions	Reptile findings
17/09/2007	15°C, overcast (80% cloud cover) with occasional sun	Nothing found
19/09/2007	15°C, slight breeze, 100% high cloud	Nothing found
22/09/2007	17.5°C, light breeze, overcast (100% cloud cover)	1 adult Common Lizard under log
24/09/2007	17°C, strong south-west breeze, sunny, (25% cloud)	Nothing found
26/09/2007	11.5°C, slight breeze, cloudy (50% cloud cover)	Nothing found
27/09/2007	11°C, slight north-east breeze, cloudy (30% cloud cover)	1 juvenile Common Lizard seen basking on log
28/09/2007	12°C, light rain, slight breeze, overcast (100% cloud cover)	4 juvenile Common Lizards basking under roof felts.

11.47 A small number of common lizards were found within the survey area, including several juveniles, with sightings mainly concentrated around the southern portion of the suitable habitat, bordering the dense scrub.

2009 survey

11.48 Slow-worm, common lizard and grass snake were all recorded within the Site boundary during surveys in 2009. Tables 11.5 to 11.7 detail the results of these surveys.

11.49 Locations of arrays are shown on Figure 11.3.1.

Table 11.5 Reptile survey results 2009: Array 1.

Date	Weather conditions	Slow-worm	Common lizard	Grass snake
07/04/2009	15^{0}C, overcast becoming very sunny during survey	8	1	0
09/04/2009	13^{0}C, cloudy, dry	10	2	0
15/04/2009	12^{0}C, slight breeze, hazy sunshine	10	2	1 (Juvenile)
24/04/2009	15 ^{0}C,dry slight breeze, sunny	13	0	1 (Juvenile)
10/06/2009	13^{0}C, heavy rain previously. Over cast and breezy during survey.	3	1	0
11/06/2009	17^{0}C, fine, dry	7	2	2 (Juvenile)
12/06/2009	15^{0}C, high cloud, hazy sunshine	9	1	0
Peak count		13	2	2 (Juvenile)

Table 11.6 Reptile survey results 2009: Array 2.

Date	Weather conditions	Slow-worm	Common lizard	Grass snake
07/04/2009	15^{0}C, overcast becoming very sunny during survey	3	0	0
09/04/2009	13^{0}C, cloudy, dry	3	0	0
15/04/2009	12^{0}C, slight breeze, hazy sunshine	2	0	0
24/04/2009	15 ^{0}C,dry slight breeze, sunny	3	0	0
10/06/2009	13^{0}C, heavy rain previously. Over cast and breezy during survey.	1	1	0
11/06/2009	17^{0}C, fine, dry	1	0	0
12/06/2009	15^{0}C, high cloud, hazy sunshine	3	0	0
Peak count		3	1	0

Table 11.7 Reptile survey results 2009: Array 3.

Date	Weather conditions	Slow-worm	Common lizard	Grass snake
07/04/2009	15^{0}C, overcast becoming very sunny during survey	1	3	0
09/04/2009	13^{0}C, cloudy, dry	9	0	0
15/04/2009	12^{0}C, slight breeze, hazy sunshine	18	4	0
24/04/2009	15 ^{0}C,dry slight breeze, sunny	3	0	0
11/06/2009	17^{0}C, fine, dry	15	1	0
12/06/2009	15^{0}C, high cloud, hazy sunshine	1	3	0
Peak count		18	4	0

Birds

Full details of the 2009/2010 data with respect to birds (both breeding and intertidal) are provided in Appendix 11.3.1.

Mammals

Bats

11.50 No potential bat roosts were identified on site and within the landscape context, the large expanse of reedbed to the north would provide more substantial foraging habitat and be more likely to have bat foraging activity than the site itself. Bats roosting in the surrounding area may commute over the site; however, given that many bat species are known to mainly use linear landscape features as flight paths, rarely flying in the open (Altringham, 2003) it is considered unlikely large numbers are flying over the site.

Otters

11.51 No records of otter are available for the site or surrounding area. No signs were recorded during the water vole survey and limited foraging habitat it present on site. Therefore this species is not considered further in this assessment

Badgers

11.52 No evidence of badgers has been found on site and this species is not considered further.

Brown hare

11.53 There are records of brown hare within 2 km of the site; however, there is only minimal sub-optimal habitat on site, and it is considered that brown hare do not occur on site, therefore they are not considered further.

Harvest mice

11.54 There are records of harvest mice occurring within 2 km of the site and whilst there have been no sightings of this species on site during the surveys, there is suitable habitat to the north of the site in the form of long grass, reedbed and scrub (Macdonald & Tattersall 2001). There is potential for a limited population of harvest mice to occur on site.

11.55 No other species of conservation value were considered likely to occur within the SEP boundary during the 2007 and 2009 surveys.

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Figure 11.3.1 – Reptile Survey Area and Results

Array 1

Array 2

Array 3

Array 4

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Legend

- Application boundary
- Survey boundary
- Reptile Refugia 2007 and 2009
- Dense scrub
- Short perenial
- Hardstanding
- Neutral grassland
- Swamp
- Spoil heap
- Scattered scrub
- Tall ruderal

Rev	Description	Date	Initial	Checked

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Client Wheelabrator

Wheelabrator KEMSLEY

Project K3 / WKN DCO Application

Title Location of Reptile Refugia, 2007 and 2009

Status	Drawn By	PM/Checked By
Information	HK	NB
Job Ref	**Scale @ A3**	**Date Created**
OXF9163	1:2,500	OCT '18

Figure Number **11.3.1**

PINS reference -

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Figure 11.3.2 – Phase 1 Habitat Survey Map

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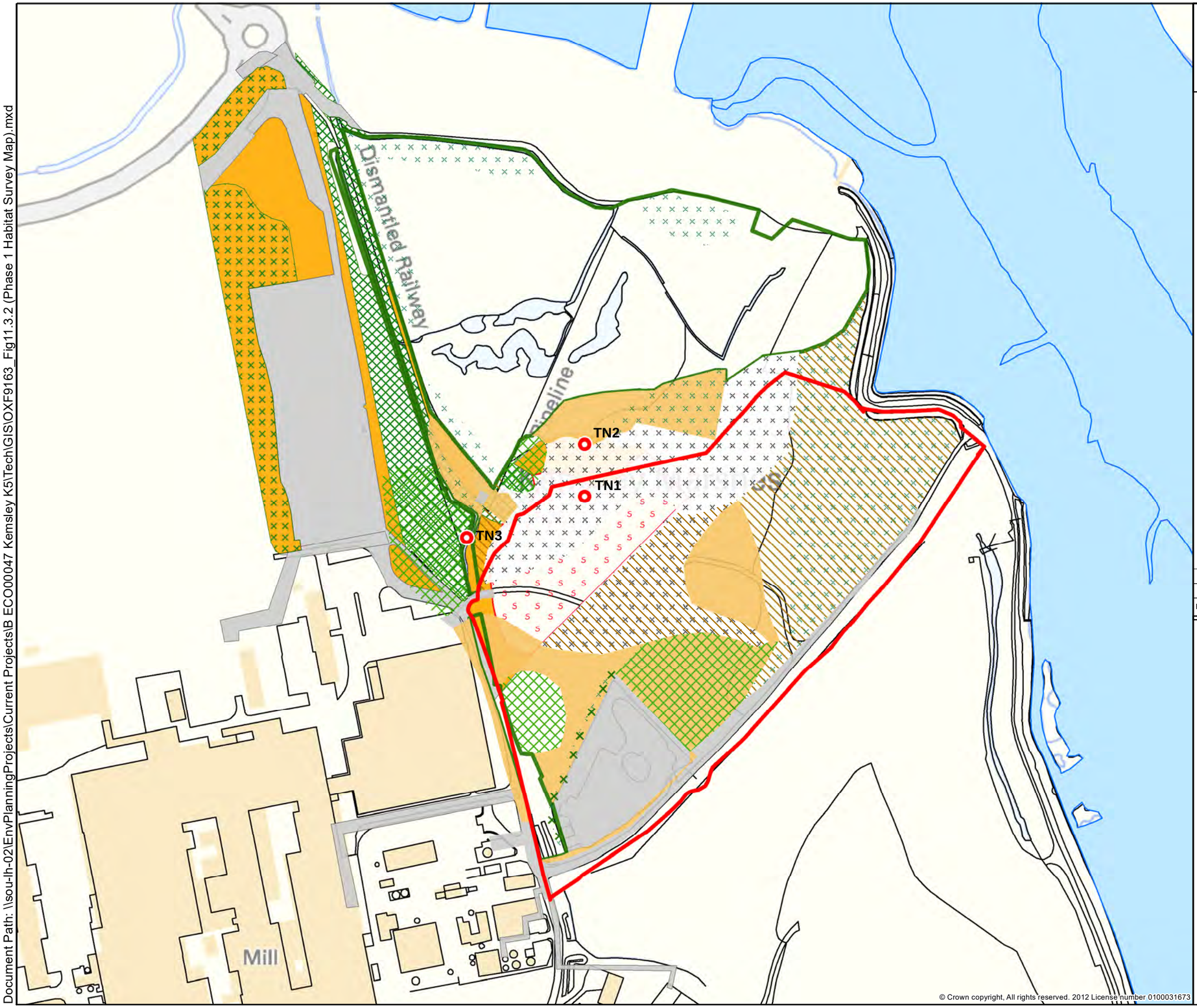

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Legend

- Application boundary
- The Swale
- Scattered scrub
- Target notes

Habitat

- Dense scrub
- Short perennial
- Hardstanding
- Neutral grassland
- Spoil pile
- Scattered scrub
- Tall Ruderal

Rev	Description	Date	Initial	Checked

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Client Wheelabrator

Wheelabrator KEMSLEY

Project K3 / WKN DCO Application

Title Phase 1 Habitat Survey Map

Status	Drawn By	PM/Checked By
Information	HK	NB
Job Ref	**Scale @ A3**	**Date Created**
OXF9163	1:3,000	OCT '18

Figure Number **11.3.2**

PINS reference -

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Figure 11.3.3 – Key Invertebrate Habitat

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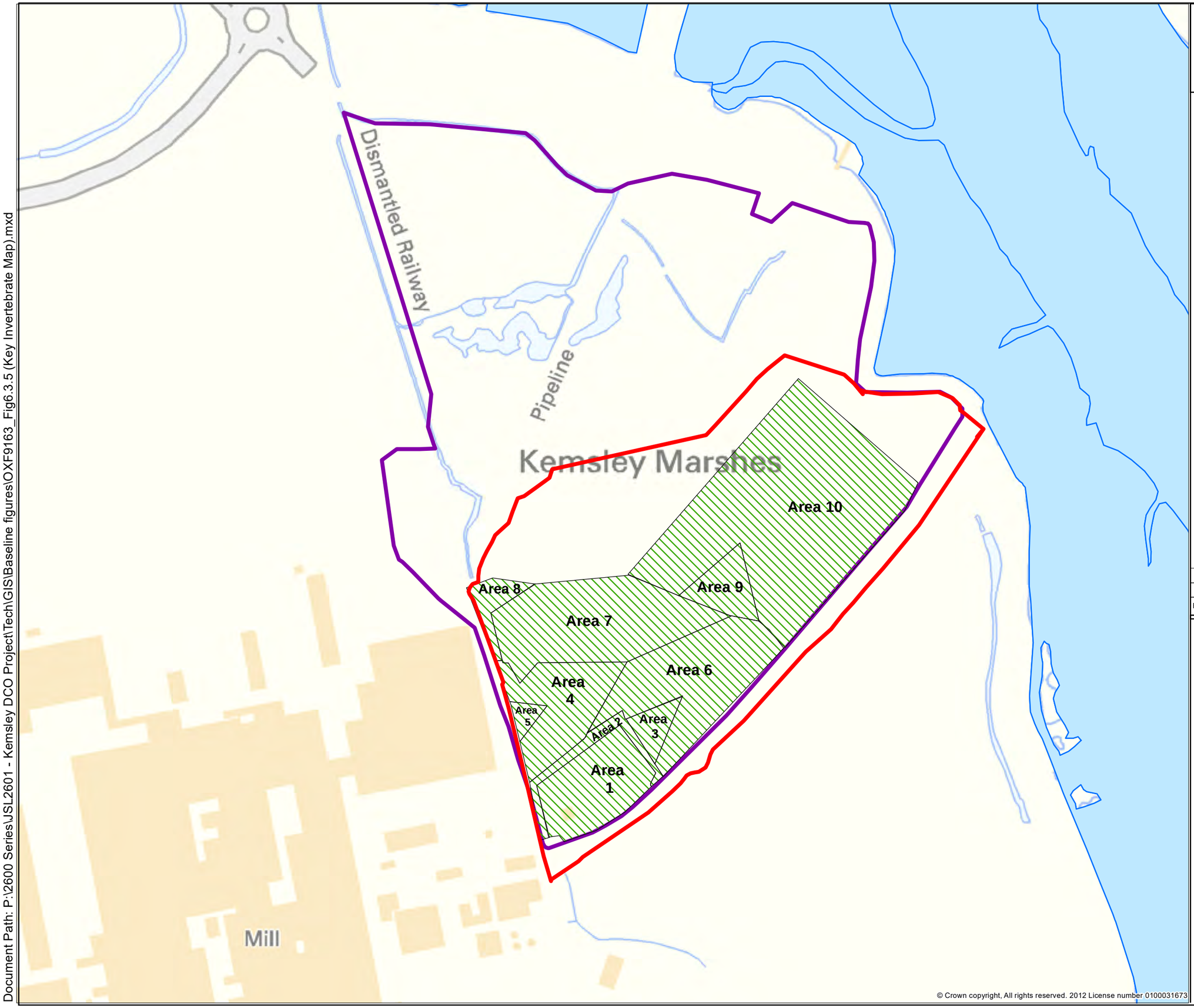

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Legend

- Application boundary
- Survey bounday
- Key invertebrate habitat
- The Swale

Rev	Description	Date	Initial	Checked

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Client Wheelabrator

Project K3 / WKN DCO Application

Title Key Invertebrate Map

Status	Drawn By	PM/Checked By
Information	HK	NB
Job Ref	**Scale @ A3**	**Date Created**
OXF9163	1:3,000	OCT '18

Figure Number **11.3.3**

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Appendix 11.3.1 – Bird Survey Report 2009/2010

KEMSLEY MILL

Intertidal bird surveys

October 2009 – January 2010

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Notice to Interested Parties

To achieve the study objectives stated in this report, we were required to base our conclusions on the best information available during the period of the investigation and within the limits prescribed by our client in the agreement.

No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information. Thus, we cannot guarantee that the investigations completely defined the degree or extent of e.g. species abundances or habitat management efficacy described in the report.

Document Information

Report title:	Kemsley Mill: Intertidal and breeding bird surveys 2009
Client:	Grovehurst Energy Ltd.
Document ref:	JPP1804-R-002b
Author:	Robin Ward & Alan Bull
Surveyors:	Alan Bull, Neal Gates & Rob Martin
Report date:	26th June 2009

Checked by:	Roger Buisson	[redacted]	30/06/09
Authorised by:	Roger Buisson	[redacted]	30/06/09

CONTENTS

TABLES

FIGURES

0 EXECUTIVE SUMMARY

0.1 RPS were commissioned by Grovehurst Energy Ltd. in 2009 to undertake ornithological surveys of a brownfield site to the east of Kemsley Paper Mill, Sittingbourne, to inform as considered necessary the proposed development of the site and the construction of a sustainable energy facility.

0.2 Kemsley Mill is located on the south bank of The Swale Estuary which is designated under European Law as a Special Protection Area. There is the potential for the proposed development to have an effect on the adjacent Swale SPA. As a result it is necessary to implement a study to assess the numbers and usage of the site by non-breeding waterbirds.

0.3 The aims and objectives of this study was within the study area to undertake through the tidal cycle diurnal distributional intertidal counts of waterbirds during November 2009 – January 2010. Consideration is given to the implications of the development proposals in relation to the birds recorded during the study, based on an indication of the scheme proposals.

0.4 A total of 44 species of waterbird (excluding gulls and terns) were recorded using the survey area within the vicinity of Kemsley in October 2009 – January 2010, with overall site usage peaking in January. Of these, 9 species were of conservation value due to their presence as species listed on the designation for The Swale Estuary SPA. These species are: Dark-bellied Brent Goose, Gadwall, Teal, Oystercatcher, Ringed Plover, Grey Plover, Knot, Dunlin and Redshank.

0.5 The distribution of waterbirds recorded within the study site during the early – mid winter period was similar to that recorded during the previous late winter period. High tide roosts were again recorded from the peninsula at Elmley, opposite the proposed development and on the saltmarsh islands The Lilies. The species present on the intertidal mudflats were primarily using the area for feeding. This is recognised as being an important activity in maintaining the birds in viable condition for migration and breeding. The species present on the areas of saltmarsh and the land adjoining Elmley were predominantly roosting.

0.6 The diurnal counts of Black-tailed Godwit during winter 2009/10 (November – January) suggest that the study site has been of international importance for the species. The site has also been of national importance for Black-tailed Godwit during the late autumn of 2009 (October). Diurnal counts of Avocet during winter 2009/10 (November –January) have shown that the site has been of national importance for the species. Significant proportions (>5%) of The Swale SPA populations for six of the cited waterbirds species were recorded (Teal, Oystercatcher, Ringed Plover, Grey Plover, Dunlin and Redshank).

0.7 In October 2009 and November 2009-January 2010, the total waterbird assemblage (3,467 and 7,962 birds respectively) was greater than 10% of the citation figure (for winter) and the latest WeBS five year autumn peak mean (2003-2007). Consequently representing a significant proportion (10.7% and 12.1% respectively) of the SPA waterbird community in both periods.

0.8 The data for collected for the late autumn (October 2009) and early – mid winter (November 2009 – January 2010) periods do not suggest any marked changes in the numbers, species composition and distribution of waterbirds using the study area to that previous observed in the late winter (February – March 2009) and spring (April – May 2009) periods.

0.9 The data gathered during the surveys in October 2009 – January 2010 completes the baseline for intertidal monitoring of waterbirds likely to be in the zone of influence from the proposed development.

0.10 The results of the intertidal waterbird surveys during October-January do not alter the Valued Ecological Receptors identified in the Environmental Statement and the outcomes of the assessments of construction and operational impacts on them. Therefore the assessments made within the Environmental Statement are accurate.

1 INTRODUCTION

Background to the study

1.1 RPS were commissioned by Grovehurst Energy Ltd. in 2009 to undertake ornithological surveys of a brownfield site to the east of Kemsley Paper Mill, Sittingbourne, to inform as considered necessary the proposed development of the site and the construction of a sustainable energy facility. The ornithological surveys were to evaluate the importance of the adjacent Swale Estuary for waterbirds within the potential zone of influence from the proposed development. This potential zone of influence from on-site activities, noise and visual impacts only, was taken to be 500 metres.

Legislation

1.2 Where there is the potential of the proposed development to have an effect on the adjacent Swale Special Protection Area SPA, for instance through the disturbance of waterbirds feeding, it is necessary to implement a study of the non-breeding waterbirds present. Kemsley Mill is immediately adjacent to The Swale SPA.

1.3 The legislative provisions for the protection of wild birds in the UK are contained primarily in Section 1- 7 of the Wildlife and Countryside Act (WCA) 1981 (as amended; Anon 1981). Under the WCA, a wild bird is defined as any bird of a species that is resident in or is a visitor to the European Territory of any member state in a wild state.

Aims and objectives

1.4 The aims and objectives of the intertidal waterbird survey were to:

- Record the waterbird species, their abundance and distribution in the study area during October 2009 - January 2010, to supplement the data already gathered in February-May 2009.
- Consider the implications of the development proposals in relation to the birds recorded during the period October 2009 – January 2010.

1.5 The collected data will be presented to illustrate the spatial distributions and densities of species within the survey area. Analysis will consider species populations recorded during the surveys in comparison to species citations for the SPA in order to consider the relative importance of the survey area.

1.6 The distributional information gathered for the waterfowl will also be compared to the most recent Wetland Bird Survey bird data for The Swale Estuary, in order to put into context the birds present in the study area.

Study area

1.7 The proposed area of development is situated on what was once Kemsley Marshes, to the immediate east of Kemsley Paper Mill, situated adjacent to The Swale Estuary, Kent. Most of the site has been levelled with an aggregate of soil and stone to create a large expanse of bare ground. Recently large piles of spoil (earth and rubble) had been deposited across the site.

1.8 The exact development footprint was undecided at the time of the original surveys, so for consistency the study area for the surveys considered in this report follow the boundaries used in February-May 2009. The text relates to the entire survey area, which covered some 6.5 ha, and included the habitats immediately adjacent to the levelled site (Appendix B, Figure 1).

1.9 The site area has generally flat topography, except where the ground has been levelled which has created slight artificial slopes down to the surrounding area and in the areas of the spoil piles. A drainage ditch runs along the western boundary of the site in a north-south orientation and is connected to the marshland to the north of the site.

1.10 Much of the surrounding area to the north-east, east and south of the site has national designations for nature conservation associated with it.

1.11 Beyond Kemsley Marshes, the Knauf Drywall Ltd production facilities are located to the north, Kemsley Paper Mill to the west, an area of what was previously landfill to the south and The Swale Estuary to the east.

Designated sites within 2 km of Kemsley Mill

1.12 Table 1.1 presents the protected sites present on The Swale Estuary that lie within 2 km of Kemsley Mill. The Swale SSSI is listed as a component of The Swale SPA. These sites are indicated in Appendix B, Figure 2, which presents their location in relation to Kemsley Mill.

Table 1.1: Designated sites within 2 km of the study area

Site name	Type	Approximate area (ha)	Condition summary	Interest Features (Source: Natural England 2008, JNCC 2006, JNCC 2008)	Distance from site (km)
The Swale	SPA Ramsar SSSI	6,515	Favourable	Supports nationally important populations of breeding Annex 1 species including Little Tern and Mediterranean Gull; wintering Annex 1 species including Avocet and Golden Plover. Supports populations of international importance of migratory Ringed Plover, Wigeon, Pintail, Shoveler, Grey Plover, Redshank and Black-tailed Godwit. - Also supports an assemblage of over 20,000 waterbirds.	0

1.13 There are other internationally and nationally designated sites that are located between 2 and 5 km from Kemsley Mill and therefore are less likely to be affected by the proposed development scheme. Those additional sites within 5km of Kemsley Mill are detailed in Table 1.2.

Table 1.2: Additional designated sites located within 5 km of Kemsley Mill

Site name	Type	Approximate area (ha)	Interest Features (Source: JNCC 2008)	Distance from site (km)
Medway Estuary and Marshes	SPA Ramsar SSSI	4,684	Supports nationally important populations of breeding Annex 1 species including Avocet and Little Tern; wintering Annex 1 Avocet. Supports populations of international importance of migratory Dark-bellied Brent Goose, Shelduck, Pintail, Ringed Plover, Grey Plover, Dunlin, Black-tailed Godwit and Redshank. Also supports an assemblage of over 20,000 waterbirds.	2.4

The Swale SPA

1.14 The Swale SPA is an estuarine area that separates the Isle of Sheppey from the mainland of Kent and adjoins the Medway Estuary to the west. It is a complex of brackish and freshwater, floodplain grazing marsh with ditches, and intertidal saltmarshes and mudflats. The intertidal flats are extensive, especially in the east of the site.

1.15 Almost half of The Swale SPA includes the largest remaining areas of freshwater grazing marsh in Kent. This comprises a total area in excess of 3,100 ha. A diversity of grazing management regimes helps maintains the suitability of the grassland as winter feeding and breeding habitat for important numbers of wildfowl and waders.

1.16 Mudflats are the second most extensive habitat, with over 2,400 ha present. The intertidal mud provides foraging habitat for species such as Avocet, which feed on the invertebrates present in the mud. The Swale is of particular importance for breeding Avocet and for internationally important numbers of wintering species such as Dunlin, Grey Plover and Black-tailed Godwit, as well as the overall waterbird assemblage.

1.17 Saltmarsh habitat is less prevalent in the SPA than intertidal mud, although where present it provides important roost sites for birds.

1.18 The Swale Estuary is contiguous with one other substantial estuary in south-east England, the Medway (Table 1.2). It is known that there is significant movement between these two sites by several species (Musgrove *et al.* 2003).

1.19 The full original citation for The Swale SPA is given in Table 1.3. This is based on peak mean data from 1991/2 to 1995/6 and is the currently presented citation referenced by JNCC (2006a).

Table 1.3: SPA cited species for The Swale SPA (based on original 1996 citation).

Cited species and reasons for qualifying	**% of biogeographical population** (5 year peak mean 1991/2-1995/6)
Article 4.2 - Over winter the area regularly supports:	
Dark-bellied Brent Goose *Pluvialis squatarola*	0.9% of the Western Siberia/Western Europe population
Dunlin *Calidris alpina alpina*	2.1% of the population in Great Britain
Redshank *Tringa totanus*	0.9% of the East Atlantic wintering population
Cited species and reasons for qualifying	
Article 4.2: An internationally important assemblage of birds - during the breeding season the area regularly supports: Reed Warbler, Teal , Mallard, Gadwall, Ringed Plover, Reed Bunting, Coot , Moorhen, Oystercatcher, Curlew, Grey plover, Shelduck, Redshank, Lapwing.	
Article 4.2: An internationally important assemblage of birds - over winter the area regularly supports: 65,588 waterbirds (5 year peak mean 01/04/1998) Including: Dark-bellied Brent Goose, Gadwall, Teal, Oystercatcher, Ringed Plover, Grey Plover, Dunlin Curlew, Redshank .	

2 METHODS

Intertidal Waterbird Surveys

2.1 The aim was to undertake two surveys at low tide and two surveys at high tide each month. Each survey covered a six hour period (three hours either side of high/low tide).

2.2 A total of sixteen survey visits were undertaken between October 2009 and January 2010. The survey dates and details are tabulated in Table 2.1

Table 2.1: Intertidal Waterbird Survey dates, tide times & heights and observers.

Date	Time of low tide	Tide height (m)	Time of high tide	Tide height (m)	Observers
2nd October 2009			12:14	5.4	Rob Martin
9th October 2009	10:13	1.0			Alan Bull
20th October 2009			14:31	6.0	Rob Martin
23rd October 2009	10:06	1.1			Rob Martin
2nd November 2009			12:06	5.6	Rob Martin
10th November 2009	12:12	1.1			Rob Martin
17th November 2009			12:31	5.7	Alan Bull
24th November 2009	10:50	1.4			Rob Martin
2nd December 2009			12:00	5.7	Rob Martin
8th December 2009	10:59	0.7			Rob Martin
9th December 2009	11:56	0.8			Rob Martin
16th December 2009			12:19	5.5	Rob Martin
8th January 2010	12:15	0.9			Rob Martin
14th January 2010			12:10	5.4	Rob Martin
26th January 2010	14:29	1.5			Rob Martin
29th January 2010			11:40	5.6	Rob Martin

2.3 The full extent of the intertidal survey area is shown in Appendix B, Figure 3.

2.4 Observations during the survey were made from the sea wall, which provided a suitable vantage point to observe all birds without causing undue disturbance. One

experienced ornithologist, equipped with binoculars and telescope of appropriate magnification, walked slowly along the seawall once hourly. Observers retraced their route of the first count during the second count, the procedure thereafter repeated for the remaining counts of the survey. As the site was a linear area with good visibility, birds could be observed from distance to avoid disturbance and to ensure that if any moved they were not double-counted.

2.5 The location and extent of flocks and individual waterbirds were recorded directly into ESRI Arcpad GIS Software on handheld PDA devices, with a 1:10,000 scale Ordnance Survey base map of the study area (and adjacent land). A 50 m x 50 m grid was overlaid on top of the base map to assist with the distributional analysis. The distance from the recorder to a bird flocks was assessed through the use of this grid and through the use of landmarks present in the landscape and on the base map, which could be scaled as desired in the field. Birds were either plotted as individual counts at a location or as a flock, the extent of which could be plotted electronically directly onto the base map on the hand held PDAs. The ornithologists were proficient in the use of this method and equipment having undertaking such surveys on numerous occasions previously around the UK on coastal, estuarine and inland terrestrial and wetland sites. This is considered to be a robust and reliable method for recording birds and plotting their distribution.

2.6 On returning to the office the collected data, contained on flash memory cards, were then downloaded into ESRI ArcGIS software and distribution maps produced.

2.7 In addition to the waterbirds recorded along the intertidal areas, any observations of high tide wader roosts and raptors such as harriers and owls on the surrounding terrestrial areas were recorded.

2.8 Unfortunately the accidental damage of a memory card subsequent to the 10th November 2009 visit resulted in the loss of data for this visit. It was not realised that these data were inaccessible until it was too late to schedule an additional visit. Consequently only one low tide count can be reported for the month of November 2009.

3 DEFINITIONS

3.1 The definition of waterbirds used in this study is in accordance with the Ramsar convention upon which the SPA citation was based (Ramsar 2007) i.e. "birds ecologically dependent on wetlands". At the broad level of taxonomic order this is as follows (species groups in bold are considered likely to be observed at Kemsley):

- penguins: *Sphenisciformes*.
- **divers**: *Gaviiformes*;
- **grebes**: *Podicipediformes*;
- wetland related pelicans, **cormorants**, darters and allies: *Pelecaniformes*;
- **herons**, **bitterns**, storks, ibises and spoonbills: *Ciconiiformes*;
- flamingos: *Phoenicopteriformes*:
- screamers, **swans**, **geese** and **ducks** (wildfowl): *Anseriformes*;
- wetland related **raptors**: *Accipitriformes* and *Falconiformes*;
- wetland related cranes, **rails** and **allies**: *Gruiformes*;
- Hoatzin: *Opisthocomiformes*;
- wetland related jacanas, **waders** (or shorebirds), **gulls**, skimmers and **terns**: *Charadriiformes;*
- coucals*: Cuculiformes;* and
- wetland related owls: *Strigiformes*;

3.2 This study surveyed for all waterbirds with the exception of gulls (*Laridae*) which were only counted when surveyors considered this would not be to the detriment of accurately surveying other species groups. The term waterfowl has the same meaning within the context of this study.

3.3 For the purposes of the analysis, the term 'autumn' is used to indicate the general period of autumn migration (July - October), and 'winter' the period November to March, these definitions as used by Wetland Bird Survey (WeBS). This report therefore does not fully cover each period but supplements the gaps in the dataset for the survey undertaken in February-May 2009.

3.4 For the purposes of the analysis, the tidal cycle is divided into four periods. The term 'low tide' is used to indicate the period two hours either side of low tide, 'high tide' the period two hours either side of high tide, and the two intervening periods 'flood' and 'ebb' that fall before and after high tide respectively. A high proportion of birds feed during low water when the position of the tideline (and

thus food availability) is relative stable, resulting in relatively small changes in the distribution and numbers of foraging birds. Changes in bird distribution are most pronounced during the ebb and flood tides as availability of intertidal areas rapidly change and birds fly to/from high water roost sites.

4 RESULTS

Abundance of Waterbirds

4.1 A total of 33 and 43 species of waterbirds (excluding gulls) were recorded using the intertidal study site in October 2009 and between November and January 2010 respectively. A full list of species cited in this report together with vernacular and scientific names is included in Appendix A. Table 4.1 summarises the peak counts by month and season, for each species recorded during the survey visits.

4.2 The peak waterbird counts (excluding gulls) recorded for October 2009 and November to January 2010 were 2,211 and 4,319 respectively.

4.3 Summation of the individual species maxima during a season, irrespective of the count in which they occurred, provides a total waterbird assemblage for the season. This represents the minimum number of individual waterbirds using the area during the duration of the survey period. The total waterbird assemblage as recorded by the surveys in October 2009 and between November 2009 and January 2010 was 3,467 and 7,962 birds respectively.

Spatial and temporal distribution of intertidal waterbirds

4.4 The species, for which detailed accounts are given in this section, were chosen on the following criteria:

- A waterbird species cited as part of the interest feature of The Swale SPA (JNCC 2006). These are Dark-bellied Brent Goose, Gadwall, Teal, Oystercatcher, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank.

- A waterbird species cited as part of the interest feature of Swale Ramsar site (JNCC 2008) under (i) Ramsar criterion 6 (species/populations occurring at levels of international importance) and (ii) 'noteworthy fauna' as species outside the breeding season currently occurring at national levels. These species are in addition to those already mentioned, Little Grebe, Little Egret, Shelduck, Wigeon, Pintail, Shoveler, Avocet, Golden Plover, Lapwing, Knot, Ruff, Black-tailed Godwit, Whimbrel, Spotted Redshank and Greenshank.

- Those waterbird species that were considered part or wholly ecologically dependant upon the intertidal flats where their numbers exceeded a peak of 25 birds. These species are in addition to those already mentioned, Coot and Snipe.

4.5 Of the remaining waterbird species observed (and listed in Appendix A), none were recorded in nationally important numbers.

Table 4.1: Peak counts of all waterbird species recorded by intertidal surveys of the study area between October 2009 – January 2010.

Month	October	Autumn peak count	November	December	January	Winter peak count
Great Northern Diver	0	0	0	0	1	1
Little Grebe	5	5	9	16	26	26
Great Crested Grebe	5	5	6	14	6	14
Cormorant	7	7	18	6	1	18
Shag	0	0	0	1	0	1
Little Egret	23	23	11	5	3	11
Grey Heron	4	4	4	3	2	4
Mute Swan	1	1	0	1	0	1
Canada Goose	0	0	1	0	0	1
Dark-bellied Brent Goose	0	0	24	12	22	24
Shelduck	110	110	107	257	194	257
Wigeon	216	216	79	214	766	766
Gadwall	0	0	0	0	4	4
Teal	139	139	88	518	549	549
Mallard	13	13	5	2	3	5
Pintail	10	10	0	74	218	218
Shoveler	0	0	0	0	5	5
Pochard	0	0	0	0	1	1
Tufted Duck	0	0	0	0	1	1
Scaup	0	0	0	1	0	1
Red-breasted Merganser	1	1	1	8	14	14
Goldeneye	0	0	0	2	0	2

Month	October	Autumn peak count	November	December	January	Winter peak count
Water Rail	0	0	1	0	0	1
Moorhen	16	16	19	10	4	19
Coot	0	0	0	2	43	43
Oystercatcher	583	583	693	847	709	847
Avocet	46	46	28	61	52	61
Ringed Plover	55	55	3	40	12	40
Golden Plover	192	192	0	16	0	16
Grey Plover	98	98	15	62	47	62
Lapwing	383	383	485	432	553	553
Knot	67	67	1	283	940	940
Dunlin	537	537	61	1,447	1,678	1,678
Snipe	1	1	0	28	25	28
Black-tailed Godwit	329	329	550	750	1,246	1,246
Bar-tailed Godwit	5	5	8	8	11	11
Whimbrel	2	2	0	0	0	0
Curlew	49	49	50	41	14	50
Spotted Redshank	1	1	1	0	0	1
Redshank	463	463	357	297	263	357
Greenshank	9	9	13	6	1	13
Green Sandpiper	3	3	2	1	1	2
Turnstone	88	88	51	68	35	68
Black-headed Gull	86	86	37	128	75	128
Common Gull	10	10	3	9	8	9
Lesser Black-backed Gull	1	1	2	0	1	2

Month	October	Autumn peak count	November	December	January	Winter peak count
Herring Gull	4	4	4	3	3	4
Great Black-backed Gull	3	3	1	3	2	3
Black Tern	4	4	0	0	0	0
Kingfisher	2	2	1	2	1	2
Peak Visit Count	**2,211**	**2,211**	**1,347**	**3,416**	**4,319**	**4,319**
Total waterbird assemblage Peak	**3,467**	**3,467**	**2,694**	**5,535**	**7,475**	**7,962**

Note:
Peak Visit Count represents the greatest number of waterbirds observed in a single count*.
Total Waterbird Assemblage Peak represents the total sum of all the species peak numbers*.
*excluding gulls *Laridae*

4.6 Monthly peak and mean diurnal counts for each hour of the tidal cycle are presented graphically for 19 of the species that fit the above criteria. The graphs provide a snapshot of the abundance and temporal distribution of the individual species by day. They are expected to highlight any notable changes that may be related to tidal state and changing months. The graphs show how the peak or mean number change from high tide, through the ebb to low tide and then back to high tide.

4.7 Spatial distribution figures for 20 of the selected species are presented for two diurnal tidal survey periods, these being when the intertidal flats are (i) in part or wholly exposed (during the ebb, low & flood tide periods; referred to as "low water period"), and (ii) inundated by the tide (at high tide; "high water period") [see Figures in Appendix C]. For the majority of waterbirds, these two tidal periods represent when and when not their intertidal feeding grounds are available respectively. Separate maps are provided for each of the two seasons, autumn and winter, when for some species different populations are known to be using the site e.g. Dunlin, and seasonal differences can exist in the food resources utilised.

4.8 The high water maps have been plotted using the maximum species count occurring in each of the grid squares from the surveys. Therefore they do not represent a total of individuals across the site but the peak usage of each 50 m x 50 m grid square by the target species. The maps show the spatial distribution of the individual target species. They are expected to highlight those areas that are important to the target species each season (or part of) surveyed when feeding areas are unavailable. For the remaining target species for which only small numbers of birds were recorded in the study area, their distribution is described briefly below.

4.9 The low water maps have been plotted using the peak summed counts of each tidal period (four hours either side of low tide) occurring in each of the grid squares from the surveys. Therefore they do not represent a total of individuals across the site but the peak of the total number of bird hours of use of each 50 m x 50 m grid square by the target species per period of tidal flat exposure i.e. four hours either side of low tide. The maps show the spatial distribution of the individual target species. They are expected to highlight those areas that are important to the target species each season (or part of) surveyed for foraging areas. For the remaining target species for which only small numbers of birds were recorded in the study area, their distribution is described briefly below.

4.10 Brief summary texts accompany the graphs and maps highlighting the key points from the available data for each species.

Little Grebe

(see figures 4.1, 4.2 and C.1-C.4)

4.11 Little Grebe were present during all tidal states and numbers of birds present was largely independent of tidal state. Numbers increased from the autumn peak of 5 in October 2009 into the winter period, with the highest peak count of 26 in January. Mean numbers present regardless of tidal state were similar in December and January, 8.8 and 9.4 respectively.

4.12 As an aquatic forager all records were from birds on water and individuals were recorded foraging throughout the tidal cycle, though most frequently over the high tide period.

4.13 All records of Little Grebe were from birds on water with site usage during the low water period concentrated within the stretch of the Elmley Reach immediately adjacent to the proposed development. Birds were also noted away from the estuary on the pools at the sewage works north of the proposed development site.

Figure 4.1: Peak numbers of Little Grebe at hourly intervals through the tidal cycle during October 2009 - January 2010

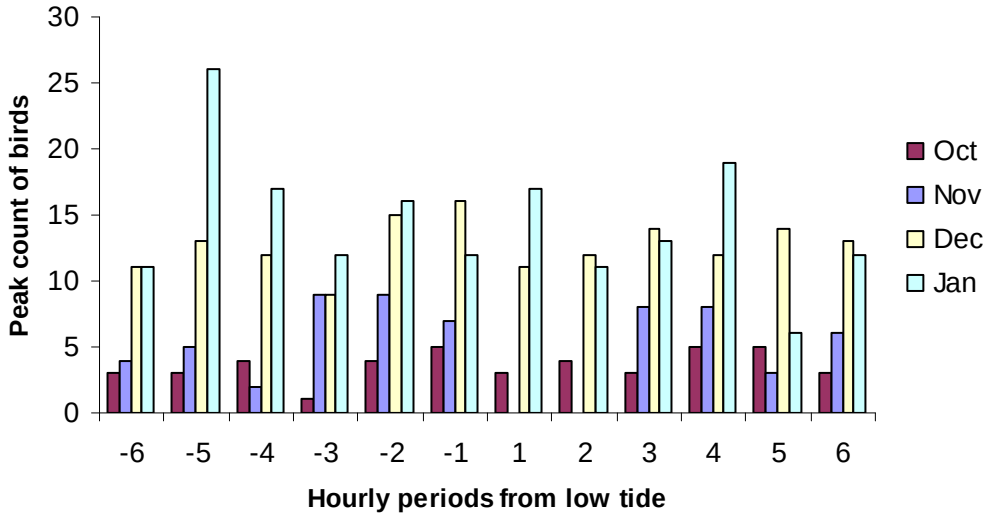
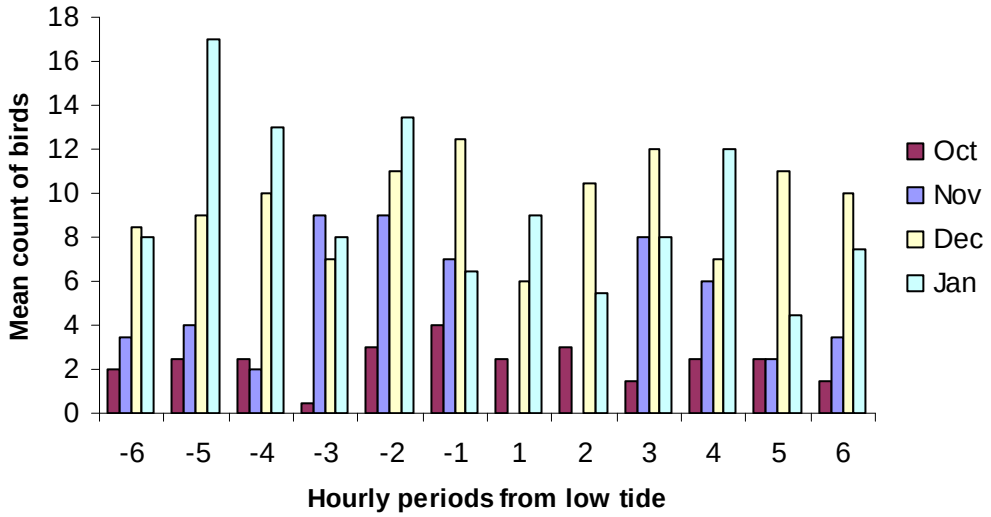


Figure 4.2: Mean numbers of Little Grebe at hourly intervals through the tidal cycle during October 2009 - January 2010



Little Egret

(see figures 4.3, 4.4 and C.5-C.8)

4.14 Little Egrets were present in greatest numbers during October with a peak count of 23 recorded. Birds were recorded on all survey visits, though numbers decreased in the winter period with peak counts of 5 in December and 3 in January.

4.15 Birds were recorded at all tidal states, with most observed feeding, often on the saltmarsh islands, The Lilies, and the fringe of saltmarsh along Milton Creek and around Grovehurst Jetty. A high tide roost occurred of up to 18 individuals in October, though 16 were also noted roosting at low tide.

Figure 4.3: Peak numbers of Little Egret at hourly intervals through the tidal cycle during October 2009 - January 2010

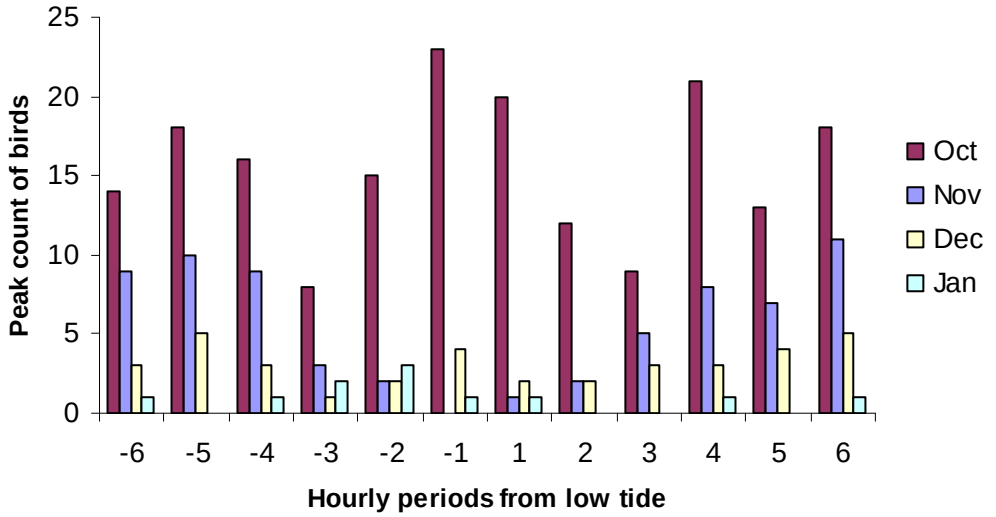
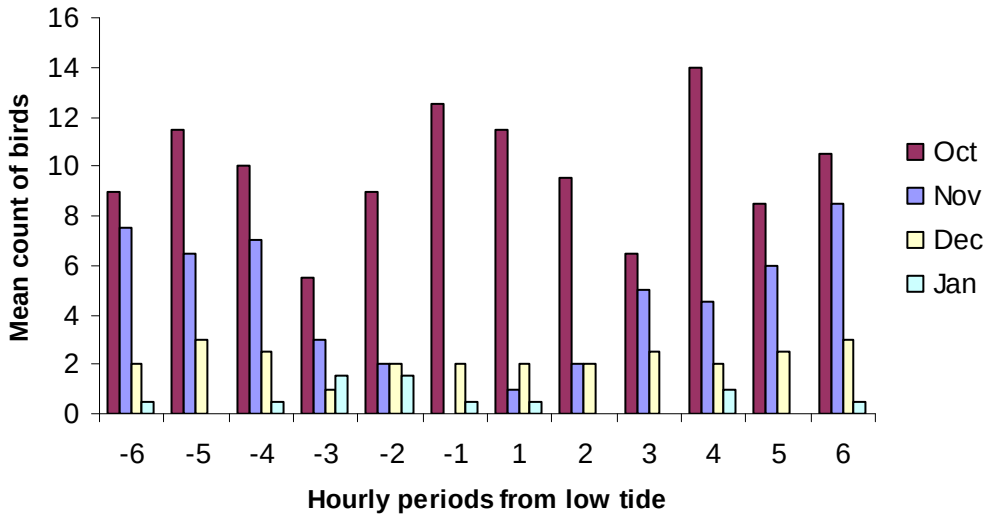


Figure 4.4: Mean numbers of Little Egret at hourly intervals through the tidal cycle during October 2009 - January 2010



Dark-bellied Brent Goose

(see figures 4.5, 4.6 and C.9-C10)

4.16 Only recorded on four of the 15 survey visits, in small groups of 4-24 individuals. Birds were only recorded in November, December and January, with the peak count in November.

4.17 Dark-bellied Brent Goose were only present during the high tide visits, and were mostly recorded as swimming.

Figure 4.5: Peak numbers of Dark-bellied Brent Goose at hourly intervals through the tidal cycle during October 2009 - January 2010

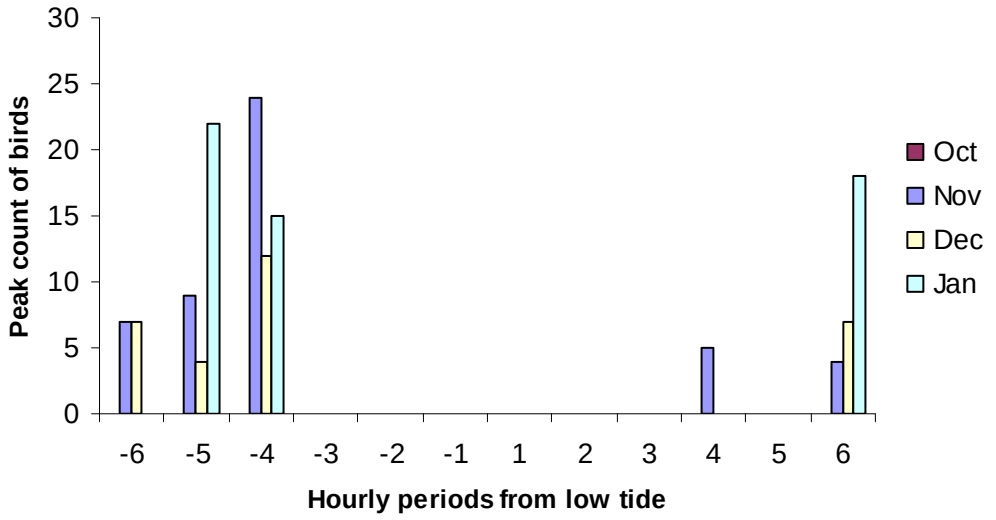
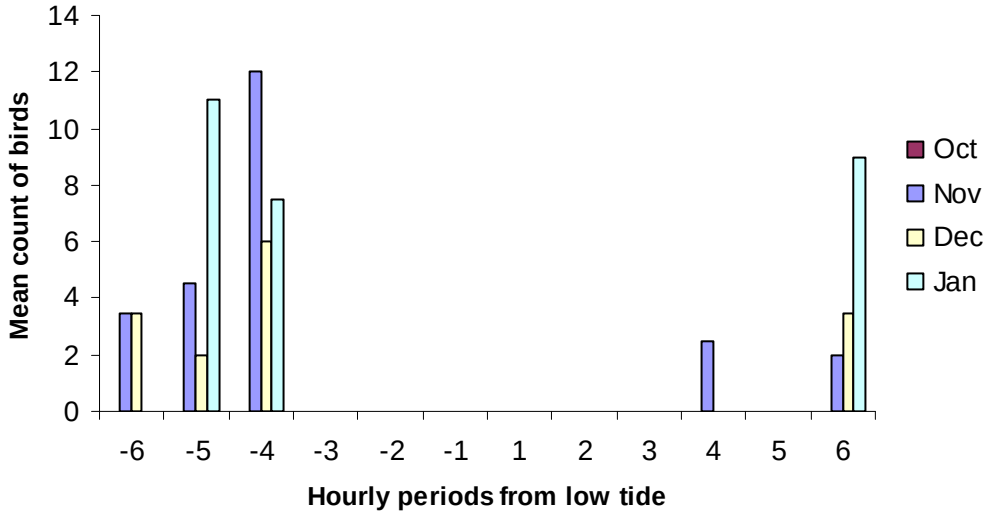


Figure 4.6: Mean numbers of Dark-bellied Brent Goose at hourly intervals through the tidal cycle during October 2009 - January 2010



Shelduck

(see figures 4.7, 4.8 and C.11-C.14)

4.18 Shelduck were recorded on all visits during the current survey period. During the autumn (October) numbers peaked at 110 birds. During the winter period peak numbers increased to 257 in December and 194 in January. Mean numbers regardless of tidal state were similar between October and November, 45 and 38 respectively, but considerably higher in December and January, 90 and 67.2 respectively.

4.19 Birds were found throughout the tidal cycle, though abundance at each state varied by month. In October numbers were similar throughout the cycle, but with a distinct peak over low tide. For the three winter months more birds were present during the high tide period including the two peak counts mentioned above.

4.20 In October, Shelduck usage throughout the tidal cycle was predominately distributed within the bay on the Elmley side opposite the proposed development with smaller numbers spread elsewhere across the intertidal areas. In winter, the birds present showed a much more dispersed pattern of usage across the study area throughout the tidal cycle, with concentrations occurring in the bay on the Elmely side and around the saltmarsh islands, The Lilies.

4.21 The majority of birds were recorded either foraging or roosting. Neither activity was restricted to a particular tidal state, though foraging was more frequently recorded during low tide and, conversely, roosting was more frequent over high tide as feeding areas became inundated.

Figure 4.7: Peak numbers of Shelduck at hourly intervals through the tidal cycle during October 2009 - January 2010

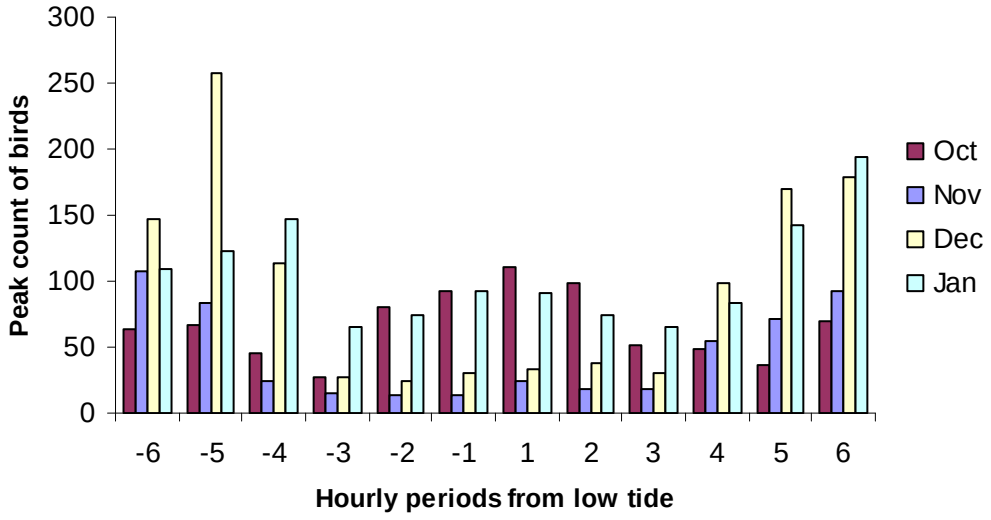
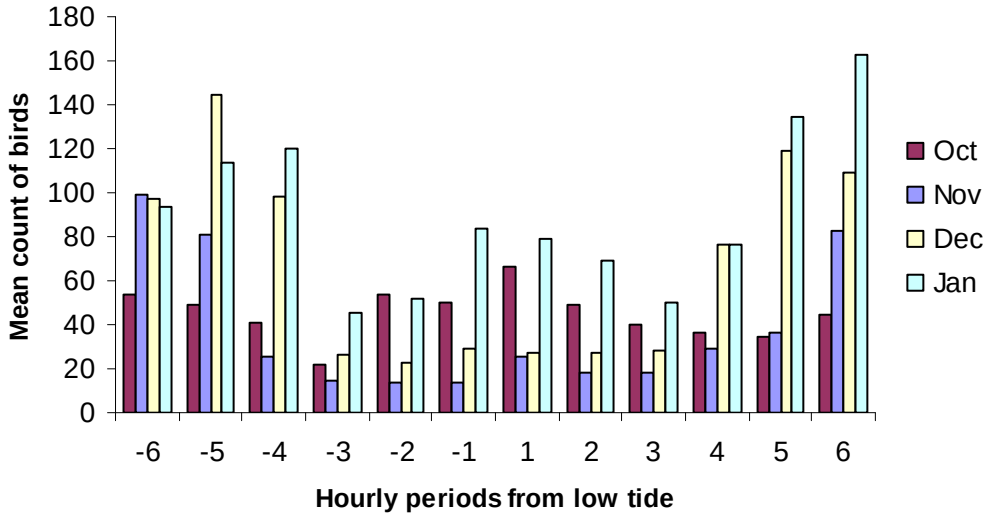


Figure 4.8: Mean numbers of Shelduck at hourly intervals through the tidal cycle during October 2009 - January 2010



Wigeon

(see figures 4.9, 4.10 and C.15-C.18)

4.22 Wigeon were recorded using the study area on every visit throughout the autumn and winter period. Very few birds were present at the beginning of October, with a peak count of 5 for the first half of the month. Numbers increased rapidly to an October peak of 216. Counts were similar in November and December, but greatly increased in January, with a peak count of 766. Mean numbers reflected this January influx, 128.5 compared with 66.1 for December.

4.23 Wigeon used the study area throughout the tidal period, with a clear differentiation in its use between the high and low water periods when most birds fed and roosted respectively.

4.24 Wigeon during the low water period were predominately distributed on the eastern lower intertidal flats of Elmley Reach. At high water, birds were concentrated within the bay on the Elmley side opposite to the proposed development with some use also made of the saltmarsh islands, The Lilies.

Figure 4.9: Peak numbers of Wigeon at hourly intervals through the tidal cycle during October 2009 - January 2010

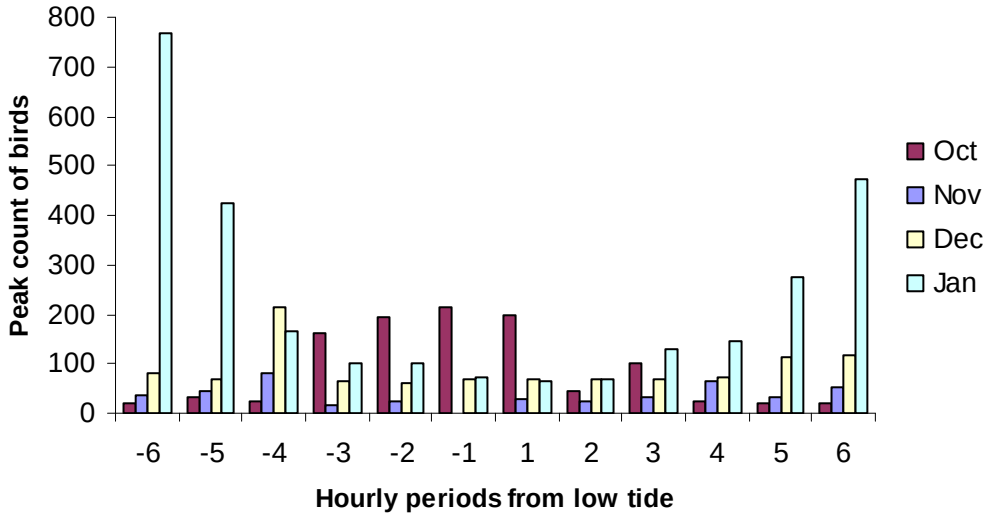
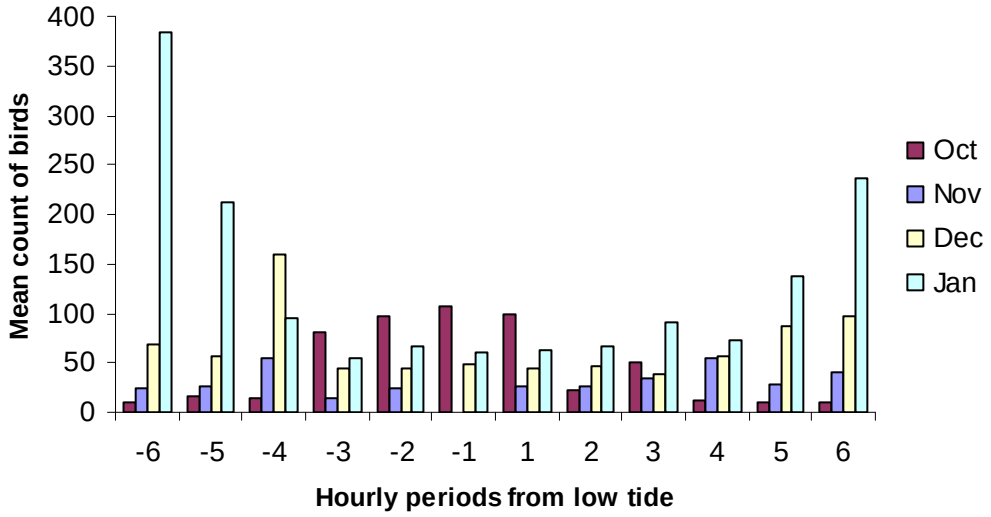


Figure 4.10: Mean numbers of Wigeon at hourly intervals through the tidal cycle during October 2009 - January 2010



Gadwall

4.25 Gadwall were only recorded in January during the present survey period, in small numbers of between one and four.

Teal

(see figures 4.11, 4.12 and C.19-C.22)

4.26 Teal were recorded in the study area by all visits throughout the survey period. Teal were present throughout the tidal cycle with smaller numbers recorded generally during high and ebb tides.

4.27 Teal made widespread use of the study area's intertidal areas throughout the tidal cycle, with notable concentrations along the length of Milton Creek and by the outfall from the sewage works to the north.

4.28 The majority of Teal recorded were of birds feeding irrespective of tidal state, though large numbers were recorded roosting on the flow tide after birds had been feeding during the ebb tide. Roosts were also occassionally noted over the high tide period.

Figure 4.11: Peak numbers of Teal at hourly intervals through the tidal cycle during October 2009 - January 2010

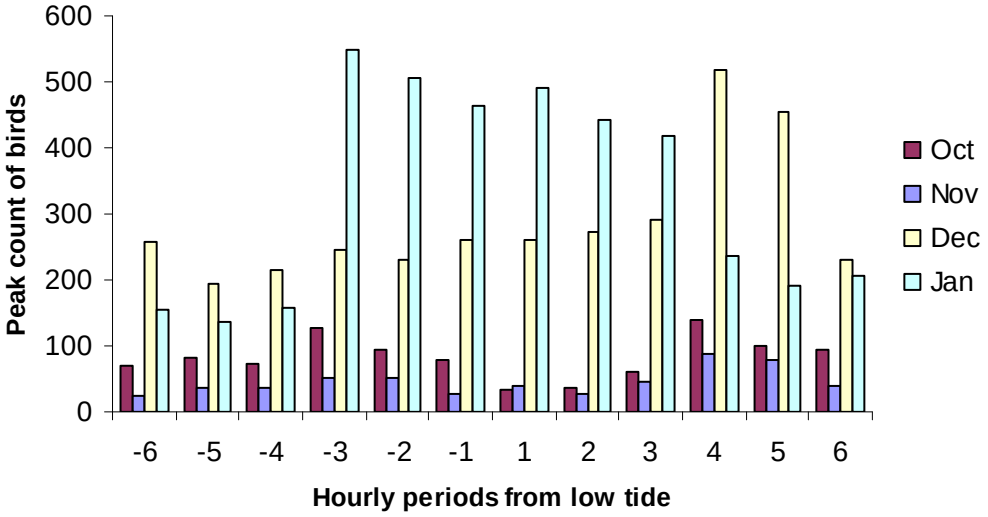
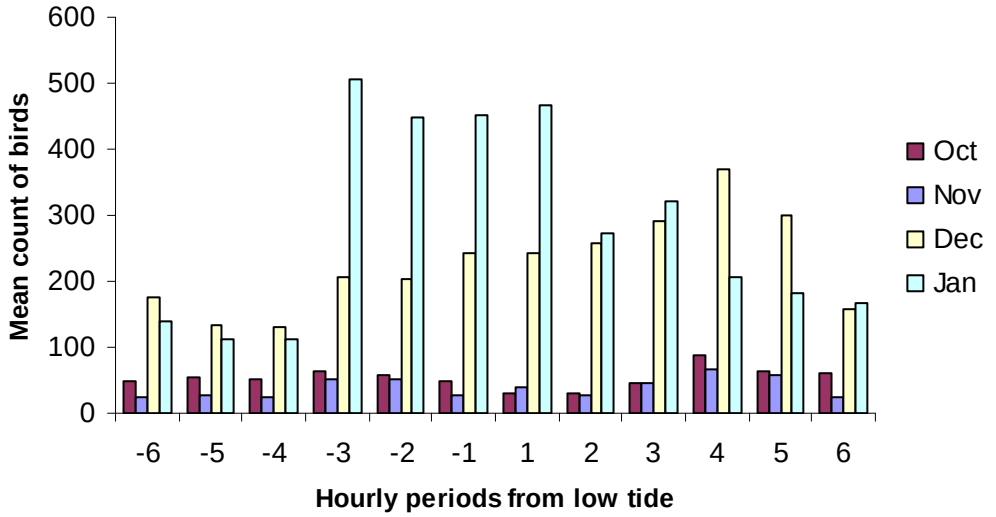


Figure 4.12: Mean numbers of Teal at hourly intervals through the tidal cycle during October 2009 - January 2010



Pintail

(see figures 4.13, 4.14 and C.23-C.25)

4.29 Pintail were intermittently recorded during the winter period, with peaks counts of 74 in December and 218 in January, but none recorded in November. Few birds were present during October, with a peak of just 10. While the October birds were recorded during low tide, the large numbers in December and January were birds present over the high tide period.

4.30 When Pintail were present over high water they were to be found using the bay on Elmley, opposite to the proposed development. Birds observed during the low water period were around the central part of the eastern lower intertidal flats of Elmley Reach and the saltmarsh islands, The Lilies.

4.31 The majority of Pintail recorded were of birds roosting irrespective of tidal state.

Figure 4.13: Peak numbers of Pintail at hourly intervals through the tidal cycle during October 2009 - January 2010

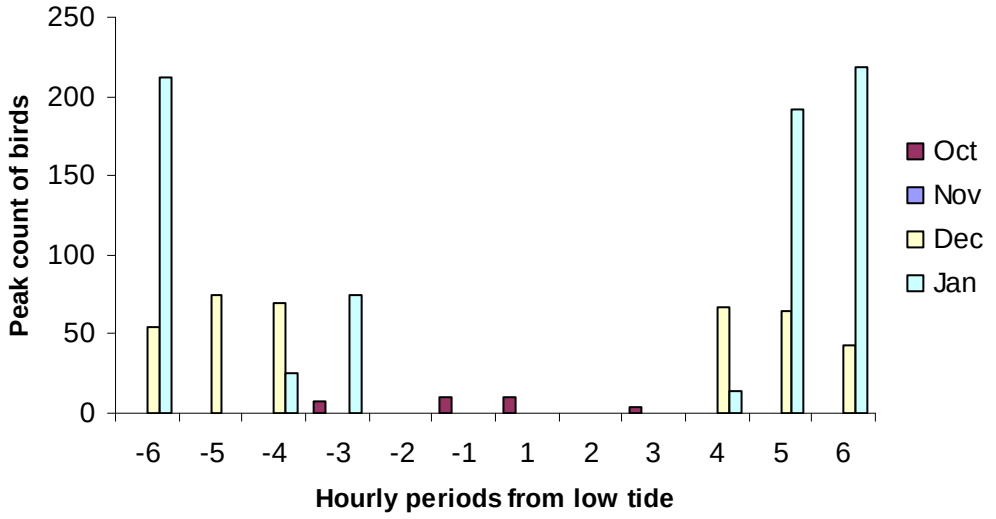
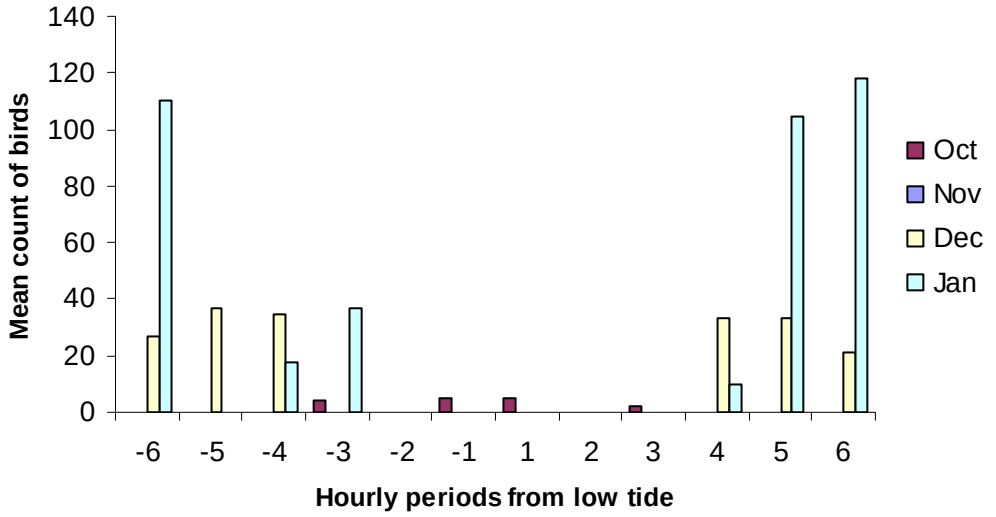


Figure 4.14: Mean numbers of Pintail at hourly intervals through the tidal cycle during October 2009 - January 2010



Shoveler

4.32 The only records of Shoveler were of two birds roosting during the ebb tide of 8th January and five birds swimming during the high tide period on 14th January. These were present in the bay adjacent to Elmley, opposite to the proposed development.

Coot

4.33 Coot were recorded on seven dates in December and January with a peak count of 43 on the 8th January.

4.34 Coot were observed in the main channel of the Elmley Reach and from the lagoons at the sewage works.

Oystercatcher

(see figures 4.15, 4.16 and C.26-C.29)

4.35 Oystercatcher were recorded in the study area by all surveys throughout the autumn and winter, with numbers increasing from October then remaining reasonably stable during the winter period with a tidal maximum of between 693 and 790. During the winter period birds were present throughout the tidal cycle with the site predominately used as a roost over the high water period. Much smaller numbers of birds remained in the study area when intertidal flats became largely exposed allowing birds to forage. However, in October a greater number of birds were present during the low tide period with comparatively little fluctuation in numbers during the tidal cycle. This was due to a large number of Oystercatcher roosting over the low tide period during this month.

4.36 Oystercatcher use of the intertidal flats was found to be widespread during the low water period with the only notable concentration being beside Elmley in both October and January. At high tide, the principal roost site within the study area was located on the peninsula on Elmley opposite the proposed development site.

Figure 4.15: Peak numbers of Oystercatcher at hourly intervals through the tidal cycle during October 2009 - January 2010

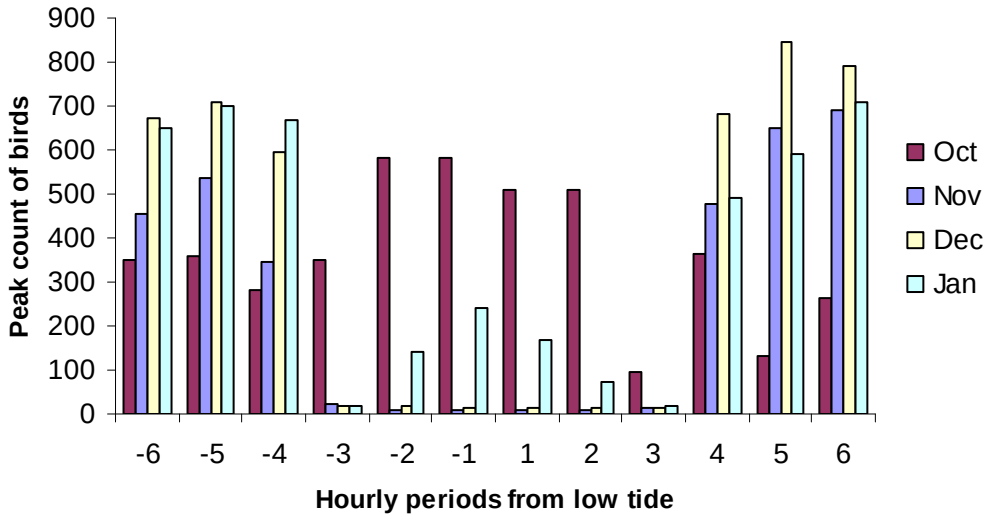
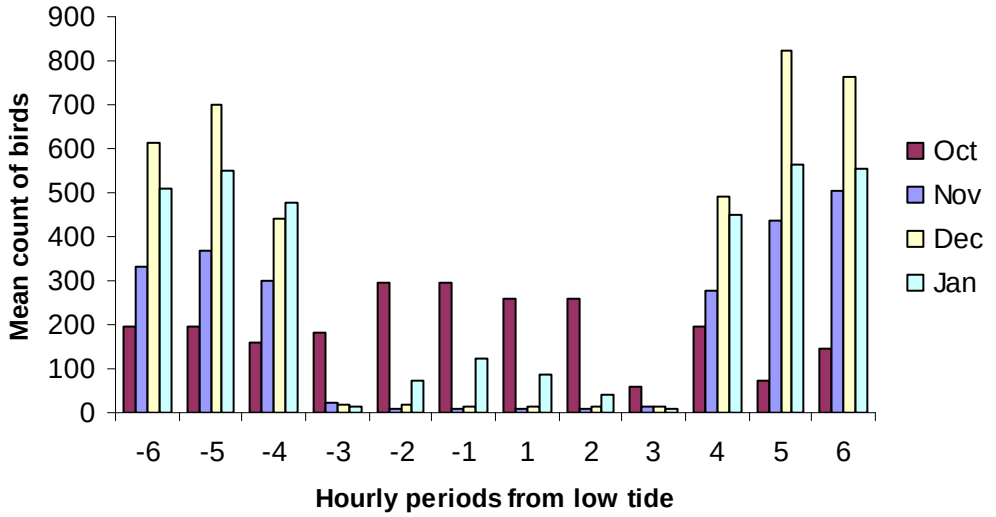


Figure 4.16: Mean numbers of Oystercatcher at hourly intervals through the tidal cycle during October 2009 - January 2010



Avocet

(see figures 4.17, 4.18 and C.30-C.33)

4.37 Avocet were recorded in the study area by all surveys in October and all but one visit (in November) during the winter. Few birds were recorded during the November visits, with a mean count of just 2.8, but numbers increased for December and January with peak counts of 61 and 52 respectively. The mean count during October was 8.4, whereas in December and January it increased to 23 and 22.5.

4.38 Few birds were recorded during low tide between October and December, but in January birds were present in similar numbers throughout the tidal cycle, with most of these birds recorded as roosting during low tide. Prior to January, birds were split fairly equally between feeding and roosting, without clear differentiation between high and low tide. The behaviour of the birds is most likely dependent on the height of the tide above chart datum as to whether suitable foraging habitat remains accessible during the high tide period.

4.39 At low tide birds were mainly distributed along the eastern side of Elmley Reach and along Milton Creek, with a marked concentration of bird activity in the central part of eastern lower intertidal flats of Elmley Reach. With tidal inundation of the flats at high tide, birds congregated to both feed and roost within the bay on Elmley, opposite the proposed development, and occasionally at the mouth of Milton Creek.

Figure 4.17: Peak numbers of Avocet at hourly intervals through the tidal cycle during October 2009 - January 2010

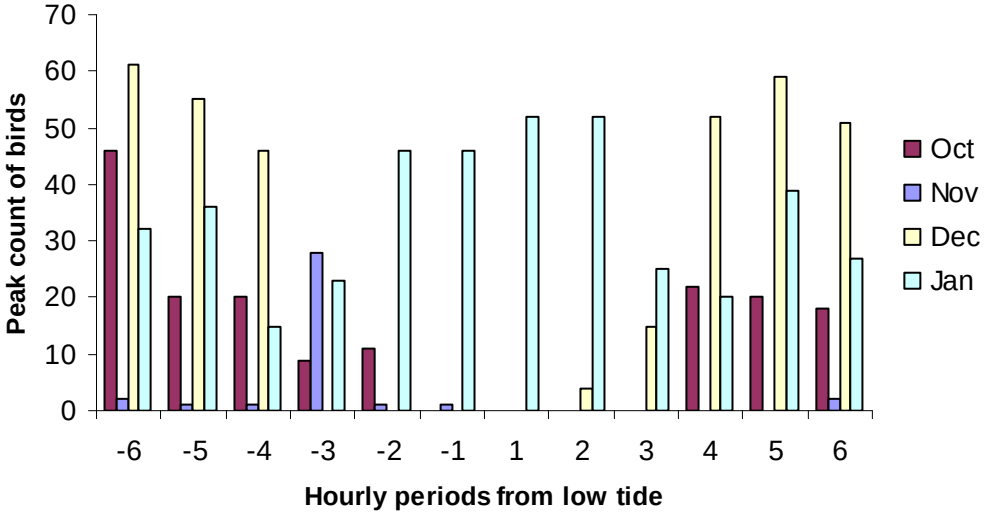
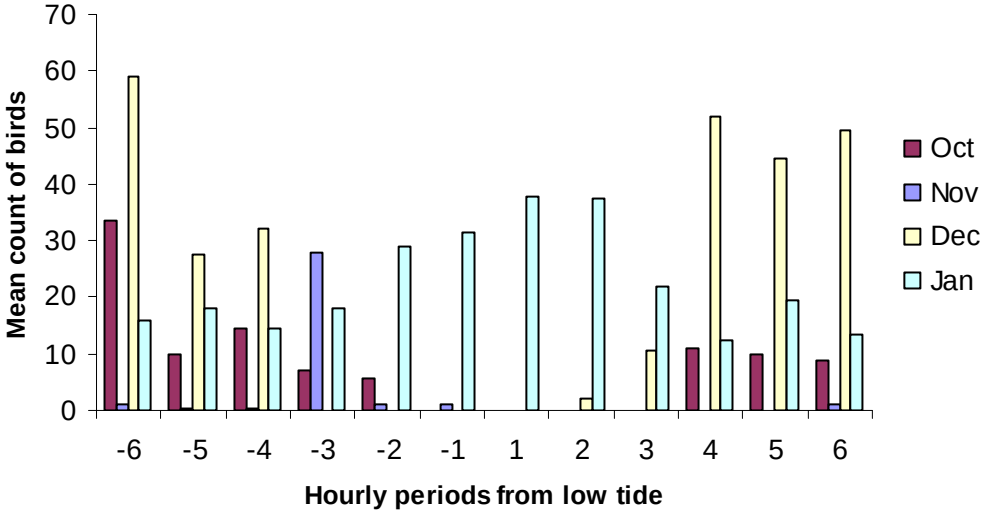


Figure 4.18: Mean numbers of Avocet at hourly intervals through the tidal cycle during October 2009 - January 2010



Ringed Plover

(see figures 4.19, 4.20 and C34-C.36)

4.40 In October Ringed Plover were regularly recorded during the low tide period, with a peak count of 55 individuals. These were mostly recorded roosting.

4.41 During the winter period usage by Ringed Plover was erratic, with up to three birds present on one of the November visits and a peak count of 12 in January, when the species was recorded on three visits. In December Ringed Plover were present on two visits, with a peak count of 40 birds. The species was only found during the high tide period, and individuals were either feeding or roosting in approximately equal numbers.

4.42 For both seasons, through the tide usage of the study area was confined to in and around the bay on Elmley, opposite the proposed development site.

Figure 4.19: Peak numbers of Ringed Plover at hourly intervals through the tidal cycle during October 2009 - January 2010

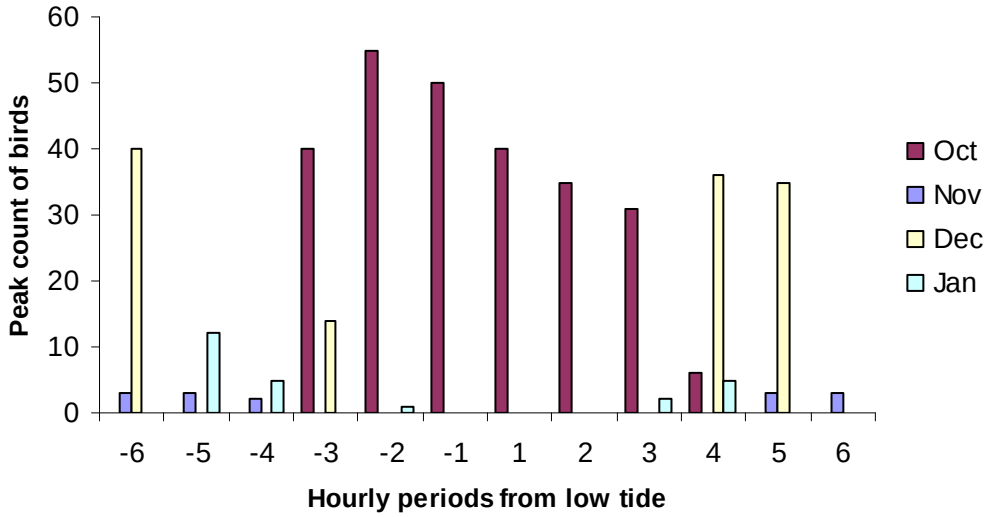
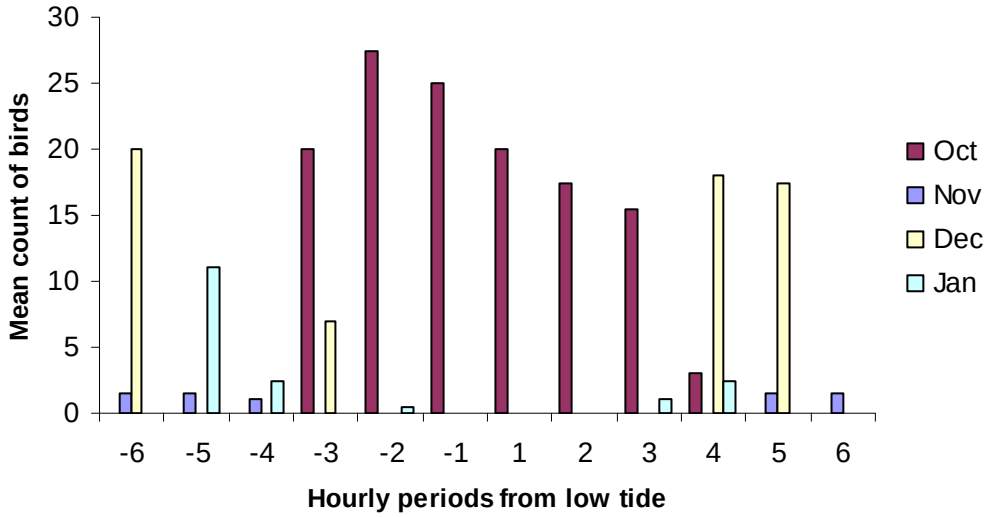


Figure 4.20: Mean numbers of Ringed Plover at hourly intervals through the tidal cycle during October 2009 - January 2010



Golden Plover

4.43 Golden Plover were only recorded on two occassions during the survey period. 192 were present, mostly roosting, on the ebb tide of 2nd October and 16 were present feeding during the ebb tide of 2nd December.

4.44 Both groups were on the Elmley side of The Swale, opposite the proposed development site, and are likely to have been disturbed from the Elmley nature reserve.

Grey Plover

(see figures 4.21, 4.22 and C.37-C.40)

4.45 In autumn, Grey Plover were recorded on three of the four visits, with a peak count of 98 individuals, which occurred during the ebbing tide. Most birds during the month occurred over the high tide period, with the majority recorded feeding except for a roost of 76 birds.

4.46 Over the winter birds were recorded on every visit, with larger numbers of birds present in December and January than in November, with peak counts of 62 and 47 respectively in the former and 15 in the latter. However, there is little difference in the numbers of birds present during low tide over this period. The main difference is the presence of up to 59 individuals feeding during the ebb and flow tides and subsequently joining the roost around the peninsular at Elmley.

4.47 Grey Plover use of the study area was found during the low water period to be widely distributed. Within the area however concentrations were noted upon the

intertidal flats along the east side of The Lilies and the eastern lower level flats of Elmley Reach, opposite the proposed site of development. At high tide, birds were to be found predominately within the bay on Elmley, opposite the proposed site of development, and around the saltmarsh islands, The Lilies.

Figure 4.21: Peak numbers of Grey Plover at hourly intervals through the tidal cycle during October 2009 - January 2010

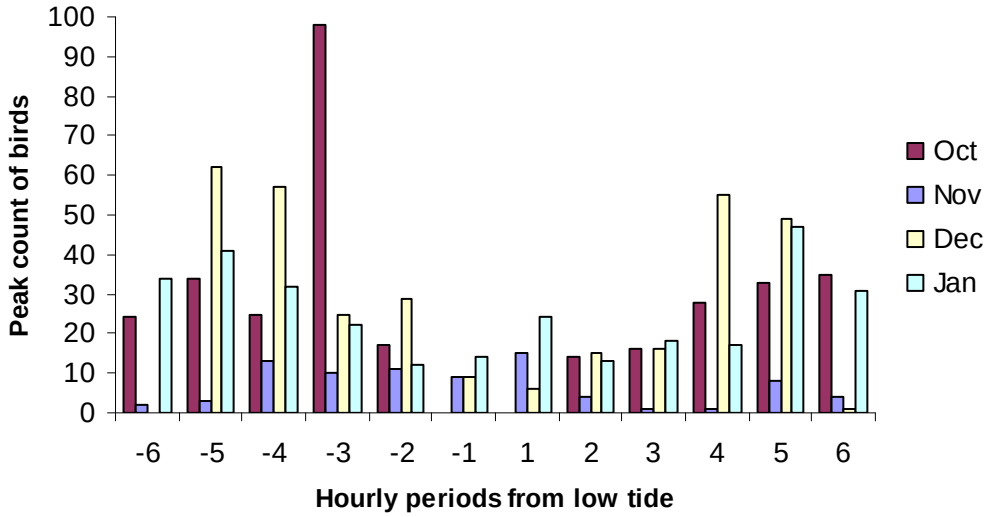
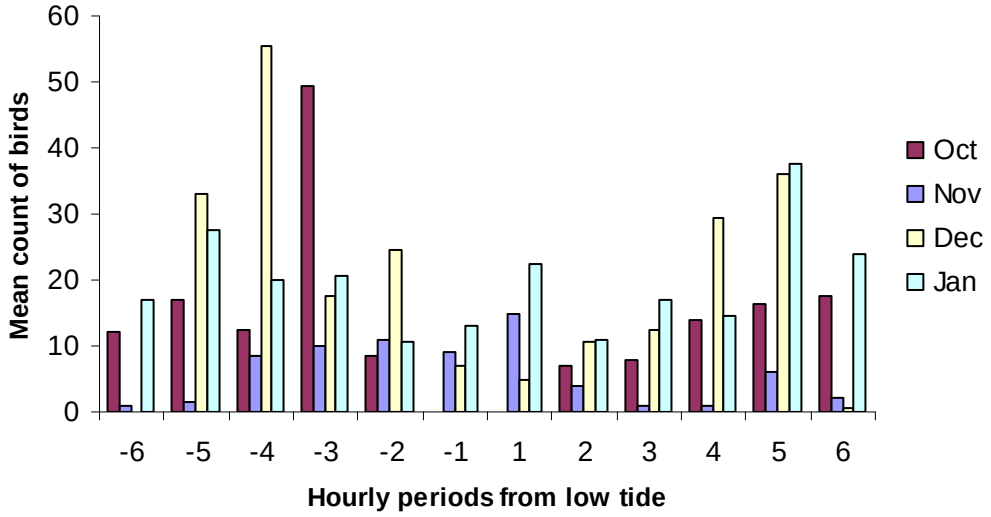


Figure 4.22: Mean numbers of Grey Plover at hourly intervals through the tidal cycle during October 2009 - January 2010



Lapwing

(see figures 4.23, 4.24 and C.41-C.44)

4.48 Lapwing were recorded on all visits in October and most visits through the winter period. The October peak was 383, and peak counts through the winter were between 432 and 553. All of the peak counts are from the low tide period and largely consist of roosting birds. Few birds were recorded over the high tide period, and very few birds were recorded feeding except for in January, when up to 295 were feeding on the flow tide.

4.49 Lapwing largely utilised the intertidal mudflats on the Elmley side of The Swale, especially the rocky areas exposed at low tide. Smaller numbers were occasionally found in similar habitat to the west of Grovehurst Jetty.

Figure 4.23: Peak numbers of Lapwing at hourly intervals through the tidal cycle during October 2009 - January 2010

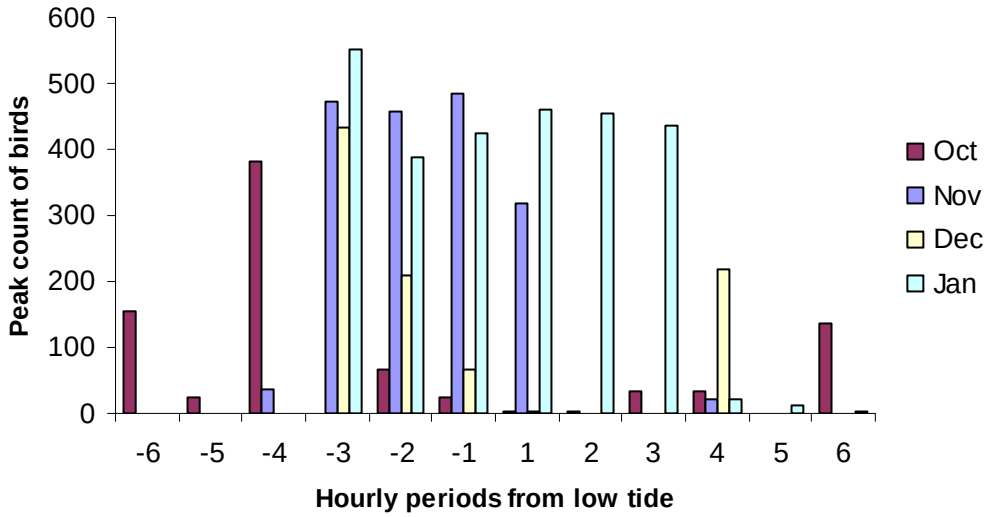
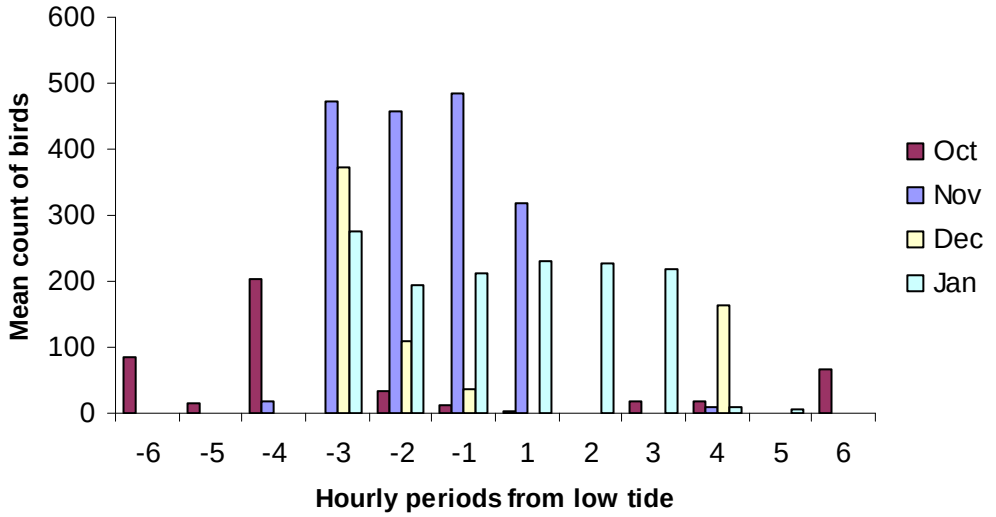


Figure 4.24: Mean numbers of Lapwing at hourly intervals through the tidal cycle during October 2009 - January 2010



Knot

(see figures 4.25, 4.26 and C.45-C.47)

4.50 Knot were recorded on only one visit in October, when 67 birds were observed feeding on the ebb tide. During the winter Knot used the site erratically. In January, Knot used the peninsula at Elmley as a high tide roost, with a peak count of 940 on the 14th, but the peak on the 29th January was only 40 birds.

4.51 Knot also occassionally used the intertidal mudflats to the east of The Lilies to feed during the ebb and flood tide in both December and January, with a peak count of 623 on the flood tide in January.

4.52 Few Knot were present at low tide. A maximum of only 7 individuals were recorded feeding during the low tide period, on one day in January.

Figure 4.25: Peak numbers of Knot at hourly intervals through the tidal cycle during October 2009 - January 2010

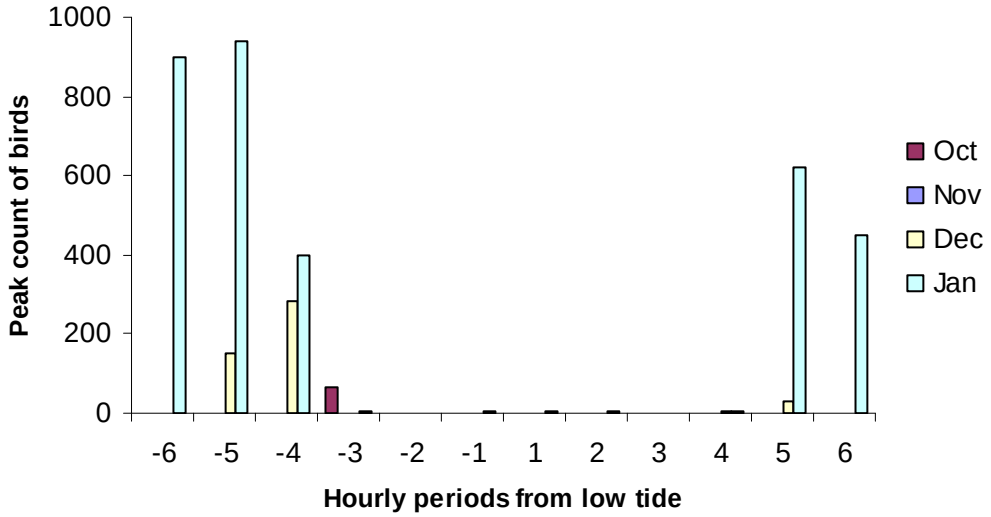
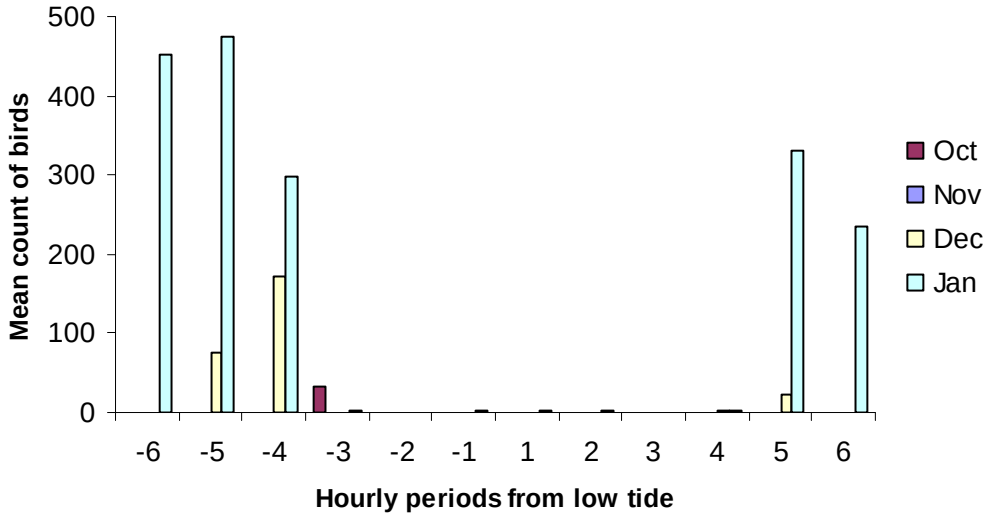


Figure 4.26: Mean numbers of Knot at hourly intervals through the tidal cycle during October 2009 - January 2010



Dunlin

(see figures 4.27, 4.28 and C.48-C.51)

4.53 The majority of records of Dunlin were from the low water period, with the exception being the count on the 23rd February which was made just before the tidal mudflats were inundated with water. The birds were feeding on the last remaining sections of intertidal mud within the site boundary before they were forced off to their roost sites elsewhere.

4.54 Dunlin usage of the intertidal mudflats over the low water period was predominantly from the area around the peninsula at Elmley. Over high water the vast majority of usage was of the areas around the saltmarsh islands, The Lilies and around the peninsula at Elmley.

Figure 4.27: Peak numbers of Dunlin at hourly intervals through the tidal cycle during October 2009 - January 2010

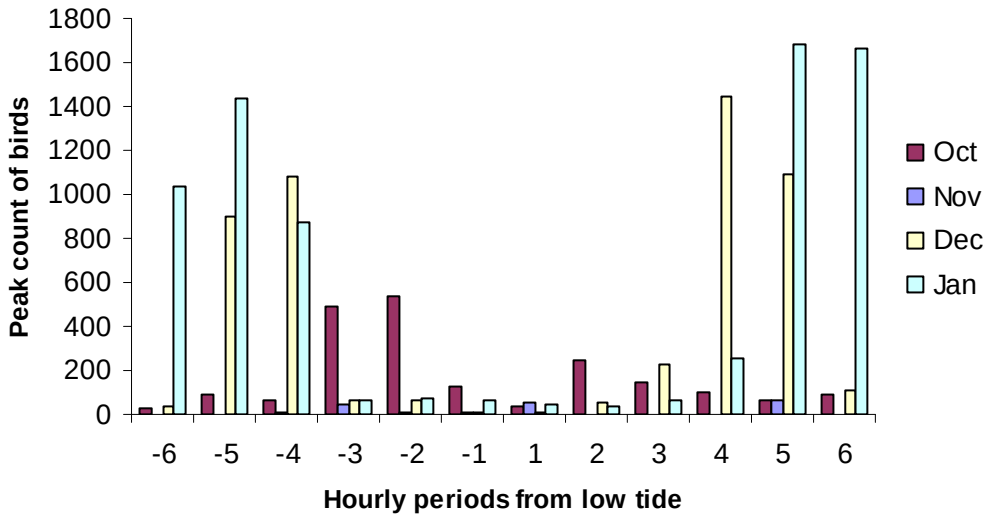
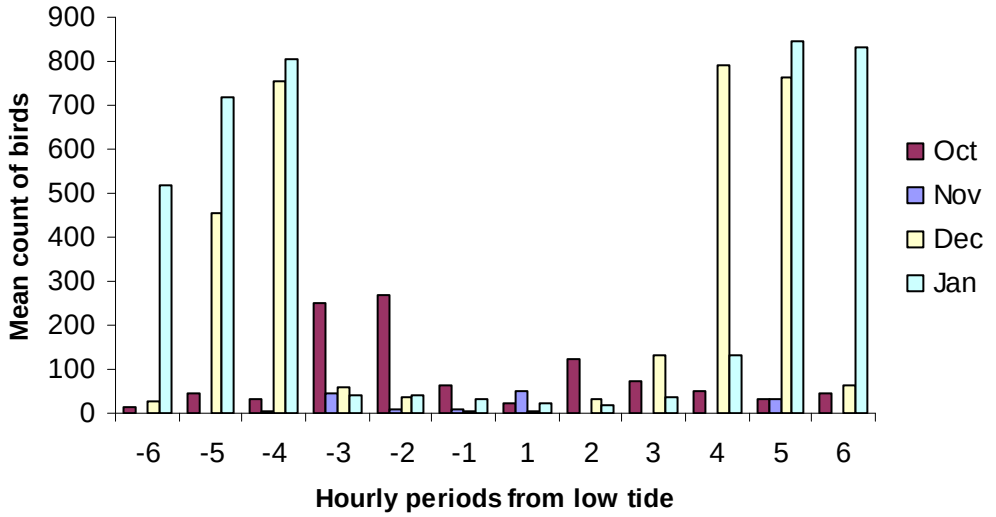


Figure 4.28: Mean numbers of Dunlin at hourly intervals through the tidal cycle during October 2009 - January 2010



Snipe

4.55 Snipe were recorded throughout the survey period primarily over the low tide period with the peak count of 25 on the 29th January 2010 over the flooding tide.

4.56 The majority of records of Snipe came from the saltmarsh around the outfall to the north of the proposed development site and the saltmarsh islands, The Lilies.

Black-tailed Godwit

(see figures 4.29, 4.30 and C.52-C.55)

4.57 Black-tailed Godwit were recorded throughout the survey period. The peak count of 1,246 was made over high water on 29th January 2010. The site was used throughout the tidal cycle, although the largest numbers were recorded over the high water period.

4.58 Over the low water period the species was widely spread over the intertidal mudflats throughout the survey period. Roosts of birds were recorded from the peninsula at Elmley and the saltmarsh islands, The Lilies.

Figure 4.29: Peak numbers of Black-tailed Godwit at hourly intervals through the tidal cycle during October 2009 - January 2010

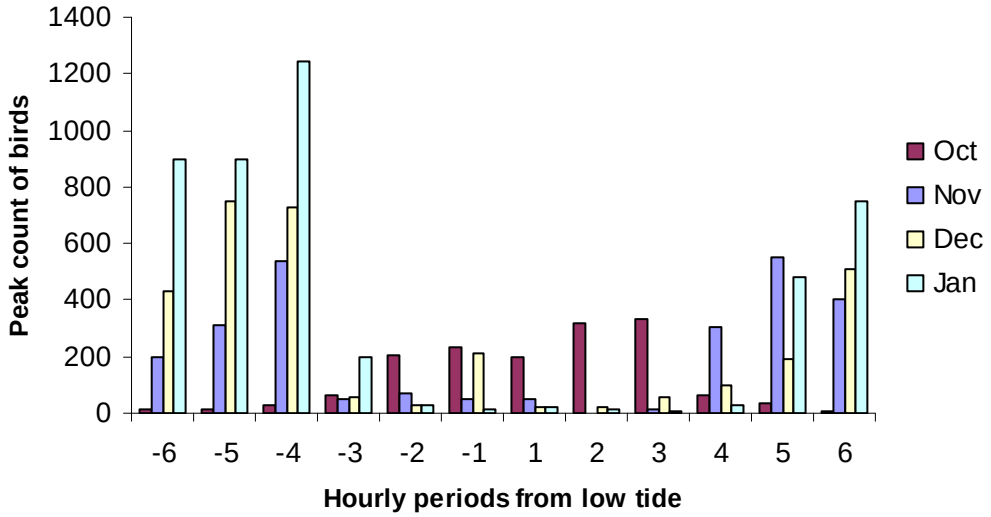
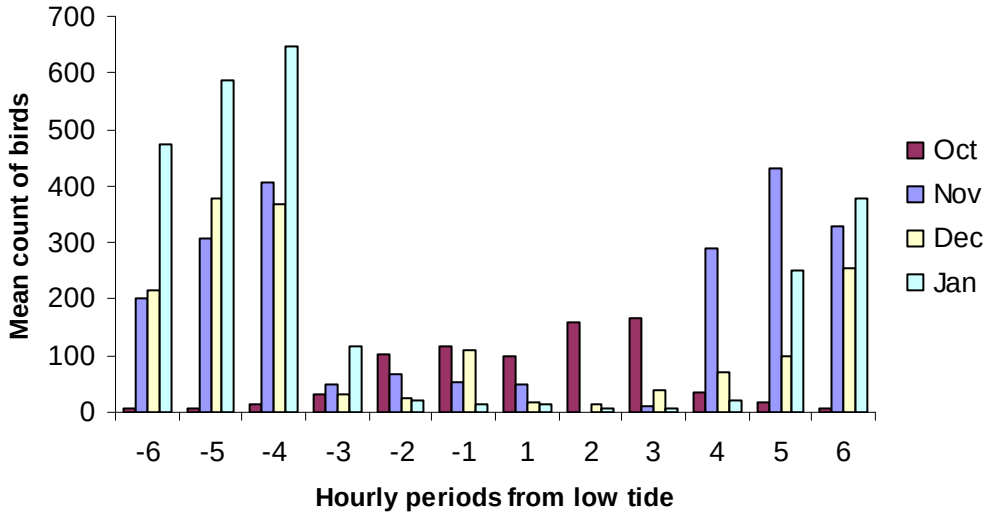


Figure 4.30: Mean numbers of Black-tailed Godwit at hourly intervals through the tidal cycle during October 2009 - January 2010



Whimbrel

4.59 Whimbrel were only recorded on one date; the 2nd October 2009, over the high tide.

Curlew

(see figures 4.31, 4.32 and C.56-C.59)

4.60 Curlew were recorded throughout the survey period and tidal cycle, with birds using the intertidal flats for feeding right up until inundation by water and the saltmarsh islands and peninsula at Elmley for roosting and feeding over the high water.

4.61 Curlew were widely distributed across the intertidal mudflats over low water, with roosting and feeding birds being recorded on the peninsula at Elmley and the saltmarsh islands, The Lilies over high water.

Figure 4.31: Peak numbers of Curlew at hourly intervals through the tidal cycle during October 2009 - January 2010

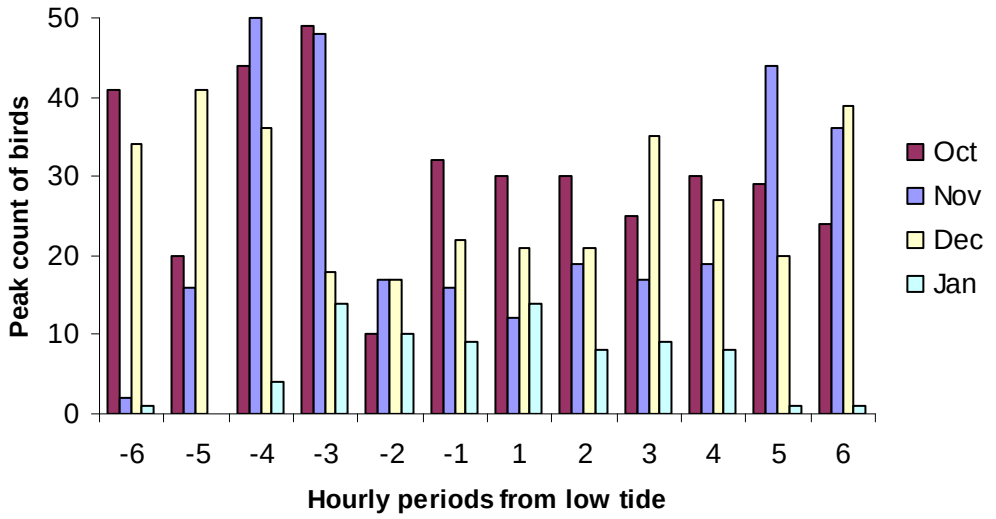
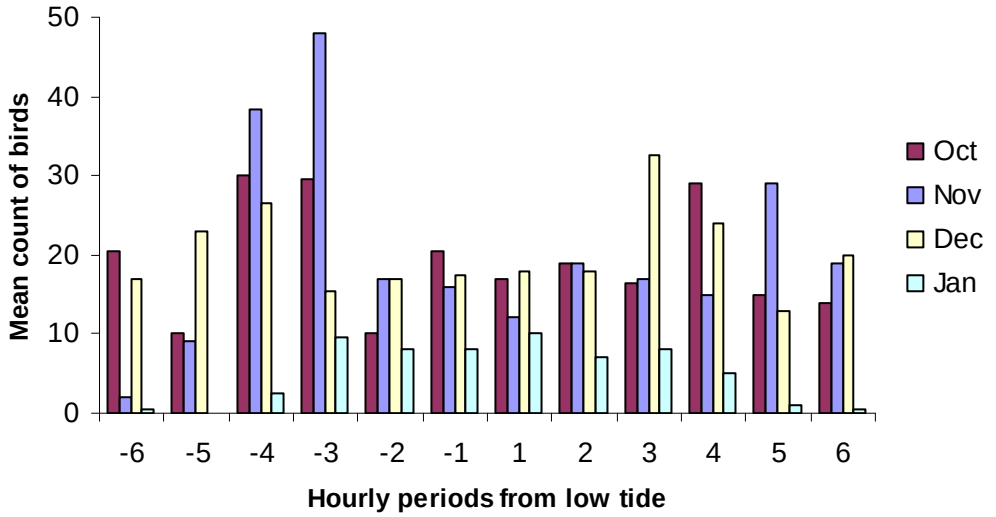


Figure 4.32: Mean numbers of Curlew at hourly intervals through the tidal cycle during October 2009 - January 2010



Spotted Redshank

4.62 Spotted Redshank were recorded on two dates; the 20th October 2009 and 17th November 2009. All records referred to single birds and occurring over both high and low water periods.

Redshank

(see figures 4.33, 4.34 and C.60-C.63)

4.63 Redshank were recorded throughout the survey period and tidal cycle, with birds using the intertidal flats for feeding right up until inundation by water.

4.64 Redshank were widely distributed across the intertidal mudflats over low water, with roosting and birds being recorded on the saltmarsh islands, The Lilies over high water.

Figure 4.33: Peak numbers of Redshank at hourly intervals through the tidal cycle during October 2009 - January 2010

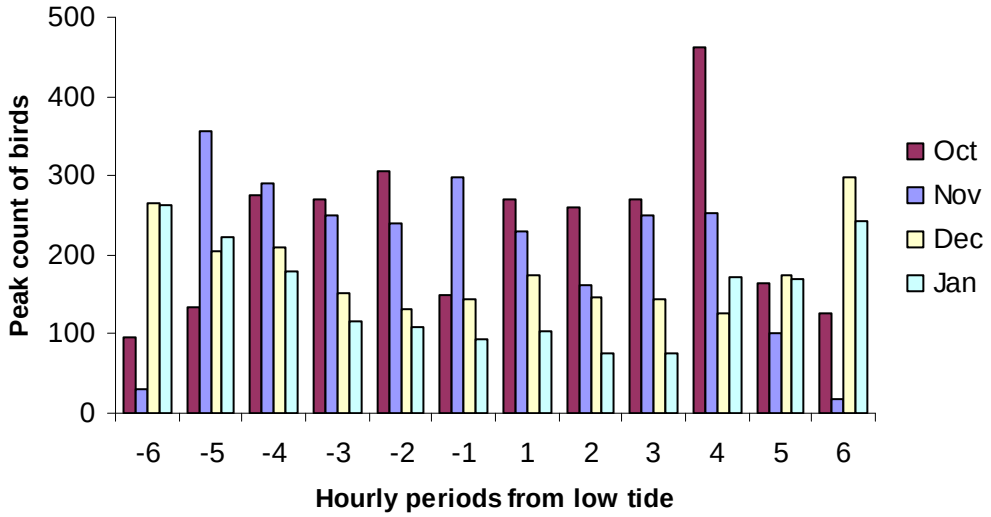
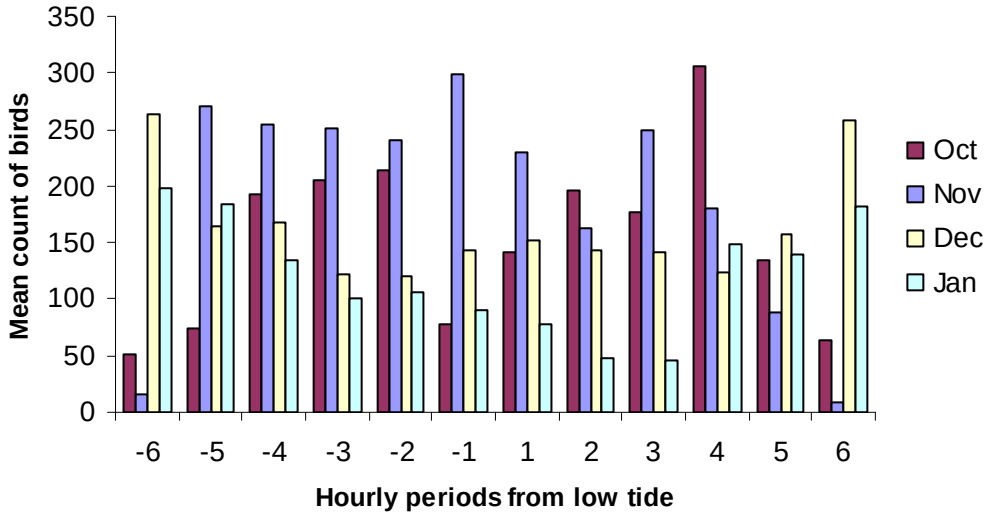


Figure 4.34: Mean numbers of Redshank at hourly intervals through the tidal cycle during October 2009 - January 2010



Greenshank

(see figures 4.35, 4.36 and C.64-C.67)

4.65 Greenshank were recorded on 9 dates, with records occurring in all months. A peak count of 13 was made on the 2nd November. The species showed no pattern in its temporal occurrence on the site with records throughout the tidal cycle.

4.66 Greenshank were solely recorded from Milton Creek area through out the tidal cycle in both October and November-January.

Figure 4.35: Peak numbers of Greenshank at hourly intervals through the tidal cycle during October 2009 - January 2010

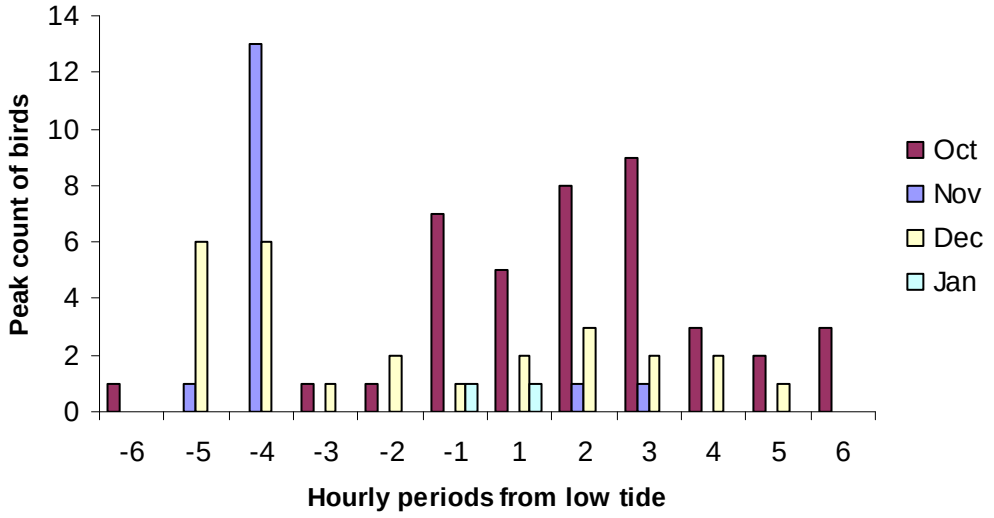
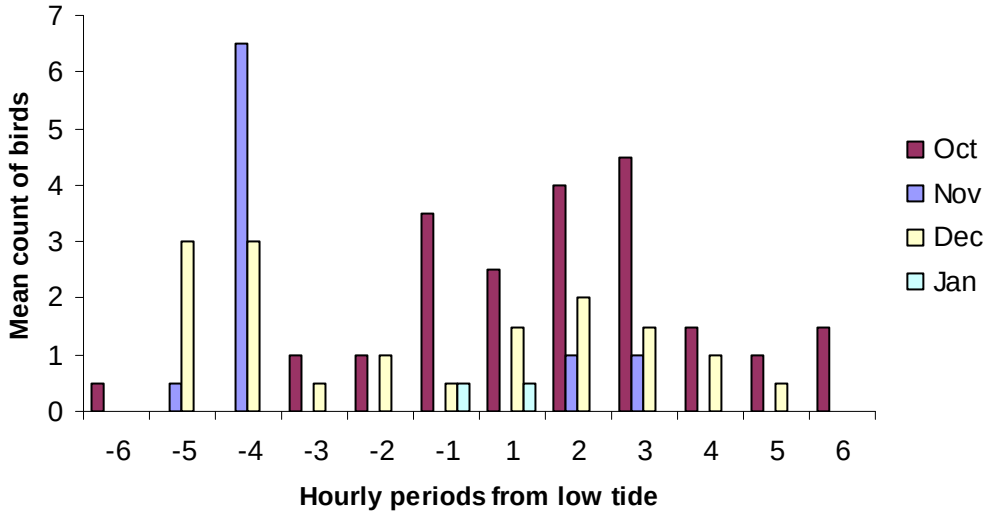


Figure 4.36: Mean numbers of Greenshank at hourly intervals through the tidal cycle during October 2009 - January 2010



Turnstone

(see figures 4.37, 4.38 and C.68-C.71)

4.67 Turnstone were recorded in all months with a peak count of 88 on the 20th October. The species was recorded solely over the high water period in October, with birds in November-January being mainly recorded over the low water period.

4.68 Turnstone were predominantly recorded from around the peninsula at Elmley and saltmarsh islands, The Lilies.

Figure 4.37: Peak numbers of Turnstone at hourly intervals through the tidal cycle during October 2009 - January 2010

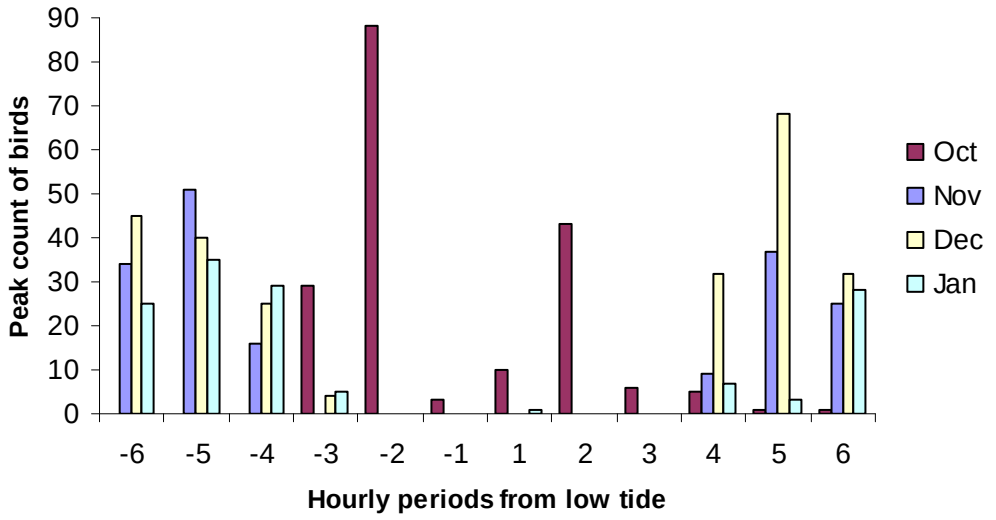
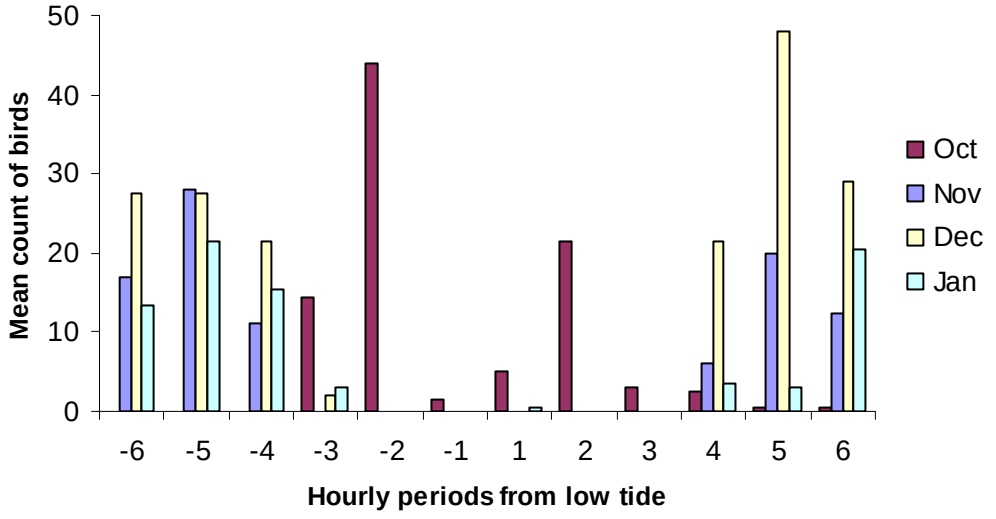


Figure 4.38: Mean numbers of Turnstone at hourly intervals through the tidal cycle during October 2009 - January 2010



5 EVALUATION

5.1 The study area lies within The Swale SPA, where the SPA citation species are within the protection of the EU Birds Directive. It is therefore appropriate to consider the importance to birds of the study area as a whole in the context of The Swale SPA waterbird assemblage.

Late autumn waterbird populations

5.2 Table 5.1 summarises the maximum counts recorded for key species which were either cited as part of The Swale SPA (in italics) or were frequently recorded. Data are also provided for the 1% threshold criteria, and the latest 5-year peak means for the SPA. The 1% criterion is used to assess the importance of wetlands. A wetland is considered internationally important if it regularly supports 1% of a species biogeographic (in this case NW Europe) population. A wetland in Britain is considered of national importance if it regularly supports 1% of the total numbers in Britain (Austin *et al.* 2008).

5.3 The waterbird data presented in The Swale SPA citation originates from Wetland Bird Survey (WeBS) monthly coordinated 'core' counts made during high tide periods, principally from September to March. WeBS is a joint scheme run by the British Trust for Ornithology (BTO), the Wildfowl & Wetlands Trust (WWT), Royal Society for the Protection of Birds (RSPB) and Joint Nature Conservation Committee (JNCC) to monitor non-breeding waterfowl in the UK. The scheme aims to identify population sizes, to determine trends in numbers and distribution, and to identify important sites for waterbird (Austin *et al.* 2008).

5.4 For the majority of waterbirds, 1% thresholds for identifying wetland sites of national importance in Britain are only available for wintering populations. Due to the respective species phenologies, it is appropriate to apply these same thresholds in the assessment of wetlands of national importance using autumn count data for all waterfowl with the exception of waders (Austin *et al.* 2008). In many wader species, substantial autumn passage occurs through Britain which may largely comprise of a different subspecies or biographical population to that of the wintering population. For a small number of wader species e.g. Ringed Plover, 1% thresholds had previously been derived and published for this passage period e.g. Musgrove et al. 2007. However, the most recent guidance from WeBS and the statutory agencies, as published in Austin et al 2008, no longer provides separate 1% passage threshold criteria for any species; no explanation is given. Therefore for all wader species, the following evaluation uses the 1% national thresholds for wintering populations.

5.5 A total of 33 species of waterbirds were recorded using the study site in October 2009. Of these, 10 species were of conservation value due to their presence as species listed on the designation for Swale SPA and Swale SSSI. These species are (with the SPA species in italics): Wigeon, *Teal, Oystercatcher, Ringed Plover, Grey Plover, Dunlin,* Knot, *Curlew*, *Redshank and* Spotted Redshank.

Table 5.1: Comparison of peak waterbird counts in October 2009 as recorded during RPS Intertidal waterbird surveys, with latest SPA autumn population estimates and current 1% thresholds for national and international importance.

Species	Peak count during October 2009 at Kemsley study area		5yr autumn Peak mean for Swale SPA (2002/03-2006/07)	Great Britain 1% Threshold	International 1% Threshold
	Number of birds	% of SPA population			
Little Grebe	5	9.3	54	78	4,000
Little Egret	23	20.4	113	?	1,300
Dark-bellied Brent Goose	*0*	-	*710*	*981*	*2,000*
Shelduck	110	10.1	1,090	782	3,000
Wigeon	0	-	4,851	4,060	15,000
Gadwall	0	-	35	171	600
Teal	139	3.9	3,586	1,920	5,000
Pintail	0	-	208	279	600
Shoveler	0	-	123	148	400
Coot	0	-	(294)	1,730	17,500
Oystercatcher	583	13.6	4,285	3,200	10,200
Avocet	46	10.1	456	50	730
Ringed Plover	55	8.5	645	330	730
Golden Plover	192	14.8	1,296	2,500	9,300
Grey Plover	98	5.3	1,834	530	2,500
Lapwing	0	-	2,462	20,000	20,000
Knot	0	-	312	2,800	4,500
Dunlin	*537*	*10.3*	*5,237*	*5,600*	*13,300*
Snipe	1	3.1	32	?	20,000
Black-tailed Godwit	329	22.6	1,453	150	470
Whimbrel	2	3.6	(55)	+	6,800
Curlew	49	3.4	1,441	*1,500*	*8,500*
Spotted Redshank	1	4	25	+	900
Redshank	*463*	*31.1*	*1,487*	*1,200*	*2,800*
Greenshank	9	19.1	47	50	2,300

Species	Peak count during October 2009 at Kemsley study area		5yr autumn Peak mean for Swale SPA (2002/03-2006/07)	Great Britain 1% Threshold	International 1% Threshold
	Number of birds	% of SPA population			
Turnstone	88	18.3	(480)	500	1,500
Total waterbird assemblage	3,467	10.7		-	-
Total SPA waterbird assemblage			32,548	-	-

Note:
Swale SPA citation species are shown in italic.
Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question.
+ Population too small for meaningful figure to be obtained.
? Population size not accurately known.

Winter waterbird populations

5.6 Table 5.2 summarises the peak autumn counts recorded for key species which were either cited as part of The Swale SPA (in italics) or were frequently recorded. Data are also provided for the 1% threshold criteria, and where available the SPA 5-year peak means listed in the citation.

5.7 A total of 43 species of waterbirds were recorded using the intertidal study site during November 2009 - January 2010. Of these, 13 species were of conservation value due to their presence as species listed on the designation for Swale SPA and Swale SSSI. These species are (with the SPA species in italics): *Dark-bellied Brent Goose,* Wigeon, *Gadwall, Teal,* Shoveler*, Oystercatcher, Ringed Plover, Grey Plover, Dunlin,* Knot, *Curlew, Redshank* and Spotted Redshank.

Table 5.2: Comparison of peak waterbird counts in November 2009 - January 2010 as recorded during RPS Intertidal waterbird surveys, with latest SPA winter population estimates and current 1% thresholds for national and international importance.

Species	Peak count during November 2009 - January 2010 at Kemsley study area		5yr winter peak mean for Swale SPA (2002/03-2006/07)	Great Britain 1% Threshold	International 1% Threshold
	Number of birds	% of SPA population			
Little Grebe	26	38..8	67	78	4,000
Little Egret	11	26.8	41	?	1,300
Dark-bellied Brent Goose	24	1.4	*1,754*	*981*	*2,000*
Shelduck	257	12.2	2,114	782	3,000
Wigeon	766	4.1	18,521	4,060	15,000
Gadwall	4	3.1	129	171	600
Teal	549	11.4	4,812	1,920	5,000
Pintail	218	27.6	790	279	600
Shoveler	5	1.6	315	148	400
Coot	43	7.3	593	1,730	17,500
Oystercatcher	847	17.3	4,910	3,200	10,200
Avocet	61	10.3	595	50	730
Ringed Plover	40	12.2	(328)	330	730
Golden Plover	16	0.2	9,188	2,500	9,300
Grey Plover	*62*	*3.9*	1,576	530	2,500
Lapwing	553	3.6	15,470	20,000	20,000
Knot	940	28.2	3,331	2,800	4,500
Dunlin	*1,678*	*18.2*	*9,202*	*5,600*	*13,300*
Snipe	28	26.2	107	-	20,000
Black-tailed Godwit	*1,246*	*87.4*	1,425	150	470
Whimbrel	0	-	0	+	6,800
Curlew	50	4.2	1,201	*1,500*	*8,500*
Spotted Redshank	1	33.3	3	+	900

Species	**Peak count during November 2009 - January 2010 at Kemsley study area**		**5yr winter peak mean for Swale SPA (2002/03-2006/07)**	**Great Britain 1% Threshold**	**International 1% Threshold**
	Number of birds	**% of SPA population**			
Redshank	*357*	*31.7*	*1,127*	*1,200*	*2,800*
Greenshank	13	433.3	3	50	2,300
Turnstone	68	15.7	434	500	1,500
Total waterbird assemblage	7,962	10.4		**-**	**-**
Total SPA waterbird assemblage			76,323	**-**	**-**

Note:

Swale SPA citation species are shown in italic.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question.

The importance of the study area as a discrete wetland for supporting internationally and national important waterbird populations in autumn

5.8 The four most numerous waterbirds (excluding gull species) recorded using the study area in October were in descending order, Oystercatcher, Dunlin, Redshank and Black-tailed Godwit.

5.9 The peak number of Black-tailed Godwit recorded in the study area during October 2009 (919) equates to 6.1% of the national population. This means during October 2009 the study area at Kemsley has supported **Nationally Important numbers of Black-tailed Godwit**.

5.10 Of the remaining waterbird species recorded in October 2009 at the Kemsley study area none represented 1% or more of the international or national population estimates for Great Britain.

The importance of the intertidal study area as a discrete wetland for supporting internationally and national important waterbird populations in winter

5.11 The four most numerous waterbirds (excluding gull species) recorded using the study area during November 2009 – January 2010 were in descending order Dunlin, Black-tailed Godwit, Knot, and Oystercatcher.

5.12 The peak number of Black-tailed Godwit recorded in the study area during November 2009 – January 2010 (1,246) equates to 2.7% of the international population (Wetlands International 2006) and 8.3% of the national population. This means during late winter 2008/09 the study area at Kemsley has supported **Internationally Important numbers of Black-tailed Godwit**.

5.13 Of the remaining waterbird species recorded at Kemsley, the peak count during November 2009 – January 2010 of only one species equated to, or exceeded, the 1% national winter population estimates for Great Britain. The peak count of Avocet at Kemsley during November 2009 – January 2010 (61) equates to 1.7% of the latest available estimate of the national wintering population of 3,500 birds. Furthermore, the peak count exceeded 50 birds, a minimum qualifying threshold for the designation of sites of national importance where 1% of the national population is less than 50 birds (Austin *et al.* 2008). However, the latter estimate of national wintering population is based on data from 1994/95 – 1998/99 (Rehfisch *et al.* 2003). Avocet is a species whose British wintering population has undergone a large increase in recent years (Banks *et al.* 2006). The five year mean peak winter maxima (2003/04-2007/08) recorded by WeBS is 6,110 birds; WeBS does not cover 100% of the population of the species. These data would suggest that the peak count of Avocet at Kemsley during February - March 2009 equates to no more than 1.0% whilst noting that coverage by WeBS of those sites supporting Avocet is extensive. Irrespective of the data used, during November 2009 –

January 2010 the study area at Kemsley has supported **Nationally Important numbers of Avocet**.

5.14 No other waterbird species recorded during November 2009 – January 2010 at the Kemsley study area represented 1% or more of the international or national population estimates for Great Britain for assessing wintering populations.

The importance to birds of the study area in the context of The Swale SPA in late autumn

5.15 The peak count of Redshank recorded in the study area during October 2009 (463) equates to 31.1% of The Swale SPA population, the five-year autumn peak mean as derived from the latest available WeBS data (an estimation in line with recommendations of the Ramsar Convention; Ramsar Convention Bureau 1988).

5.16 The peak number of Black-tailed Godwit recorded in the study area during October 2009 (329) equates to 22.6% of The Swale SPA population, the five-year spring peak mean as derived from the latest available WeBS data (an estimation in line with recommendations of the Ramsar Convention; Ramsar Convention Bureau 1988).

5.17 The peak number of 16 other waterbird species recorded in the study area during April-May 2009 represent between 20.4% and 3.4% of The Swale SPA population, as estimated by the latest WeBS five-year winter peak mean (2002/03-2006/07). It should however be noted that for several species, The Swale SPA autumn population comprises of small numbers of early arriving individuals which are part of the site's larger wintering population. So for example, the 192 Golden Plover recorded by the study at Kemsley represents 14.8% of The Swale SPA population in autumn but no more than 2.1% of the site's wintering population of which they are likely to be a component of. For all other species the proportion occurring within the study area is less than 1% of The Swale SPA population in spring.

5.18 Considering the total waterbird assemblage, the study area at Kemsley supported a peak number of birds of 3,467 in October 2009. This represents 10.7% of the 32,548 individual waterfowl for The Swale SPA as estimated by the latest WeBS five-year autumn peak mean (2003-2007).

The importance to birds of the intertidal study area in the context of The Swale SPA in winter

5.19 The peak number of Greenshank recorded in the study area during November 2009 – January 2010 (13) equates to 433.3% of The Swale SPA population, the five-year winter peak mean as derived from the latest available WeBS data (an estimation in line with recommendations of the Ramsar Convention; Ramsar Convention Bureau 1988). However looking at the underlying WeBS data all the peak counts during the winter have occurred in November. Furthermore the peak

count of 13 recorded during the intertidal surveys was made on the 2nd November, when this is considered against the Autumn 5 year mean peak then the peak RPS count only represents 27.7% of The Swale SPA population. The peak autumn count within this five year period of 56 was made in October. This is therefore probably a more relevant criteria against which to assess this particular count.

5.20 The peak number of Black-tailed Godwit recorded in the study area during November 2009 – January 2010 (1,246) equates to 87.4% of The Swale SPA population, the five-year winter peak mean as derived from the latest available WeBS data (an estimation in line with recommendations of the Ramsar Convention; Ramsar Convention Bureau 1988). However, the latter site population estimate is based on data from 2002/03 – 2006/7. In this respect it is important to note that the British non-breeding population of Black-tailed Godwits are of the Icelandic breeding race *islandica.* The population of this subspecies has in recent years substantially increased. This has led to a recent increase in the 1% international criterion for the species from 350 to 470 – a 34% increase – following a three yearly review (Wetlands International 2006). Published annual indices for the British non-breeding Black-tailed Godwit population for the period up until winter 2006/07 shows a continuing trend of increase. Closer scrutiny of the underlying WeBS data from which the SPA population estimate was derived shows a peak count of 1,782 birds in November 2004.

5.21 The peak number of 22 other waterbird species recorded in the study area during November 2009 – January 2010 represent between 38.8% and 1.4% of The Swale SPA population, as estimated by the latest WeBS five-year winter peak mean (2002/03-2006/07). For all other species the proportion occurring within the study area is less than 1% of The Swale SPA population.

5.22 Considering the total waterbird assemblage, the study area at Kemsley supported a peak number of birds of 7,962 between November 2009 and January 2010. This represents 10.4% of the 76,323 individual waterfowl for The Swale SPA as estimated by the latest WeBS five-year winter peak mean (2002/03-2006/07).

Comparison of WeBS data with RPS Intertidal Waterbird Surveys

5.23 The further RPS waterbird surveys of the intertidal study site covered the late autumn- early winter period. Within the most recent five years, monthly count coverage by WeBS exists at high tide for the period September 2002 – March 2007 and at low water during winter 2001/02 (November-February). To provide some assessment of how representative the RPS waterbird survey data is of the winter period as a whole, tables 5.3, 5.4 and 5.5 provide a summary of the available WeBS data. It should be noted however that the corresponding WeBS count sectors extend well beyond the area of coverage of the RPS intertidal study, the respective count areas and sectors being shown in Figure B.4. Furthermore, the Elmley Marshes WeBS high water count sector includes substantial areas of grazing marshes and freshwater which influences the species composition and numbers e.g. Coot & wildfowl. Numbers of birds counted by WeBS can therefore be expected to be higher than those recorded by the RPS intertidal survey, in some cases

markedly so e.g. Wigeon that often favour grazing marshes. The WeBS data are most appropriately considered in the context of how representative the RPS intertidal surveys findings are of when wintering waterbird usage peaks in the study area.

5.24 At low tide in late winter, the RPS waterbird survey counts for all but three species (Teal, Oystercatcher and Redshank) listed on the designation for Swale SPA and Swale SSSI, represented no more than 86% of the peak numbers recorded by the WeBS low tide counts of winter 2001/02. For Teal Oystercatcher and Redshank, the RPS waterbird surveys peak late winter count was up to 229%, 400% and 119% respectively of the numbers recorded by the WeBS low tide counts of winter 2001/02 within the corresponding count sectors. It should be noted the individual mudflat counts for the WeBS low tide counts can not necessarily be summated for a total count and particularly in respect to the peak counts. Although WeBS low tide count methodology state simultaneous counts of all sections within a site are preferable, they are not compulsory (Musgrove et al. 2003).

5.25 Table 5.4 presents the raw monthly totals for WeBS Low Tide Count data for the winter 2001/2002 for Swale Estuary. For the winter season of the survey, numbers of nine of the 13 species listed on the designation for Swale SPA and Swale SSSI peaked in early/mid winter. A similar proportion of the key species are also shown in Table 5.5 to peak numerically when considering wintering populations using at high tide the two WeBS Core Count sectors within which is the RPS intertidal study area. It is therefore likely that the RPS intertidal waterbird surveys have now provided for the majority of species considered, an assessment of the site's importance at the time of peak winter usage.

Table 5.3: Peak low water counts of key waterbirds species recorded by intertidal surveys of the study area by WeBS (winter 2001/02) and RPS (November 2009-January 2010).

Species	Peak low water count during November 2009 - January 2010 at Kemsley study area	WeBS peak low water counts Nov-Feb 2001/02			
		DS003	DS004	DS005	DS007
Little Grebe	19	5	0	50	10
Little Egret	5	1	0	3	0
Dark-bellied Brent Goose	0	0	0	1	0
Shelduck	93	51	4	300	62
Wigeon	128	168	0	40	105
Gadwall	2	0	0	6	0
Teal	549	18	82	240	2
Pintail	74	2	0	68	80
Shoveler	2	0	0	40	64
Coot	43	7	0	144	0
Oystercatcher	240	4	4	60	26
Avocet	52	3	0	16	0
Ringed Plover	14	1	0	58	7
Grey Plover	29	35	11	116	113
Lapwing	553	32	0	600	50
Knot	7	0	0	35	3
Dunlin	230	143	11	450	765
Snipe	18	0	0	49	2
Black-tailed Godwit	209	12	5	74	582
Curlew	48	10	9	22	56
Spotted Redshank	0	0	7	1	0
Redshank	298	46	78	250	13

Species	Peak low water count during November 2009 - January 2010 at Kemsley study area	WeBS peak low water counts Nov-Feb 2001/02			
		DS003	DS004	DS005	DS007
Greenshank	3	0	0	0	0
Turnstone	5	4	0	1	2

Note:

The data are taken from the period three hours either side of low tide.

The individual WeBS sector counts for a species can not be summated for a total as the individual peak counts may be in different months. The raw WeBS data were not made available to allow such a summation.

Table 5.4: WeBS Low Tide Count data for the winter 2001/2002 for Swale Estuary: Raw monthly totals for species counted for the whole site

Species	Nov	Dec	Jan	Feb	Maximum count	Month of maximum count
Little Grebe	22	26	64	33	64	Jan
Great Crested Grebe	26	17	4	311	311	Feb
Black-necked Grebe	1	.	.	.	1	Nov
Cormorant	21	46	2	51	51	Feb
Little Egret	14	19	3	5	19	Dec
Grey Heron	14	6	2	4	14	Nov
Mute Swan	3	3	20	2	20	Jan
Canada Goose	1	.	.	.	1	Nov
Barnacle Goose	.	.	.	9	9	Feb
Dark-bellied Brent Goose	.	472	106	1690	1690	Feb
Light-bellied Brent Goose	.	.	.	12	12	Feb
Shelduck	776	1538	977	2039	2039	Feb
Wigeon	407	580	603	1187	1187	Feb
Gadwall	.	.	.	6	6	Feb
Teal	261	533	692	586	692	Jan
Mallard	264	93	102	150	264	Nov
Pintail	4	68	503	94	503	Jan
Shoveler	31	55	166	5	166	Jan
Pochard	.	133	.	184	184	Feb
Tufted Duck	.	6	.	8	8	Feb
Eider	1	2	.	1	2	Dec
Common Scoter	.	.	.	2	2	Feb
Goldeneye	1	14	3	14	14	Dec,Feb
Red-breasted Merganser	4	21	2	12	21	Dec
Water Rail	.	.	2	.	2	Jan
Moorhen	1	3	2	2	3	Dec
Coot	30	58	197	60	197	Jan
Oystercatcher	3684	6085	350	5106	6085	Dec
Avocet	117	118	16	21	118	Dec
Ringed Plover	206	156	17	40	206	Nov

Species	Nov	Dec	Jan	Feb	Maximum count	Month of maximum count
Golden Plover	490	176	109	2335	2335	Feb
Grey Plover	880	1567	228	1225	1567	Dec
Lapwing	376	1280	109	1941	1941	Feb
Knot	465	474	1110	1007	1110	Jan
Sanderling	47	8	.	.	47	Nov
Dunlin	6932	9189	3978	6127	9189	Dec
Snipe	82	31	3	7	82	Nov
Black-tailed Godwit	426	323	275	1580	1580	Feb
Bar-tailed Godwit	337	247	95	383	383	Feb
Curlew	589	830	247	1174	1174	Feb
Spotted Redshank	.	7	1	.	7	Dec
Redshank	1262	1777	529	1570	1777	Dec
Common Sandpiper	1	.	.	.	1	Nov
Turnstone	387	389	26	178	389	Dec
Re-established Greylag	.	.	1	16	16	Feb

Note:
Swale SPA citation species are shown in italic.
Gulls excluded

Table 5.5: Five-year mean monthly WeBS Core Counts of key waterbirds species recorded for the sectors Elmley Marshes and Murston-Conyer at high tide

	Sector	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Little Grebe	Murston	4	18	30	**46**	28	22	10
	Elmley	11	20	**6**	5	5	0	4
Great Crested Grebe	Murston	12	11	**12**	9	3	5	7
	Elmley	21	27	13	13	**14**	3	9
Little Egret	Murston	6	24	**11**	3	3	2	2
	Elmley	37	30	**12**	7	4	3	1
Cormorant	Murston	6	8	7	**22**	11	10	13
	Elmley	19	62	**41**	36	25	5	17
White-fronted Goose	Murston	0	0	0	0	0	0	0
	Elmley	0	0	2	13	**121**	0	0
Dark-bellied Brent Goose	Murston	0	0	1	0	75	**90**	0
	Elmley	0	11	13	5	33	14	**43**
Mute Swan	Murston	2	5	3	0	2	3	**5**
	Elmley	28	41	31	**89**	48	3	7
Shelduck	Murston	18	188	106	269	227	**272**	79
	Elmley	95	534	411	691	**994**	565	545
Wigeon	Murston	65	133	**502**	309	166	439	31
	Elmley	217	3,805	6,878	7,527	**13,038**	6,211	2,803
Gadwall	Murston	0	1	6	6	**16**	6	4
	Elmley	3	8	4	6	**25**	9	14
Teal	Murston	15	22	41	96	71	**134**	59
	Elmley	1,717	2,181	**1,669**	1,659	2,511	307	321
Mallard	Murston	28	25	13	22	**30**	23	14
	Elmley	368	423	407	650	**725**	184	120
Pintail	Murston	0	0	1	4	12	**48**	10
	Elmley	59	193	250	451	**706**	175	166
Shoveler	Murston	0	18	14	**14**	6	10	7
	Elmley	50	76	100	134	**158**	71	107
Pochard	Murston	4	3	27	57	**164**	70	17
	Elmley	0	0	7	0	2	7	**36**
Tufted Duck	Murston	0	3	9	17	**32**	18	11
	Elmley	2	5	3	5	8	12	**37**
Red-breasted Merganser	Murston	0	0	4	**12**	2	8	4
	Elmley	0	0	2	0	**3**	2	2
Coot	Murston	20	24	69	107	108	**142**	29
	Elmley	22	14	9	74	86	69	**131**
Oystercatcher	Murston	60	86	77	57	**84**	63	49
	Elmley	588	689	573	616	**638**	376	487
Avocet	Murston	4	9	15	23	**31**	12	19
	Elmley	43	285	91	67	135	142	**432**
Ringed Plover	Murston	0	5	0	0	0	0	**3**
	Elmley	210	146	91	**101**	76	47	59
Golden Plover	Murston	0	89	**207**	60	190	146	120
	Elmley	45	541	448	709	**2,566**	107	433
Grey Plover	Murston	19	51	66	45	**72**	46	33
	Elmley	702	621	555	497	**614**	194	479
Lapwing	Murston	210	283	**752**	553	620	364	43
	Elmley	1,017	950	1,985	2,745	**6,287**	921	463
Knot	Murston	0	0	**95**	79	16	16	28

	Sector	Sep	Oct	Nov	Dec	Jan	Feb	Mar
	Elmley	27	52	162	443	**1,002**	133	395
Dunlin	Murston	200	268	870	**1,850**	1,125	1,235	269
	Elmley	41	2,354	1,153	2,203	**2,778**	1,703	1,422
Ruff	Murston	0	0	0	0	0	0	0
	Elmley	9	1	0	0	1	3	**4**
Snipe	Murston	0	1	2	**4**	2	1	1
	Elmley	5	2	3	11	13	3	**17**
Black-tailed Godwit	Murston	110	185	135	185	**303**	218	291
	Elmley	148	138	387	265	343	120	**526**
Bar-tailed Godwit	Murston	0	1	0	2	**2**	0	0
	Elmley	32	79	18	72	73	**179**	5
Whimbrel	Murston	2	1	0	0	0	0	0
	Elmley	3	0	0	0	0	0	0
Curlew	Murston	23	24	28	26	**67**	18	22
	Elmley	315	312	383	176	345	284	**413**
Spotted Redshank	Murston	0	0	0	0	0	0	0
	Elmley	24	7	**2**	1	0	0	0
Redshank	Murston	190	210	140	**154**	126	116	76
	Elmley	294	408	219	**329**	167	93	187
Greenshank	Murston	26	32	**2**	1	1	1	1
	Elmley	4	2	0	0	0	0	0
Turnstone	Murston	0	14	**20**	19	12	18	3
	Elmley	100	85	66	**66**	34	17	34

Note:

Swale SPA citation species are shown in italic.

The figures in bold are peak winter counts (November - March).

6 CONCLUSIONS

6.1 The data presented in this study provides a robust record of the abundance, behaviour and spatial distribution of waterbirds present during the months of October 2009 to January 2010. The findings identify the intertidal area adjacent to Kemsley to be used by waterbird populations of significant conservation value.

6.2 A total of 44 species of waterbird (excluding gulls and terns) were recorded using the survey area within the vicinity of Kemsley in October 2009 – January 2010, overall site usage peaking in January. Of these, 9 species were of conservation value due to their presence as species listed on the designation for The Swale Estuary SPA. These species are: Dark-bellied Brent Goose, Gadwall, Teal, Oystercatcher, Ringed Plover, Grey Plover, Knot, Dunlin and Redshank.

6.3 The species present on the intertidal mudflats were primarily using the area for feeding. This is recognised as being an important activity in maintaining the birds in viable condition for migration and breeding. The species present on the areas of saltmarsh and the land adjoining Elmley were predominantly roosting.

6.4 The diurnal counts of Black-tailed Godwit during winter 2009/10 (November – January) suggest that the study site has been of international importance for the species. The site has also been of national importance for Black-tailed Godwit during the late autumn of 2009 (October). Diurnal counts of Avocet during winter 2009/10 (November – January) have shown that the site has been of national importance for the species. Significant proportions (>5%) of The Swale SPA populations for six of the cited waterbirds species were recorded (Teal, Oystercatcher, Ringed Plover, Grey Plover, Dunlin and Redshank).

6.5 In October 2009 and November 2009-January 2010, the total waterbird assemblage (3,467 and 7,962 birds respectively) was greater than 10% of the citation figure (for winter) and the latest WeBS five year autumn peak mean (2003-2007). Consequently representing a significant proportion (10.7% and 12.1% respectively) of the SPA waterbird community in both periods.

7 SUPPLEMENTARY EVIDENCE FOR ENVIRONMENTAL STATEMENT

Waterbird populations

7.1 The initial RPS intertidal waterbird surveys undertaken in February-March 2009 recorded a total of 33 species of waterbird during the late winter. Surveys of the early and mid winter periods recorded a total of 43 waterbird species. It should be noted the latter surveys covered an additional month to the former. In both periods the species of conservation value due to their listing on the designation for Swale SPA and Swale SSSI are considered, then the species are similar. The only additional species recorded in November – January which were not recorded in February - March are Dark-bellied Brent Goose, Gadwall and Spotted Redshank. These four species were recorded in only low numbers.

7.2 The total number of waterbird species recorded was slightly lower during October 2009 and April-May 2009 with 33 and 27 species respectively. The species of conservation value recorded includes the same species as recorded during the winter period.

7.3 These results support and confirm that the assessment of the waterbird populations undertaken in the Environmental Statement is accurate.

The importance of the intertidal study area as a discrete wetland for supporting internationally and national important waterbird populations

7.4 The initial RPS intertidal waterbird surveys undertaken in February-March 2009 showed that the study site had supported internationally important numbers of Black-tailed Godwit during the late winter period. The surveys undertaken during November 2009-January 2010 confirm that in early and mid winter the site has also supported internationally important numbers of Black-tailed Godwit.

7.5 Avocet numbers recorded during the surveys undertaken in February-March 2009 showed that the study site has been of national importance to the species in late winter. The surveys in November 2009-January 2010 confirm that the in early and mid winter the site has also been of national importance to Avocet.

7.6 These results support and confirm that the assessment given to the importance of the study area as a discrete wetland and the assessment of the importance of populations occurring within were accurately described in the Environmental Statement.

The importance to birds of the study area in the context of The Swale SPA

7.7 The initial RPS surveys undertaken in late winter (February-March 2009) showed that the study site has supported 105% of The Swale SPA Black-tailed Godwit population (based on the latest five-year winter peak mean from WeBS data). The surveys during early and mid winter (November 2009-January 2010) also show that the study site has been used by 87.4 % of The Swale SPA population. Although this

figure is slightly lower it still represents a significant proportion of The Swale SPA population.

7.8 The peak early – mid winter count of Greenshank represented 433.3% of The Swale SPA population (as derived from the latest available WeBS data). However when this count is considered against perhaps the more relevant autumn 5 year peak mean then the peak count only equates to 27.7% of the autumn population for The Swale SPA.

7.9 The initial RPS surveys undertaken in the late winter (February-March 2009) recorded the study area as supporting 5.1% of the waterbird assemblage for The Swale SPA (as estimated by the latest available WeBS five-year winter peak mean 2002/03-2006/07). The waterbird assemblage recorded during the early – mid winter period (November 2009-January 2010) represented a slightly higher proportion of The Swale SPA (10.4%). However looking at the underlying WeBS data the majority of the peak monthly counts each year on The Swale occur in January. It is therefore not surprising that the early – mid winter period surveys recorded slightly a slightly higher waterbird assemblage.

7.10 These results support and confirm that the assessment given in the Environmental Statement as to the importance of the study site in the context of The Swale SPA are accurate.

The species composition and distribution of waterbirds utilising the study area

7.11 The four most numerous waterbirds recorded using the study area during the surveys undertaken in late winter (February-March 2009) were in descending order (excluding gull species) Black-tailed Godwit, Oystercatcher, Teal and Dunlin. The respective species list for the surveys undertaken in early and mid winter (November 2009-January 2010) were: Dunlin, Black-tailed Godwit, Knot, and Oystercatcher. The composition of the species involved is fairly similar with Teal having been replaced by Redshank the only change in species.

7.12 In both the autumn (October only) and spring periods the most numerous species recorded were similar to those in winter. The five species involved were (in no particular order) Black-tailed Godwit, Redshank, Oystercatcher, Teal and Dunlin.

7.13 The distribution of waterbirds recorded within the study site during the early – mid winter period was similar to that recorded during the previous late winter period. High tide roosts where again recorded from the peninsula at Elmley, opposite the proposed development and on the saltmarsh islands The Lilies. When the intertidal flats where exposed the main concentrations of feeding waterbirds where observed in the bay at Elmley, on the lower reaches of the flats on the east side of Elmley reach and along Milton Creek.

7.14 The data for October 2009 does not suggest any marked changes in the distribution of waterbirds using the study area to that previous observed.

7.15 These results support and confirm that the assessment given to the composition of the waterbird assemblage in the Environmental Statement is accurate.

Implications for the impact assessment

7.16 The data gathered during the surveys in October 2009 to January 2010 completes the baseline for intertidal monitoring of waterbirds likely to be in the zone of influence from the proposed development.

7.17 The results of the intertidal waterbird surveys during October-January do not alter the Valued Ecological Receptors identified in the Environmental Statement and the outcomes of the assessments of construction and operational impacts on them. Therefore the assessments made within the Environmental Statement are accurate.

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9 APPENDICIES

Appendix A: Systematic list of all species common and scientific name recorded during intertidal surveys.

Common Name	Scientific Name
Great Northern Diver	*Gavia immer*
Little Grebe	*Tachybaptus ruficollis*
Great Crested Grebe	*Podiceps cristatus*
Cormorant	*Phalacrocorax carbo*
Shag	*Phalacrocorax aristotelis*
Little Egret	*Egretta garzetta*
Grey Heron	*Ardea cinerea*
Mute Swan	*Cygnus olor*
Canada Goose	*Branta canadensis*
Dark-bellied Brent Goose	*Branta bernicla*
Shelduck	*Tadorna tadorna*
Wigeon	*Anas Penelope*
Gadwall	*Anas strepera*
Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Pintail	*Anas acuta*
Shoveler	*Anas clypeata*
Pochard	*Aythya farina*
Tufted Duck	*Aythya fuligula*
Scaup	*Aythya marila*
Red-breasted Merganser	*Mergus serrator*
Goldeneye	*Bucephala clangula*
Water Rail	*Rallus aquaticus*
Moorhen	*Gallinula chloropus*
Coot	*Fulica atra*
Oystercatcher	*Haematopus ostralegus*
Avocet	*Recurvirostra avosetta*
Ringed Plover	*Charadrius hiaticula*
Golden Plover	*Pluvialis apricaria*
Grey Plover	*Pluvialis squatarola*
Lapwing	*Vanellus vanellus*
Knot	*Calidris canutus*
Dunlin	*Calidris alpina*
Snipe	*Gallinago gallinago*
Black-tailed Godwit	*Limosa limosa*
Bar-tailed Godwit	*Limosa lapponica*
Whimbrel	*Numenius phaeopus*
Curlew	*Numenius arquata*
Spotted Redshank	*Tringa erythropus*
Redshank	*Tringa tetanus*
Greenshank	*Tringa nebularia*
Green Sandpiper	*Tringa ochropus*
Turnstone	*Arenaria interpres*
Black-headed Gull	*Larus ribidundus*
Common Gull	*Larus canus*
Lesser Black-backed Gull	*Larus fuscus*
Herring Gull	*Larus argentatus*

Great Black-backed Gull	*Larus marinus*
Black Tern	*Chlidonias niger*
Kingfisher	*Alcedo atthis*

Appendix B: Maps detailing the study site

Appendix C: Distribution maps of key waterbird species recorded at Kemsley.

Figure C.1: Spatial distribution of Little Grebe over high water , Oct 2009

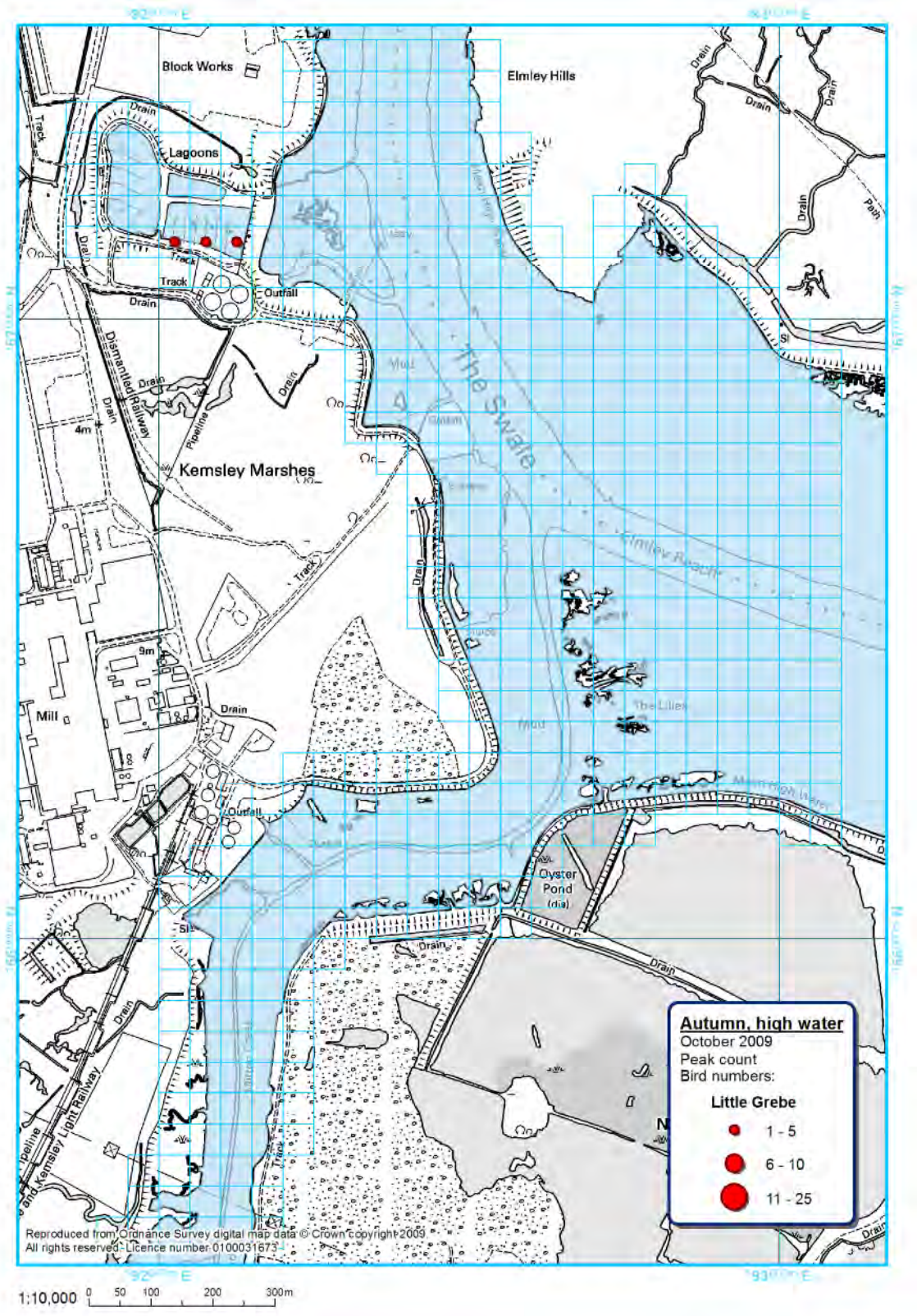

Figure C.2: Spatial distribution of Little Grebe over low water , Oct 2009

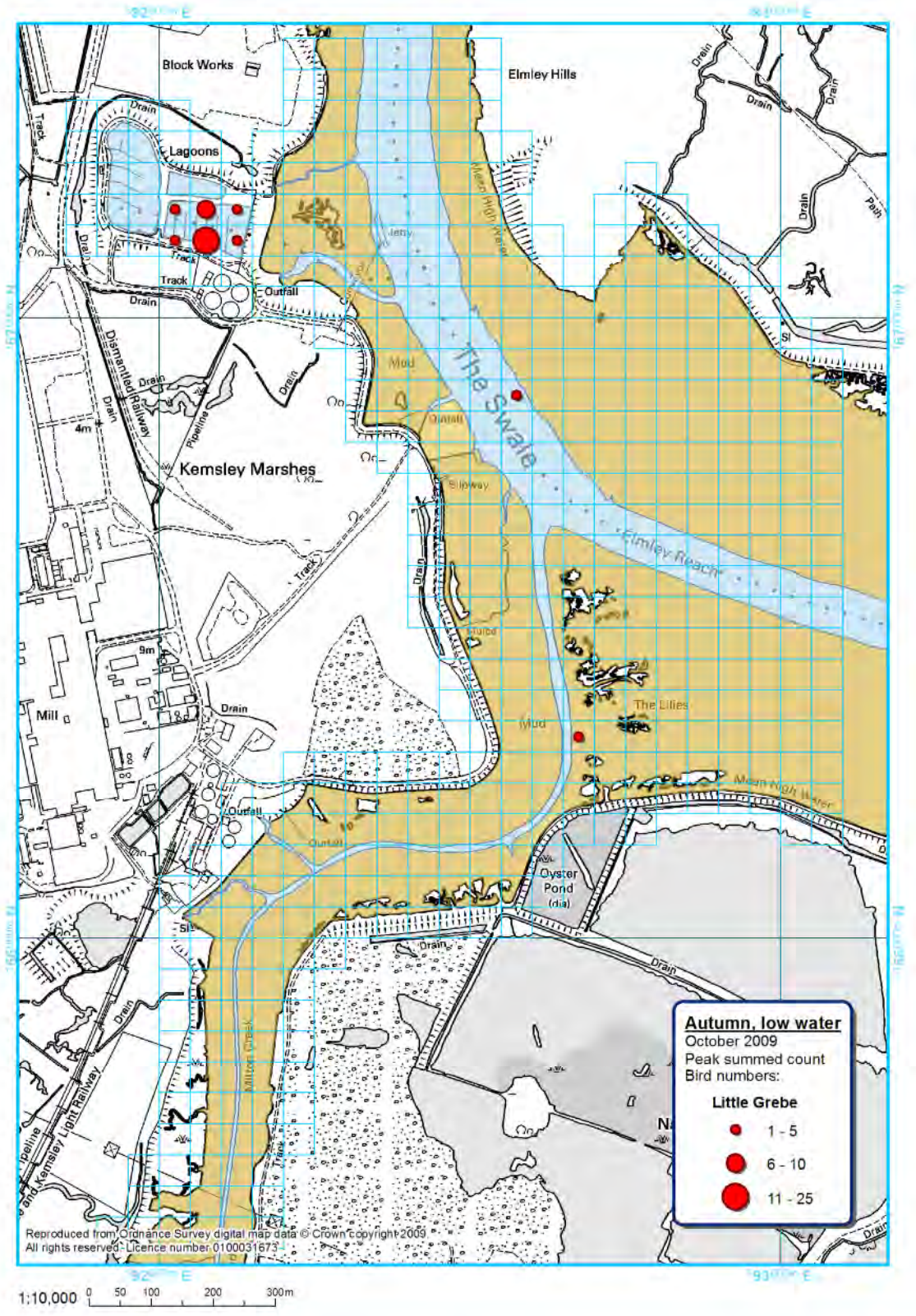

Figure C.3: Spatial distribution of Little Grebe over high water, Nov 2009 - Jan 2010

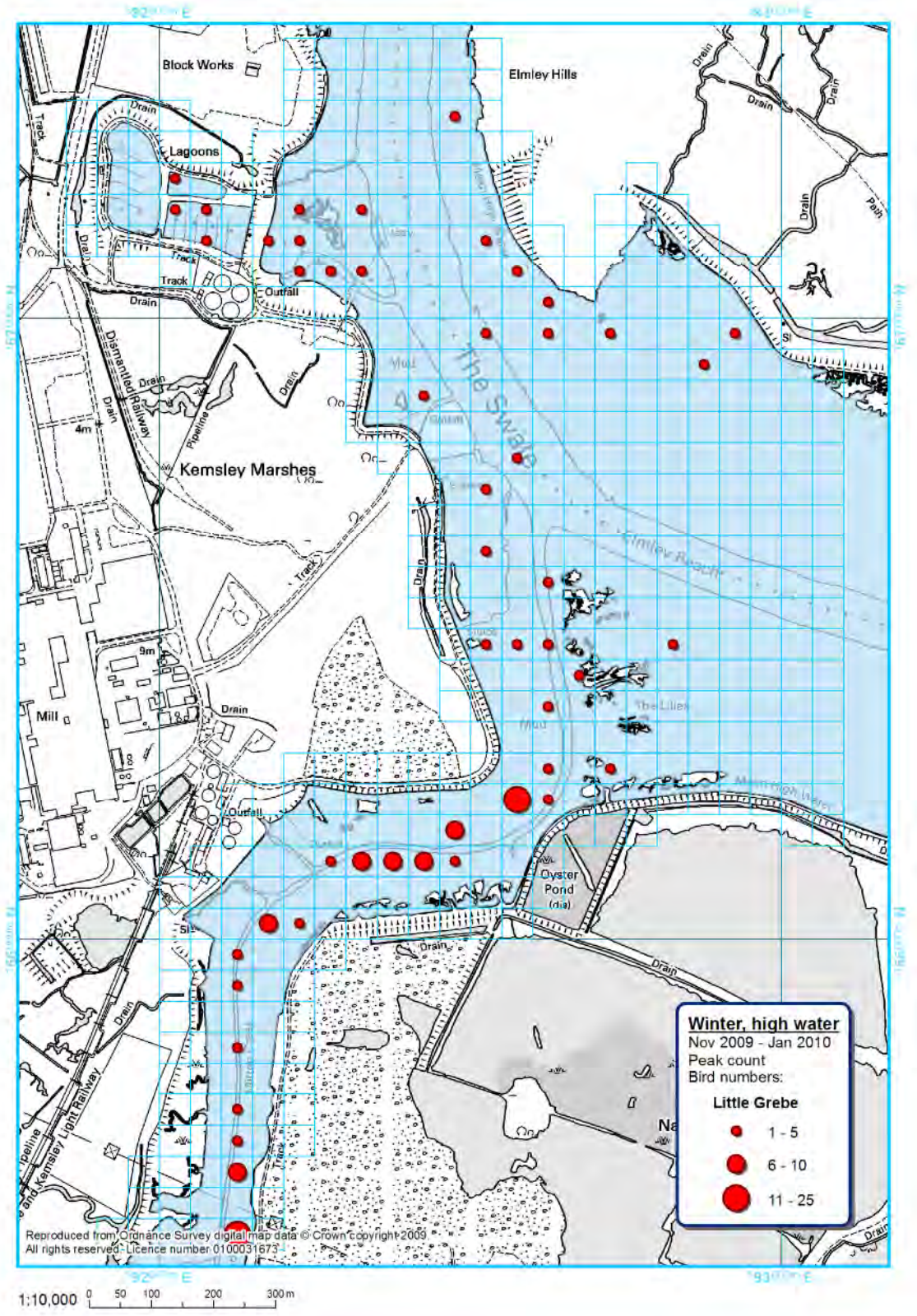

Figure C.4: Spatial distribution of Little Grebe over low water, Nov 2009 - Jan 2010

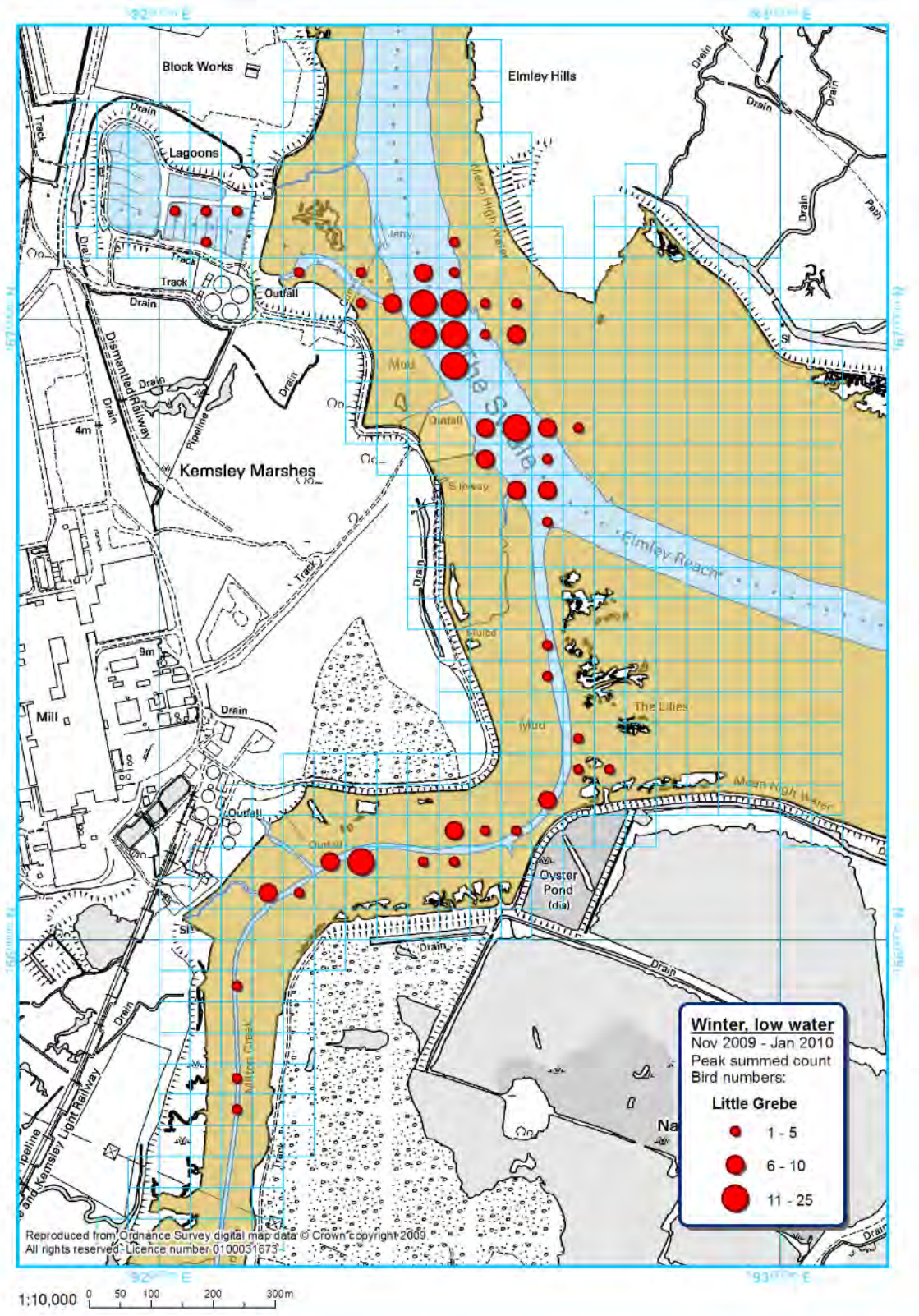

Figure C.5: Spatial distribution of Little Egret over high water , Oct 2009

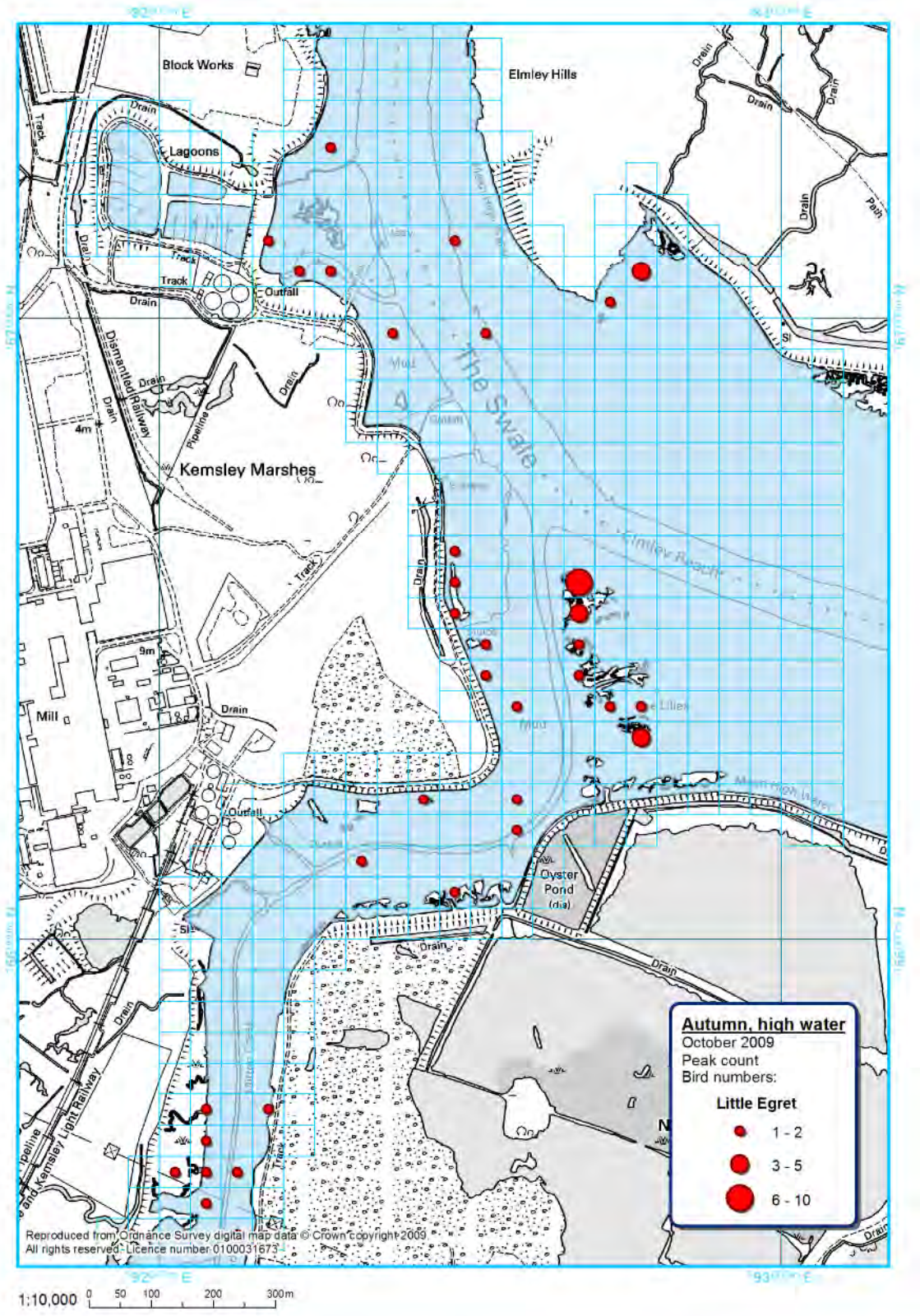

Figure C.6: Spatial distribution of Little Egret over low water , Oct 2009

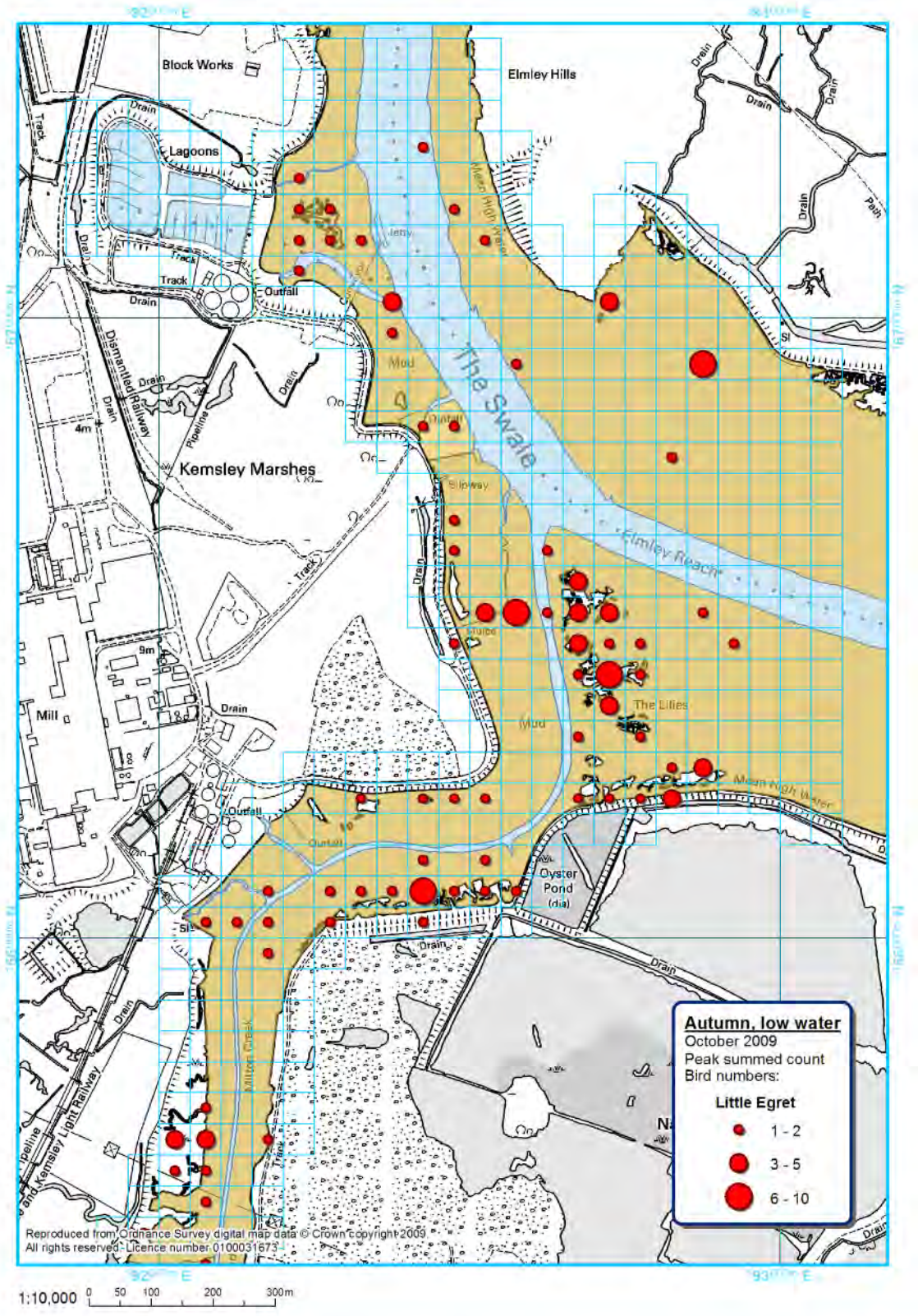

Figure C.7: Spatial distribution of Little Egret over high water, Nov 2009 - Jan 2010

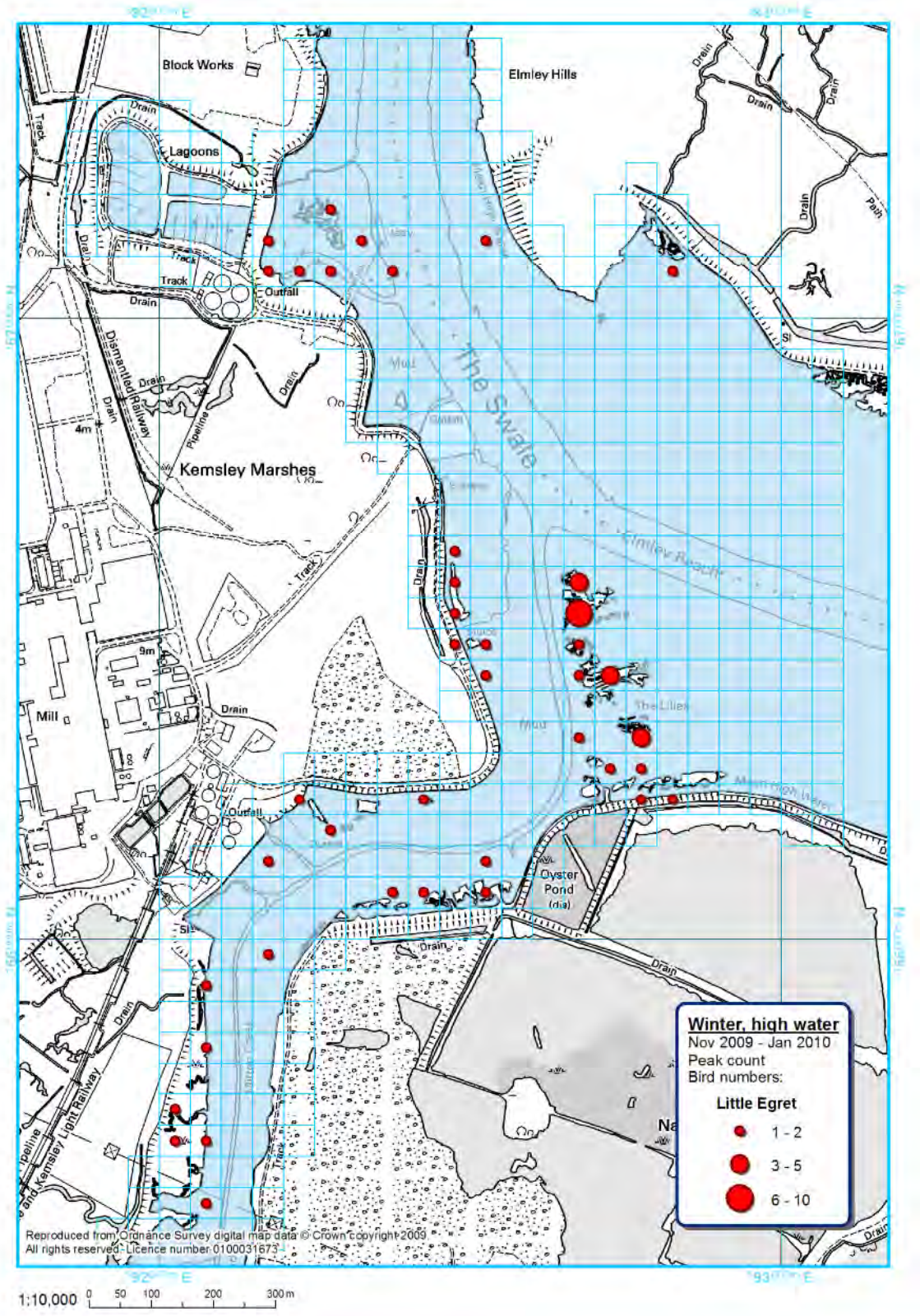

Figure C.8: Spatial distribution of Little Egret over low water, Nov 2009 - Jan 2010

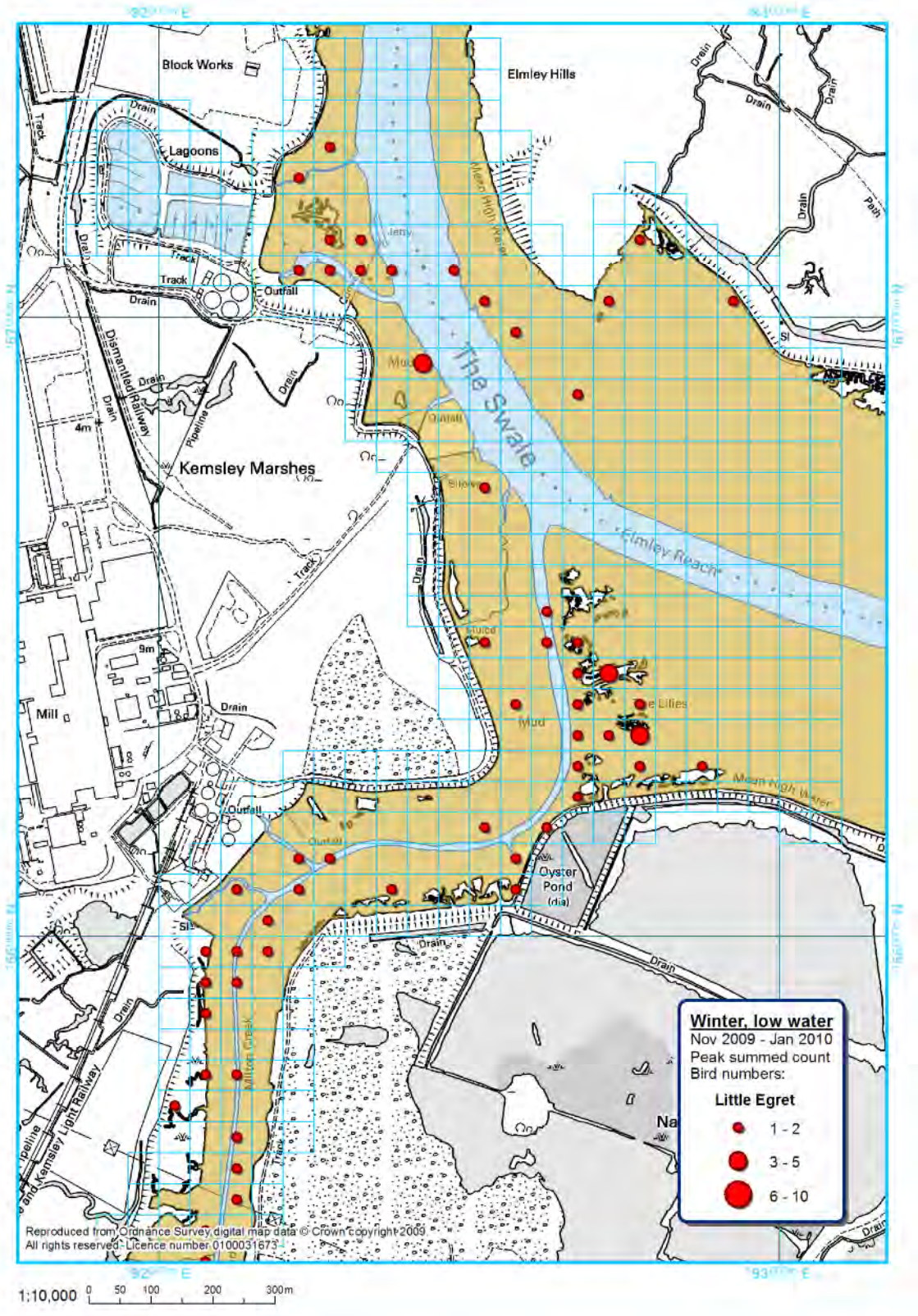

Figure C.9: Spatial distribution of Brent Goose over high water , Nov 2009 – Jan 2010

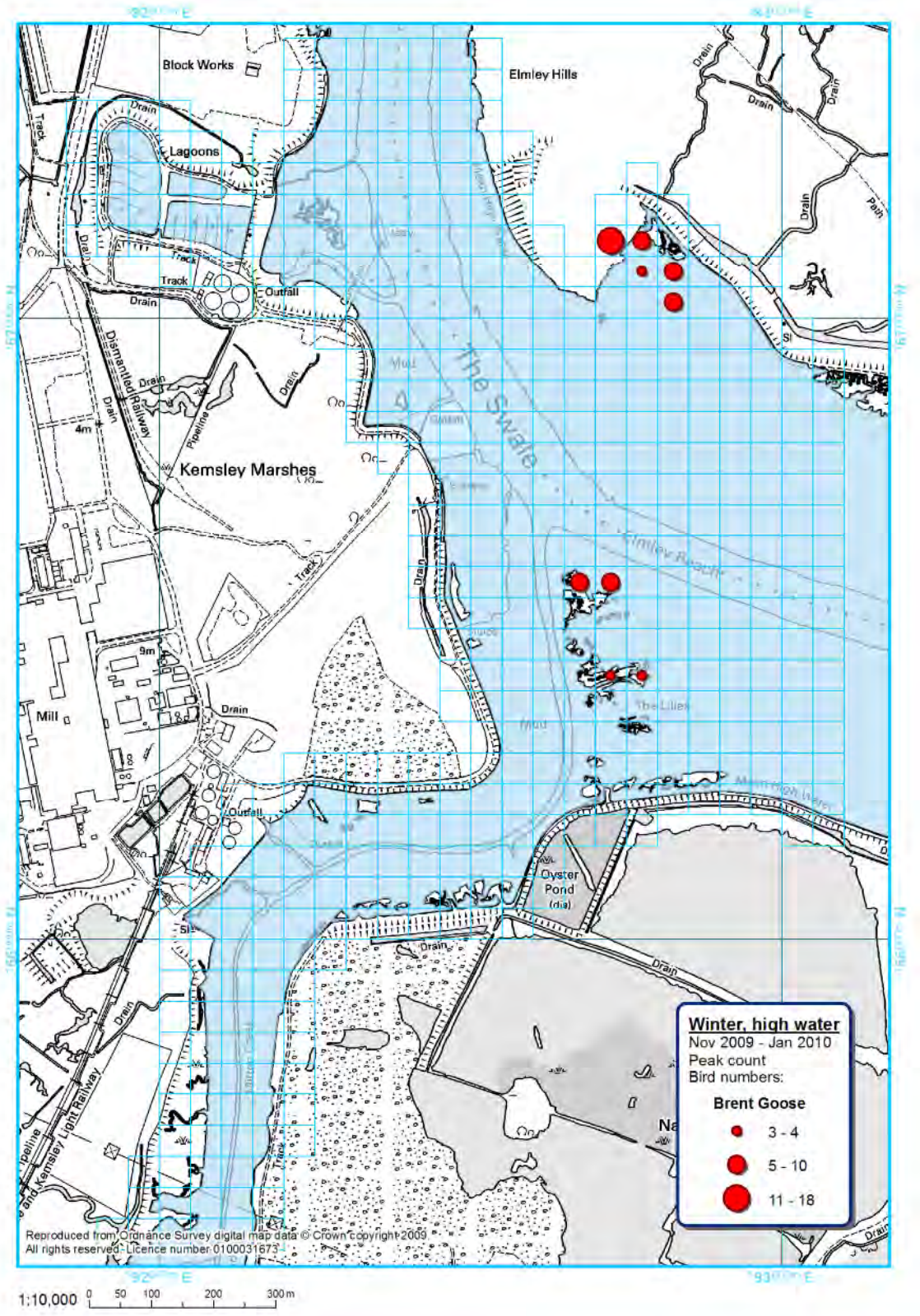

Figure C.10: Spatial distribution of Brent Goose over low water, Nov 2009 - Jan 2010

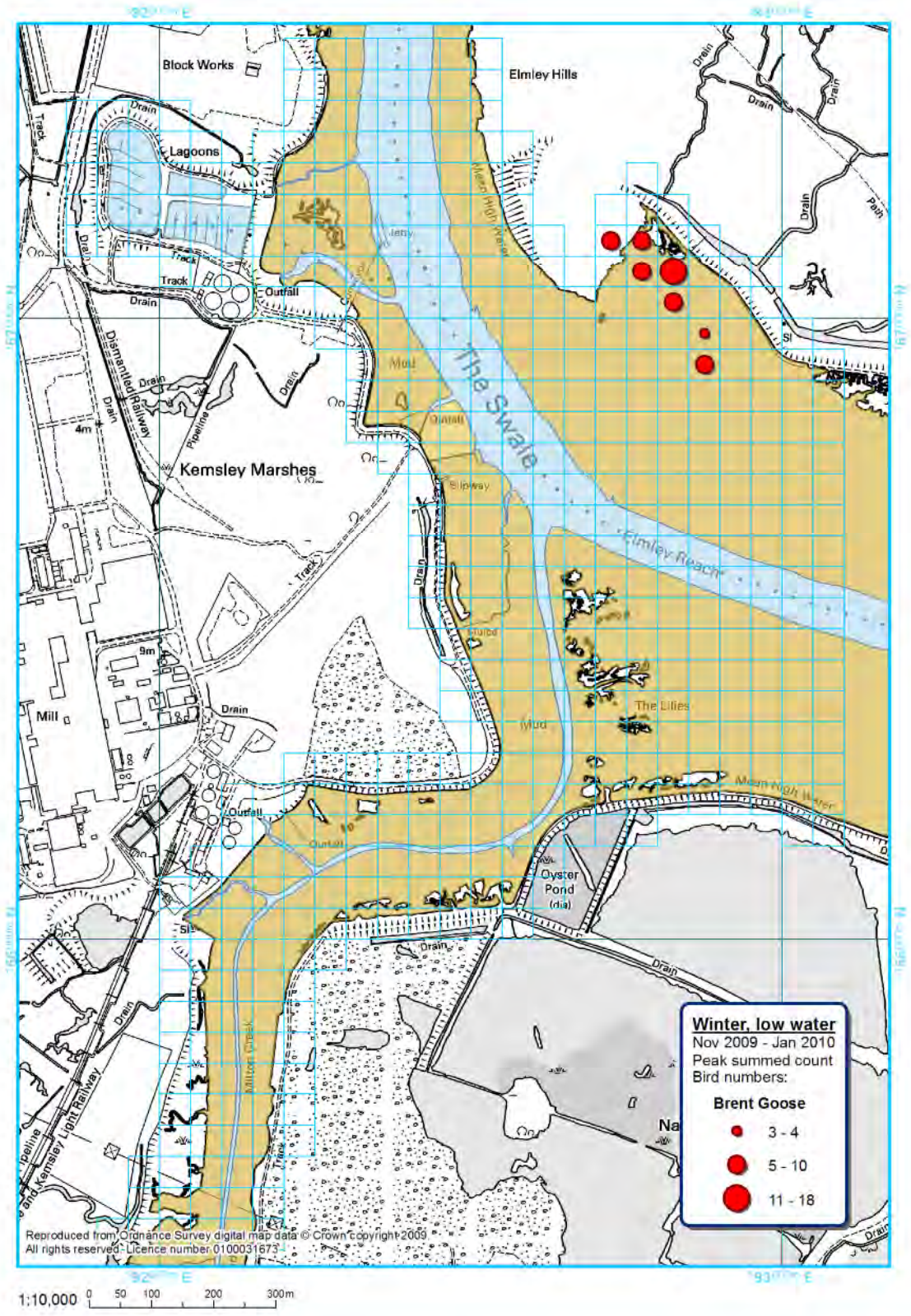

Figure C.11: Spatial distribution of Shelduck over high water , Oct 2009

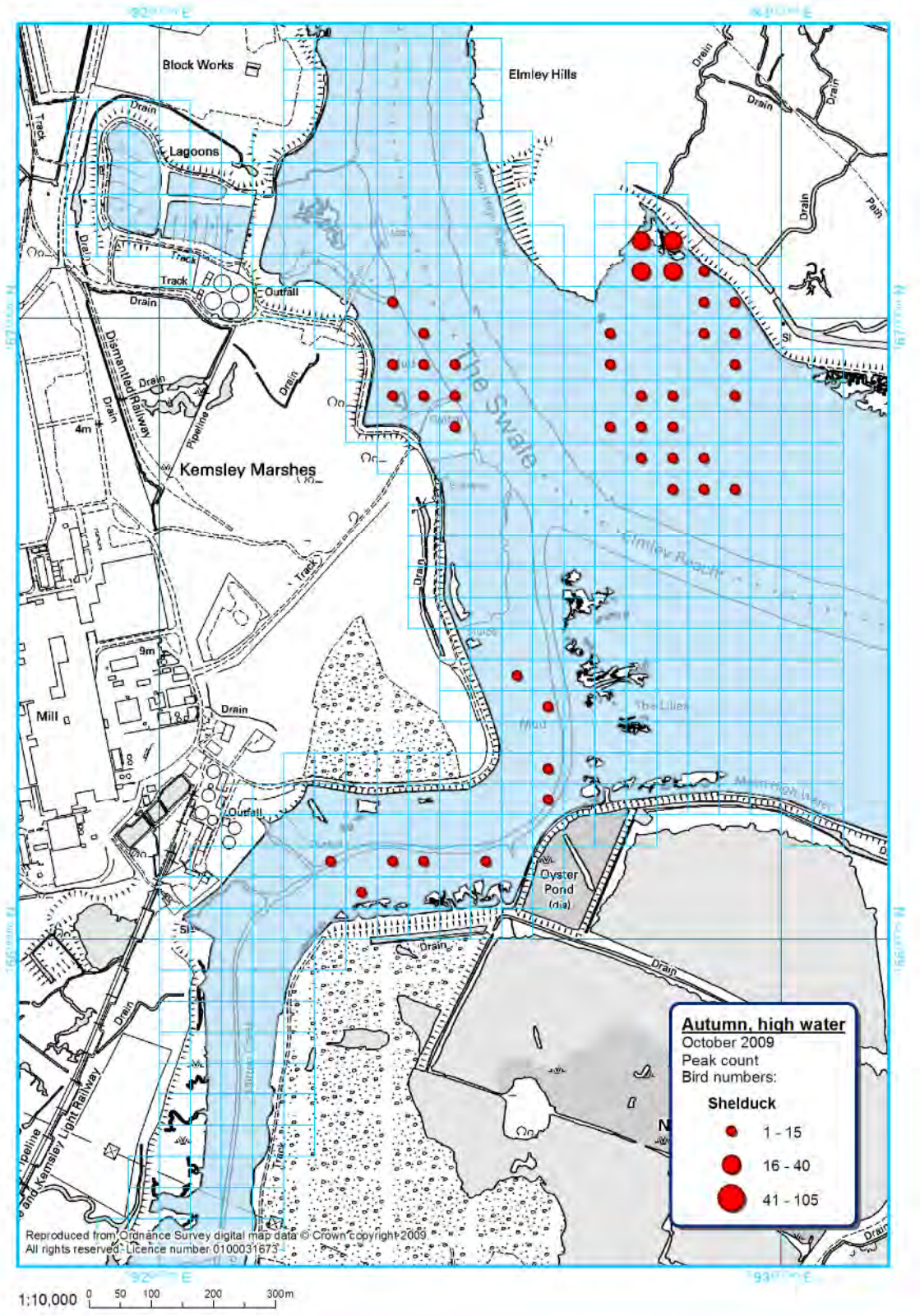

Figure C.12: Spatial distribution of Shelduck over low water , Oct 2009

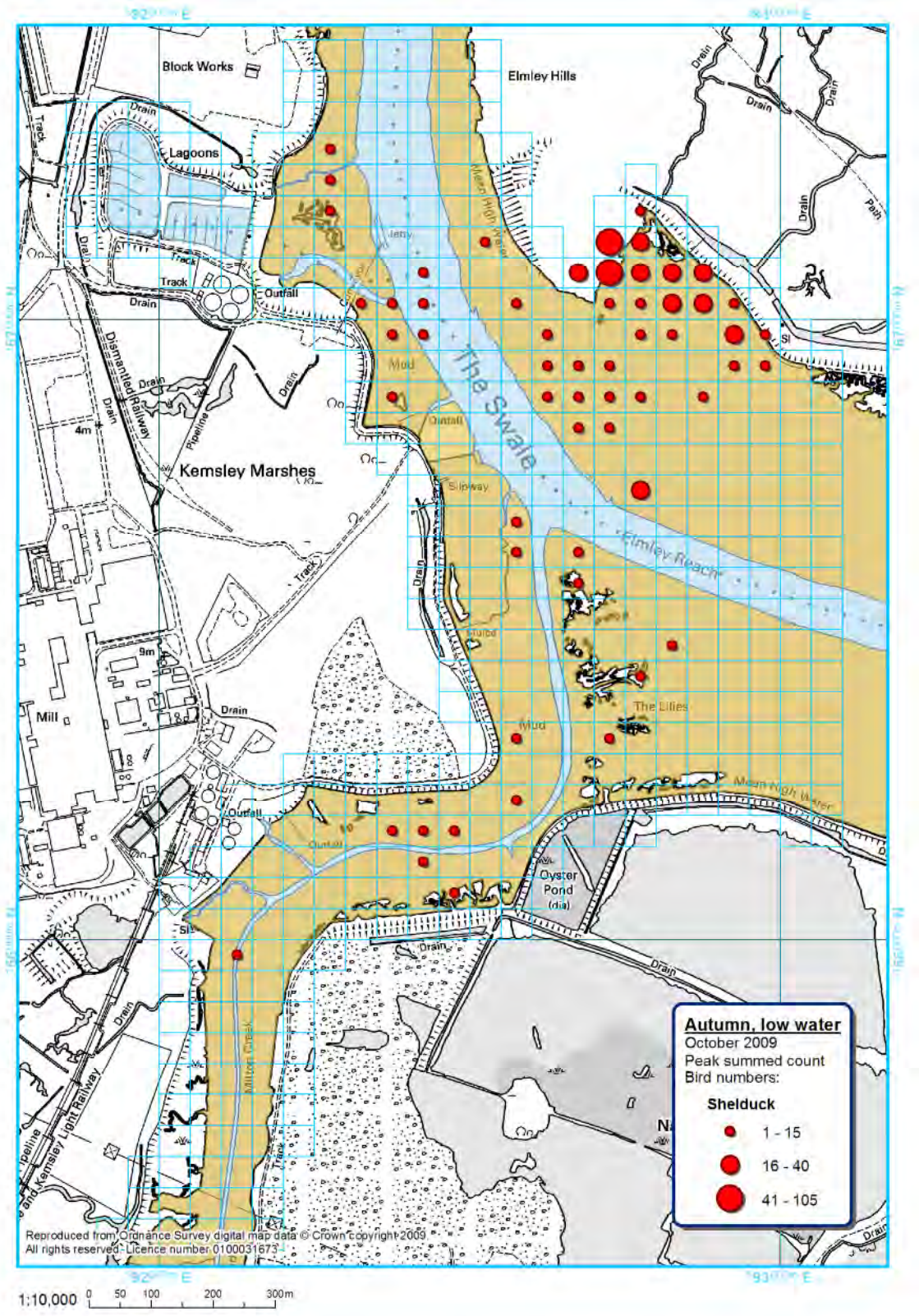

Figure C.13: Spatial distribution of Shelduck over high water, Nov 2009 - Jan 2010

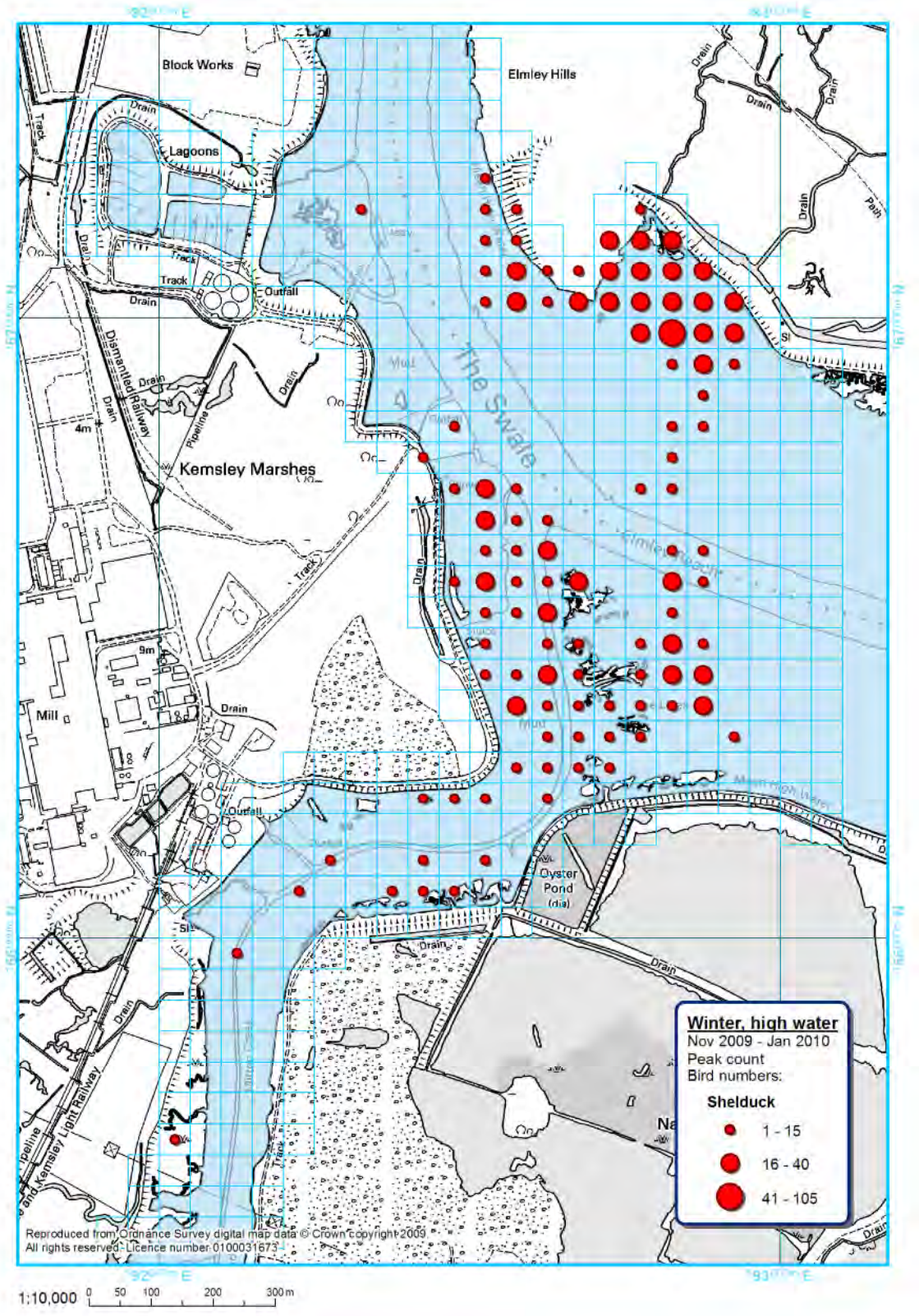

Figure C.14: Spatial distribution of Shelduck over low water, Nov 2009 - Jan 2010

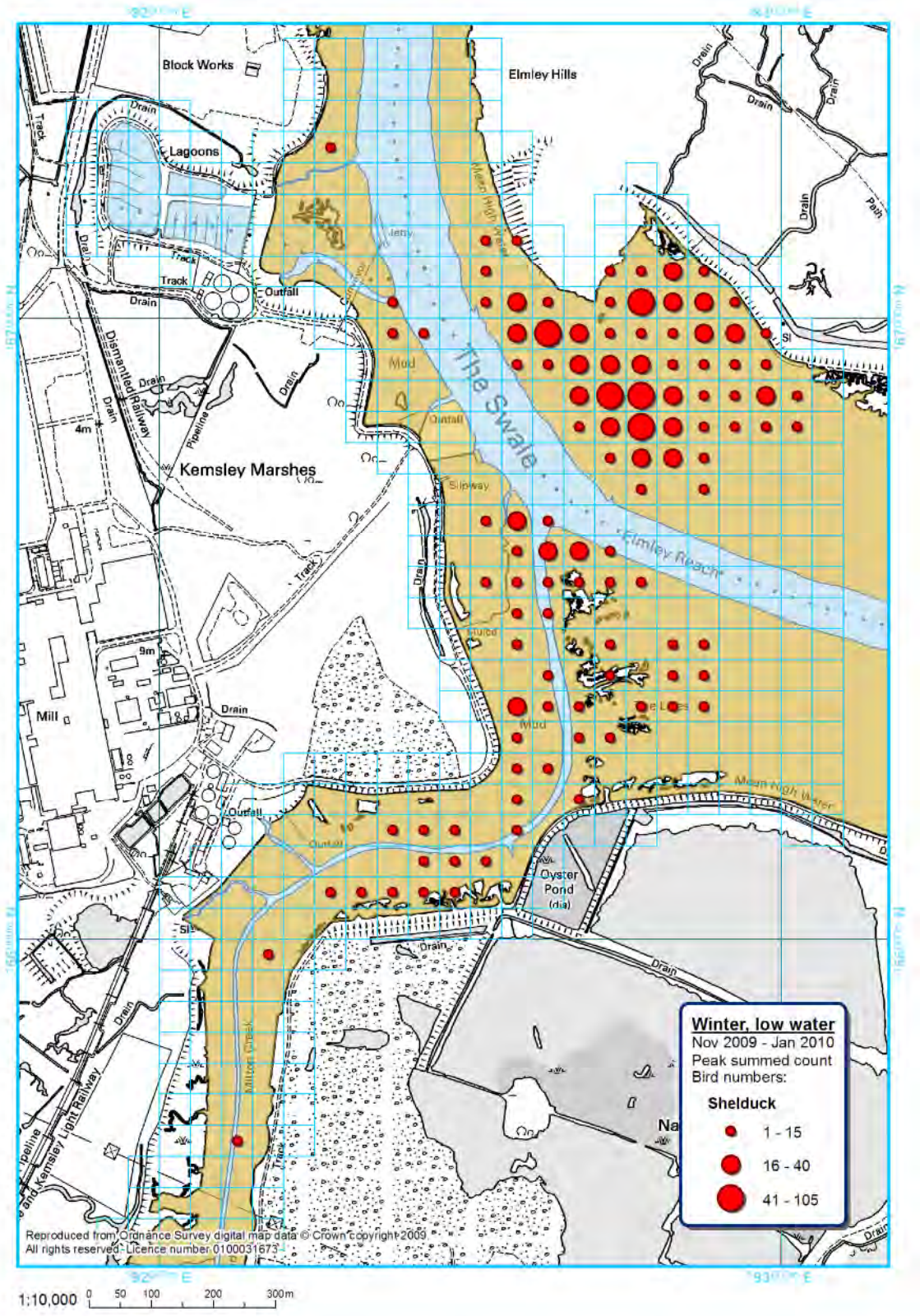

Figure C.15: Spatial distribution of Wigeon over high water , Oct 2009

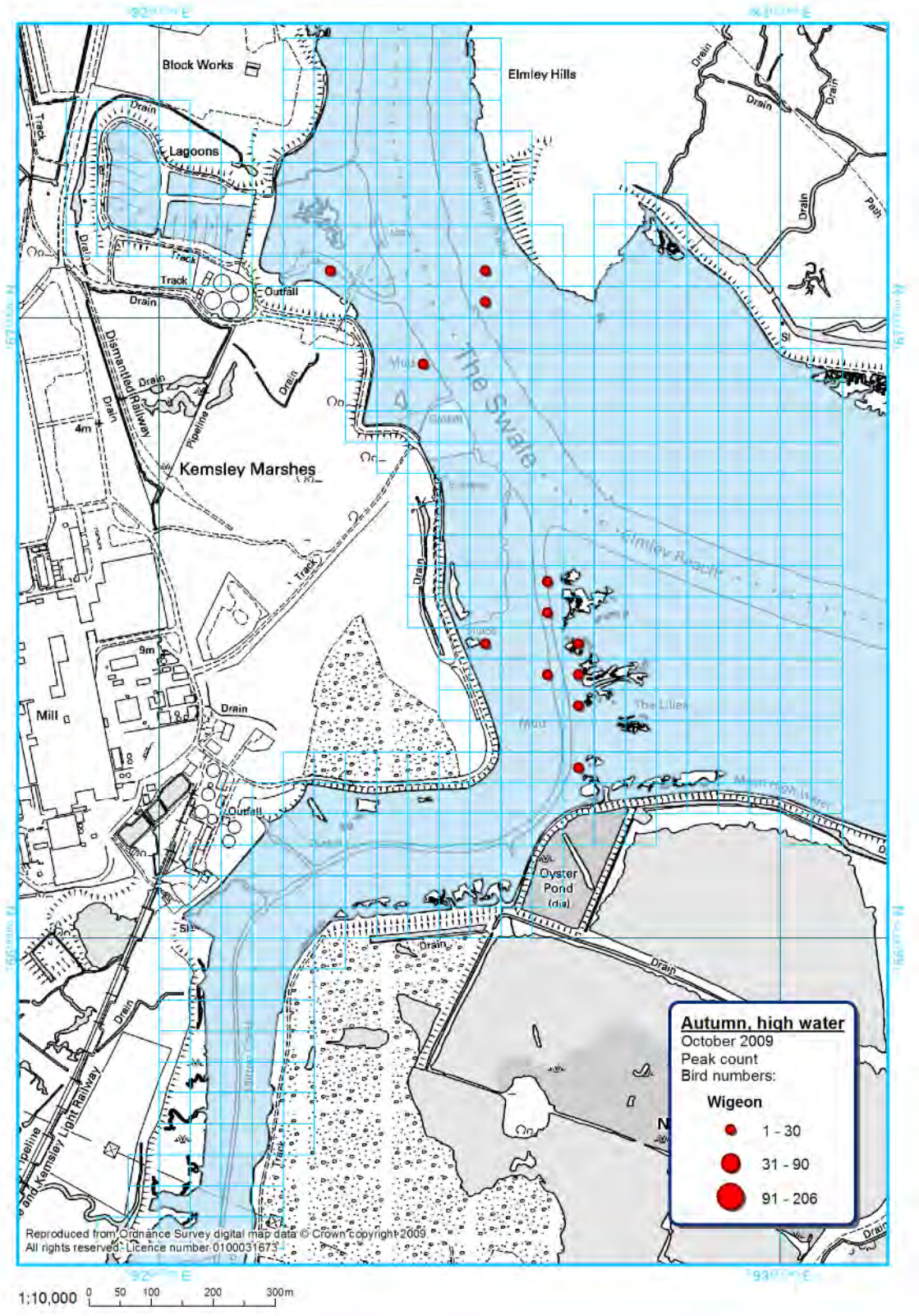

Figure C.16: Spatial distribution of Wigeon over low water , Oct 2009

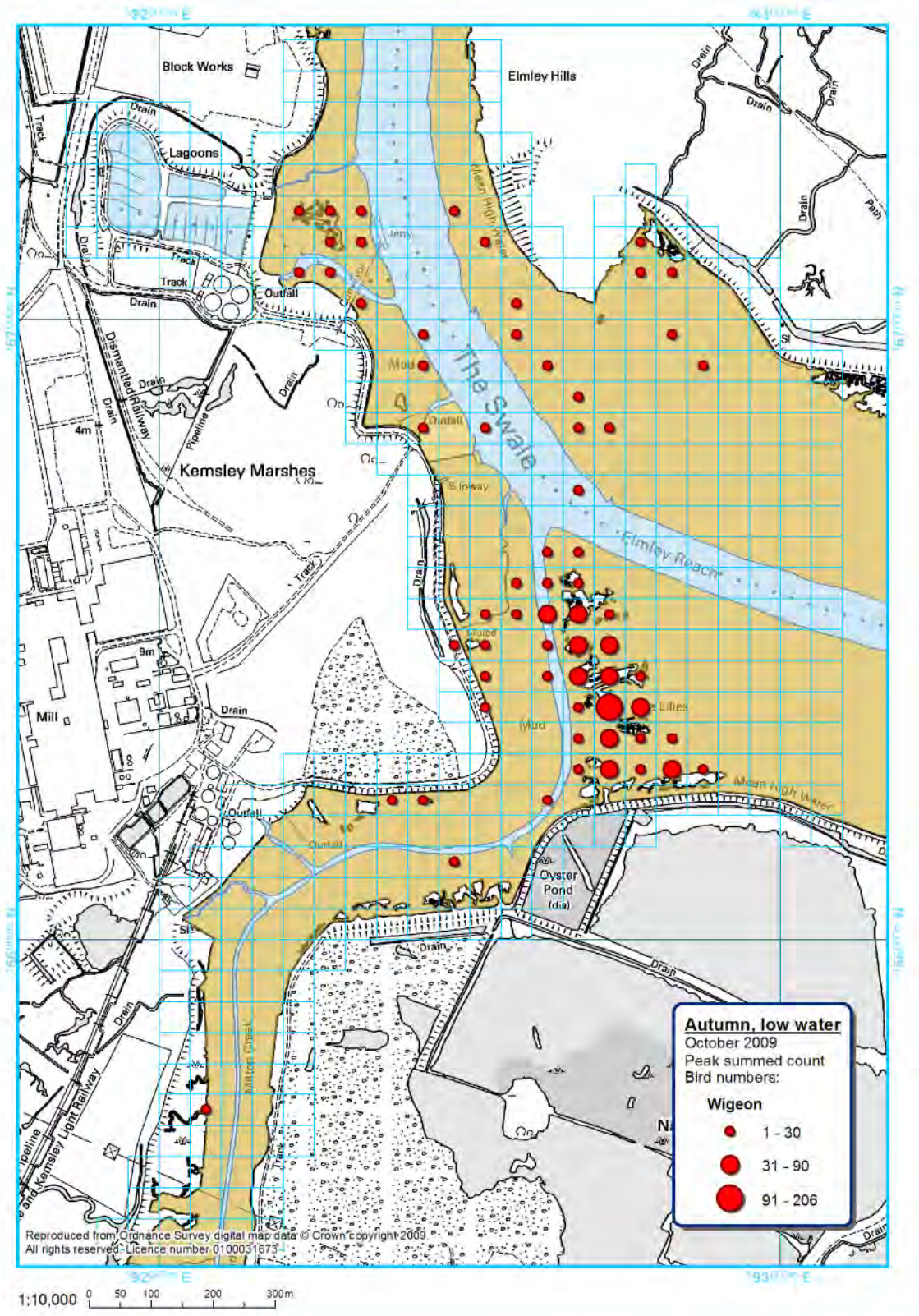

Figure C.17: Spatial distribution of Wigeon over high water, Nov 2009 - Jan 2010

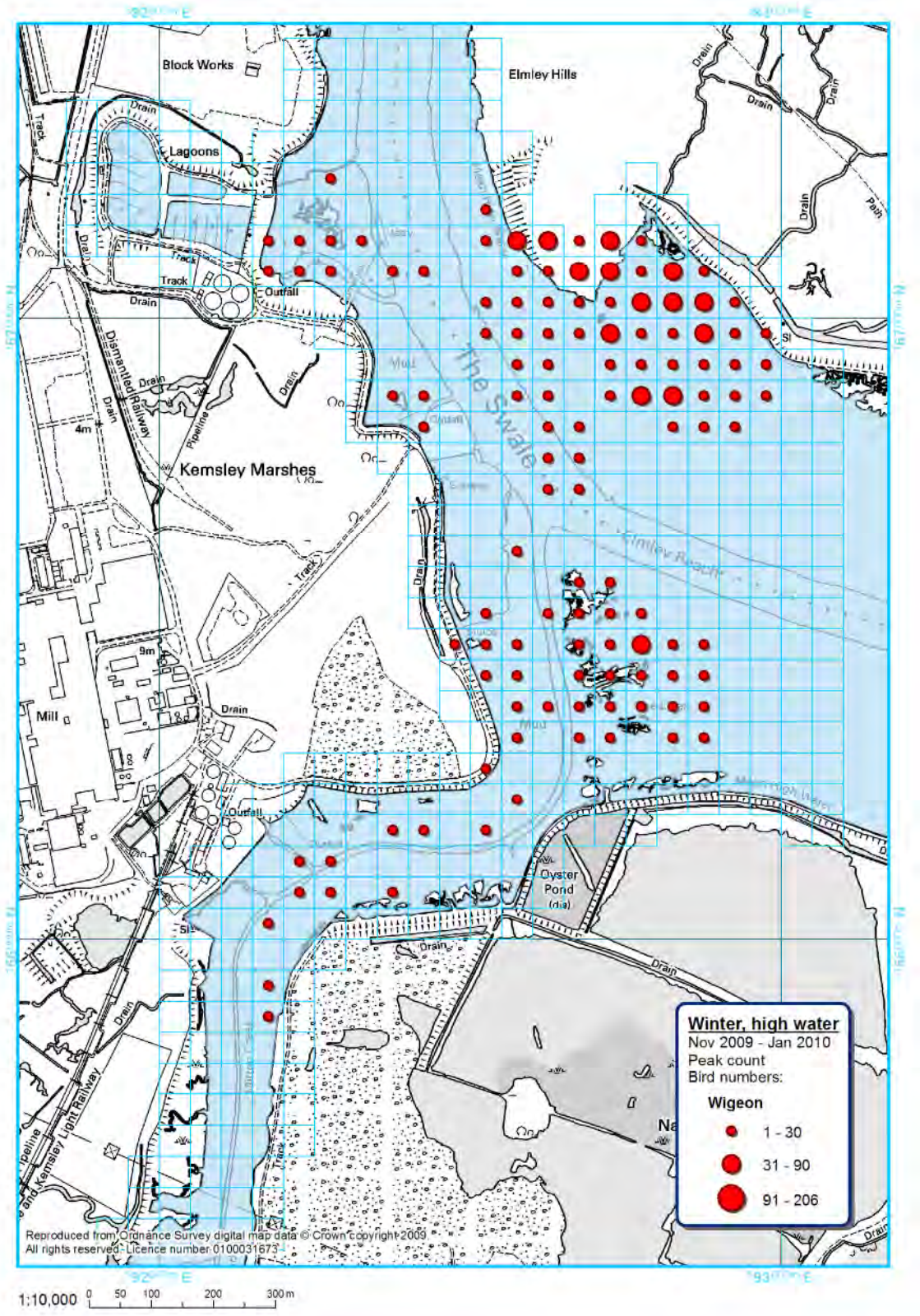

Figure C.18: Spatial distribution of Wigeon over low water, Nov 2009 - Jan 2010

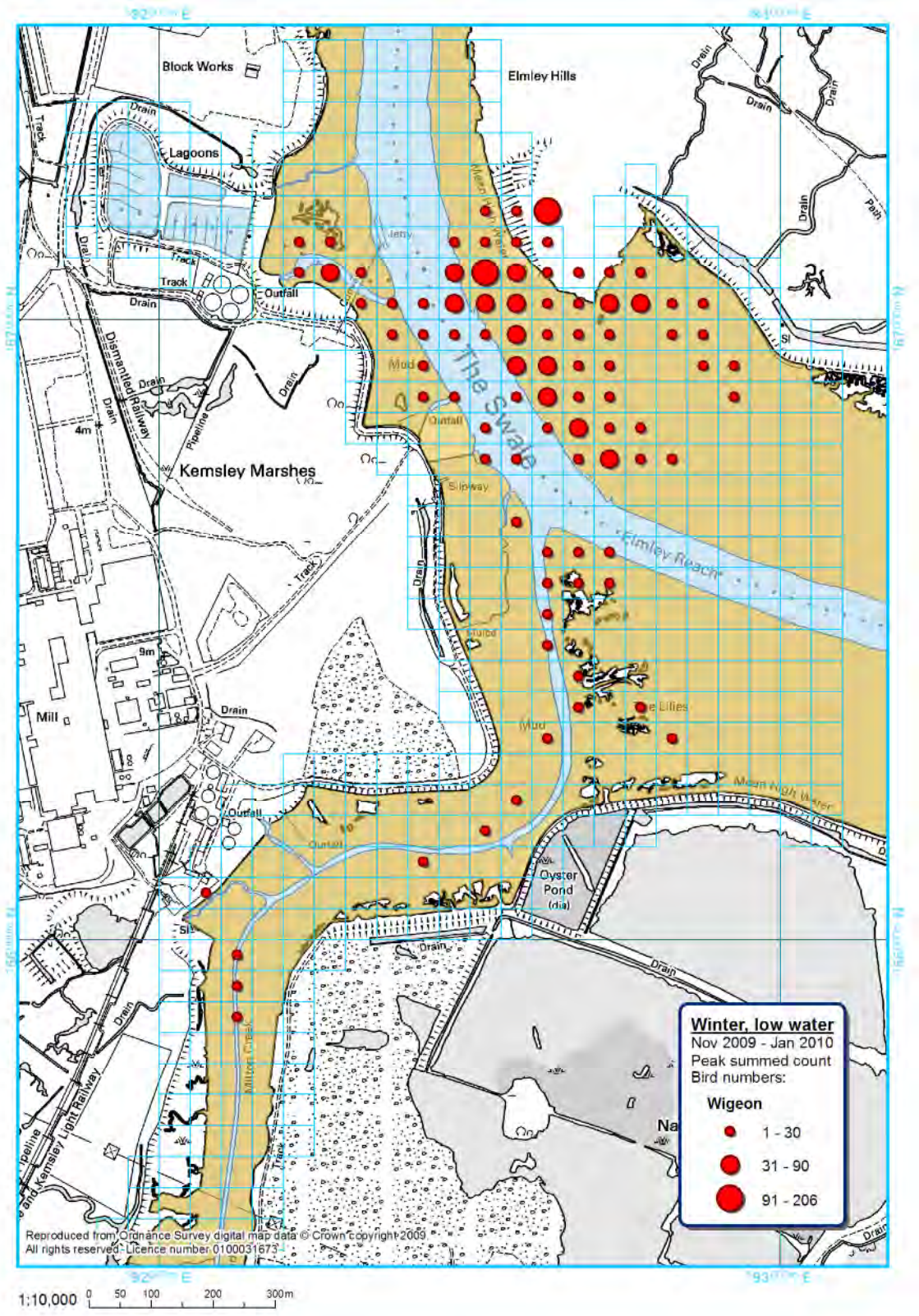

Figure C.19: Spatial distribution of Teal over high water , Oct 2009

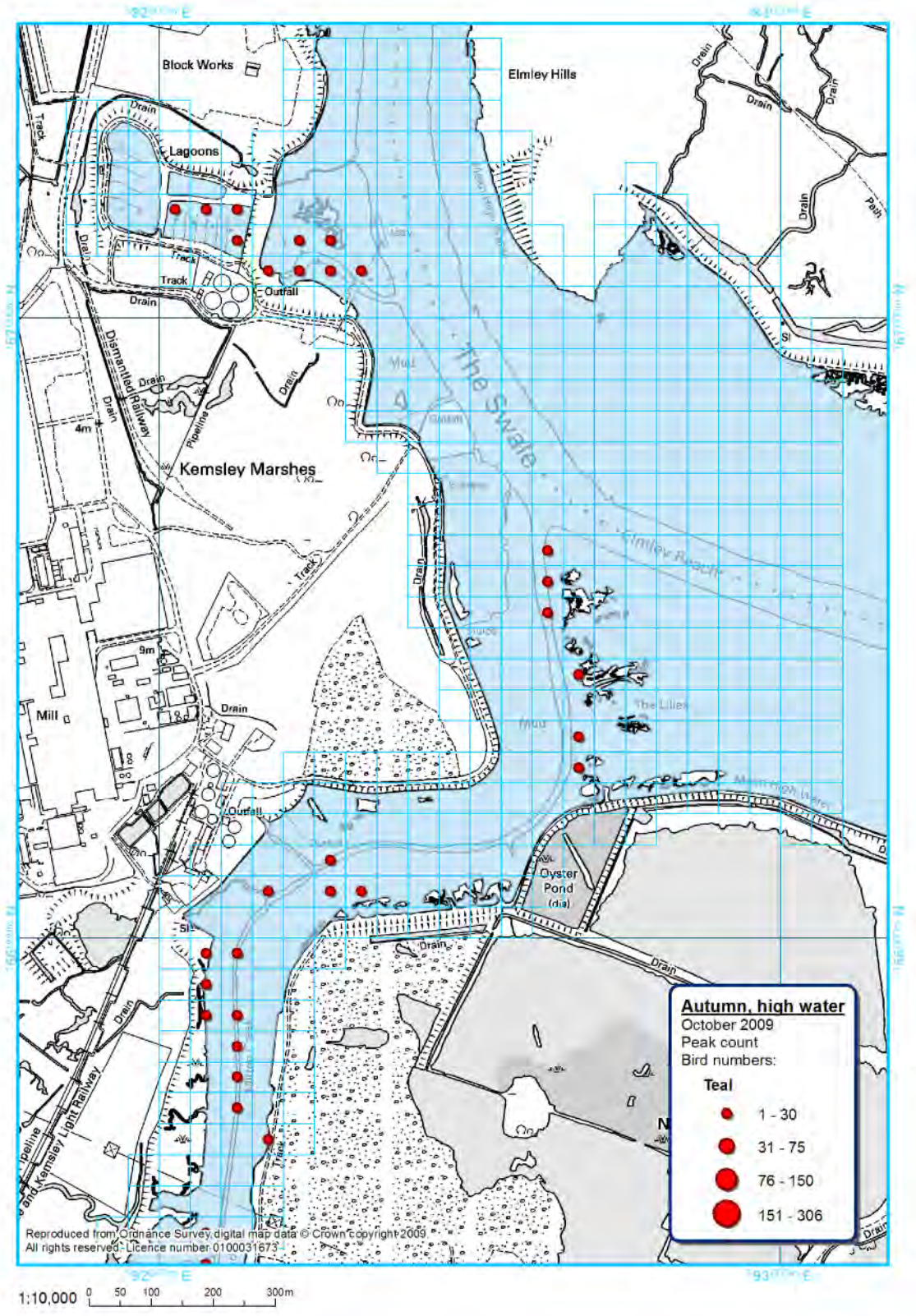

Figure C.20: Spatial distribution of Teal over low water , Oct 2009

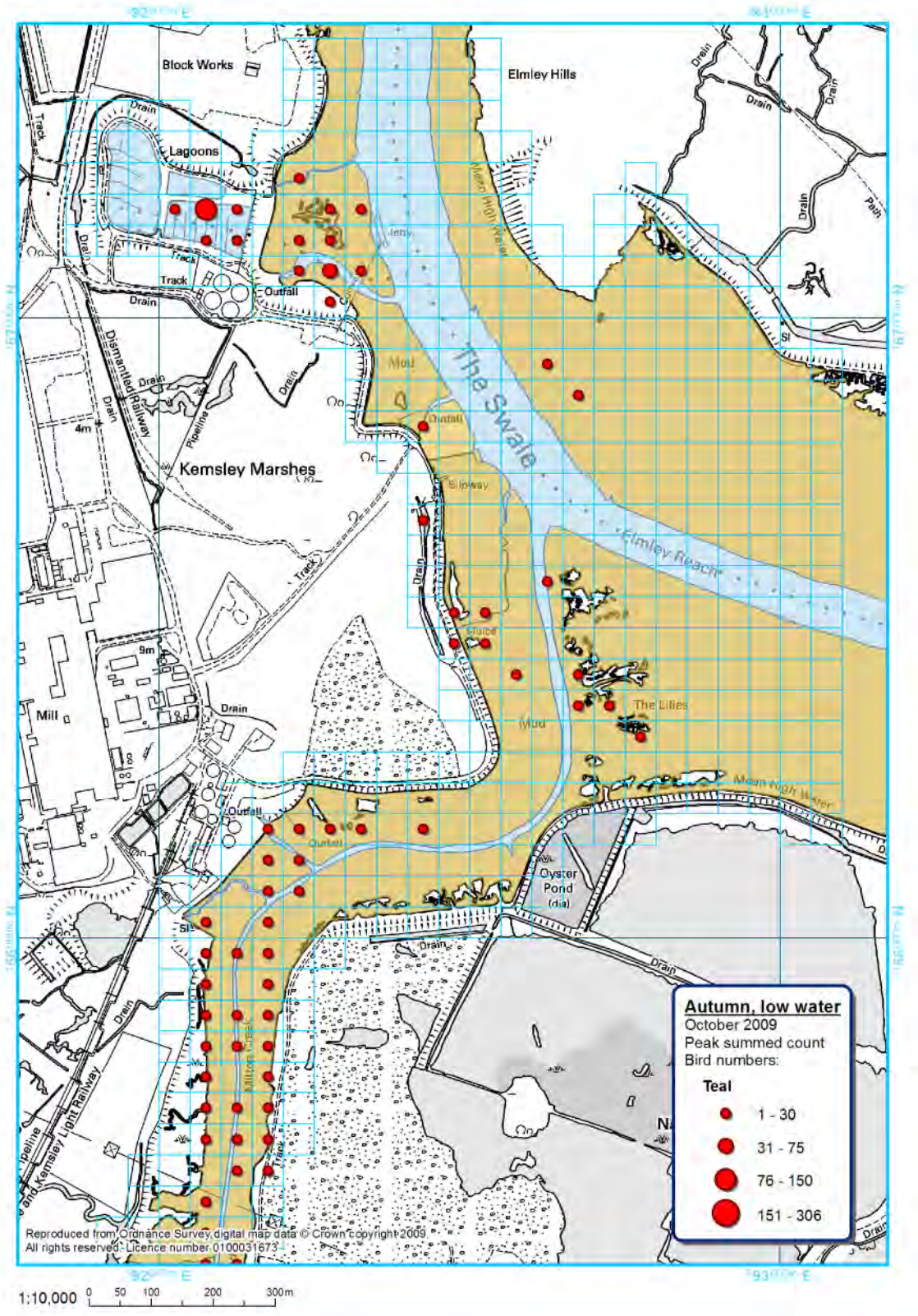

Figure C.21: Spatial distribution of Teal over high water, Nov 2009 - Jan 2010

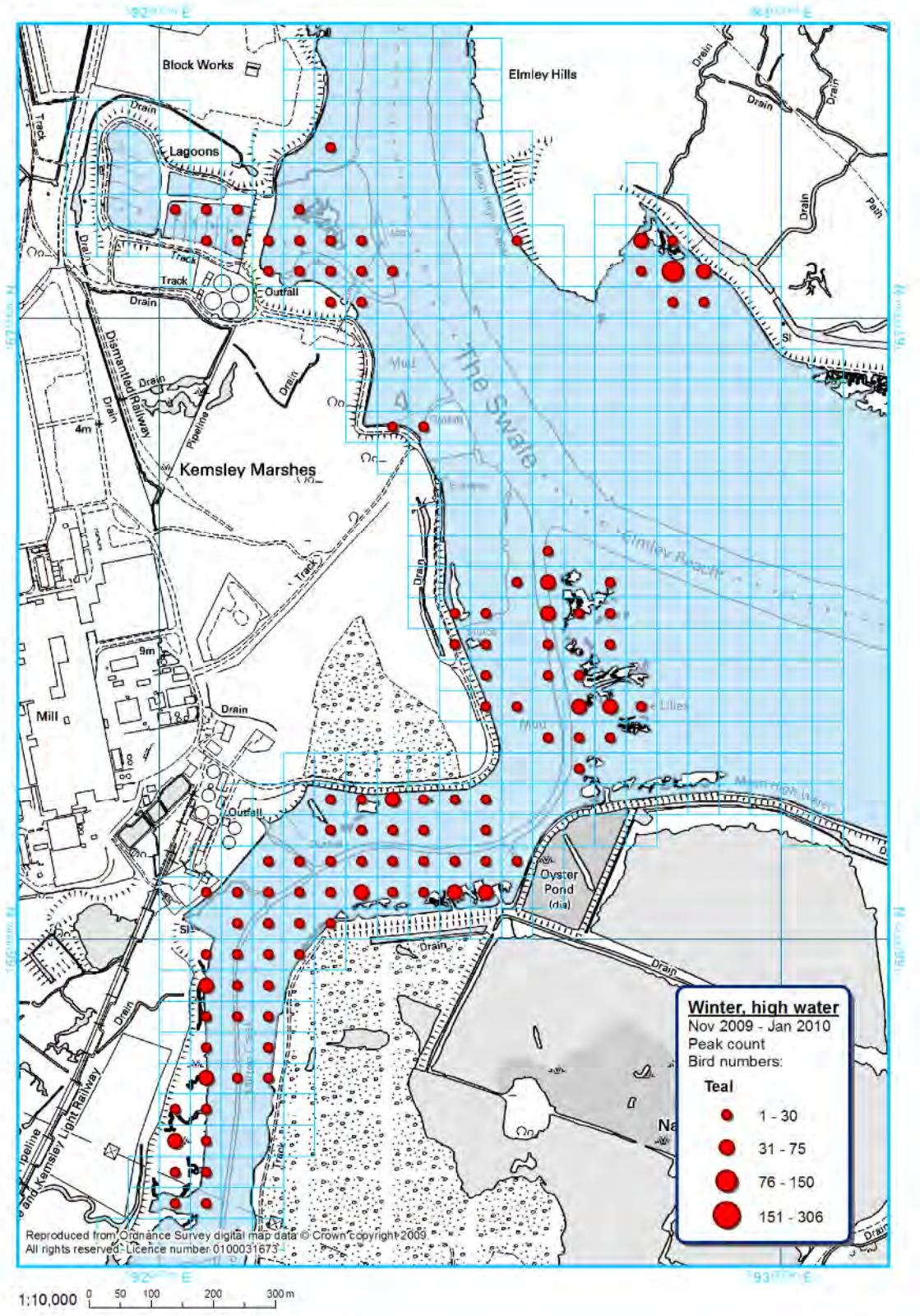

Figure C.22: Spatial distribution of Teal over low water, Nov 2009 - Jan 2010

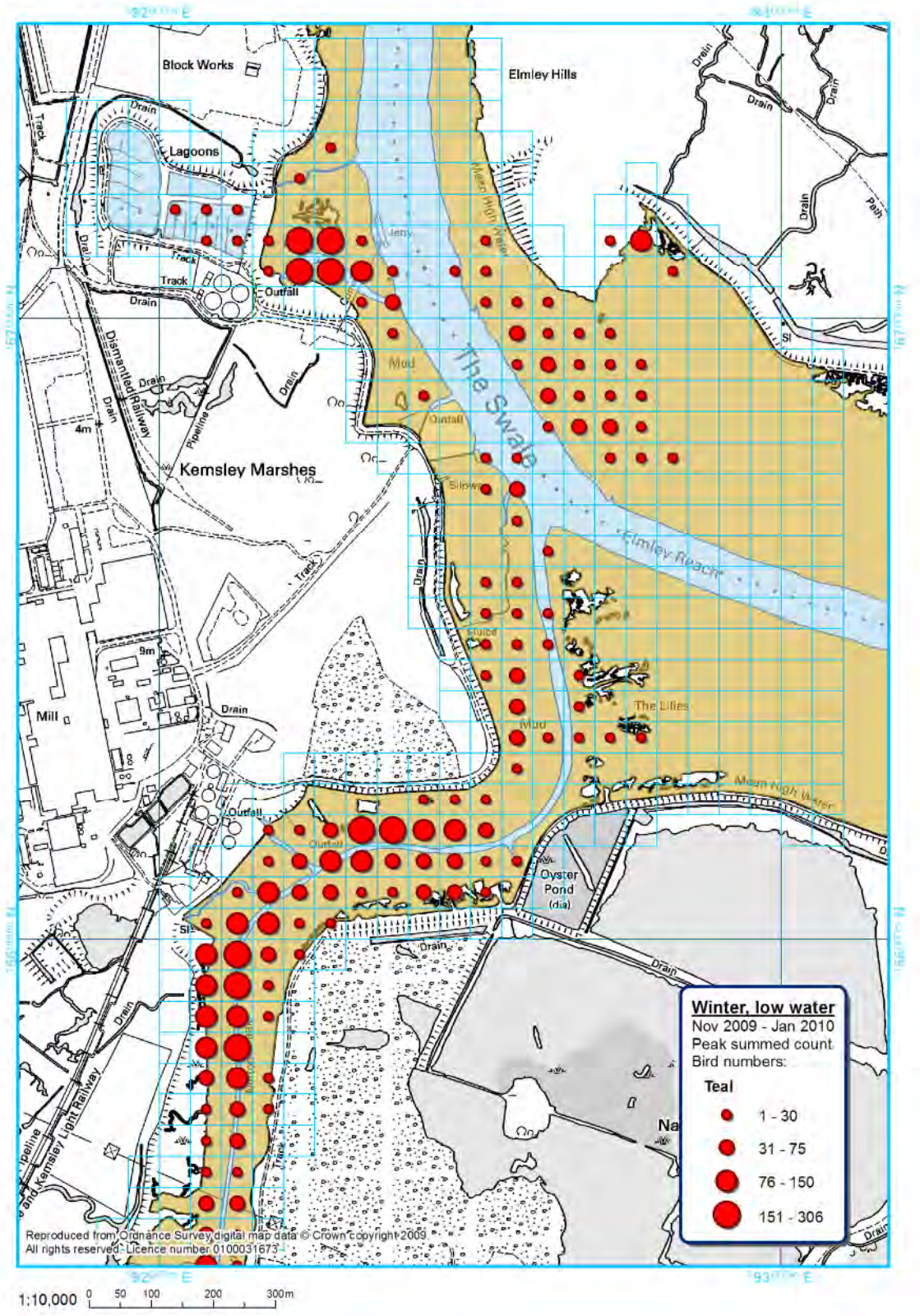

Figure C.23: Spatial distribution of Pintail over low water , Oct 2009

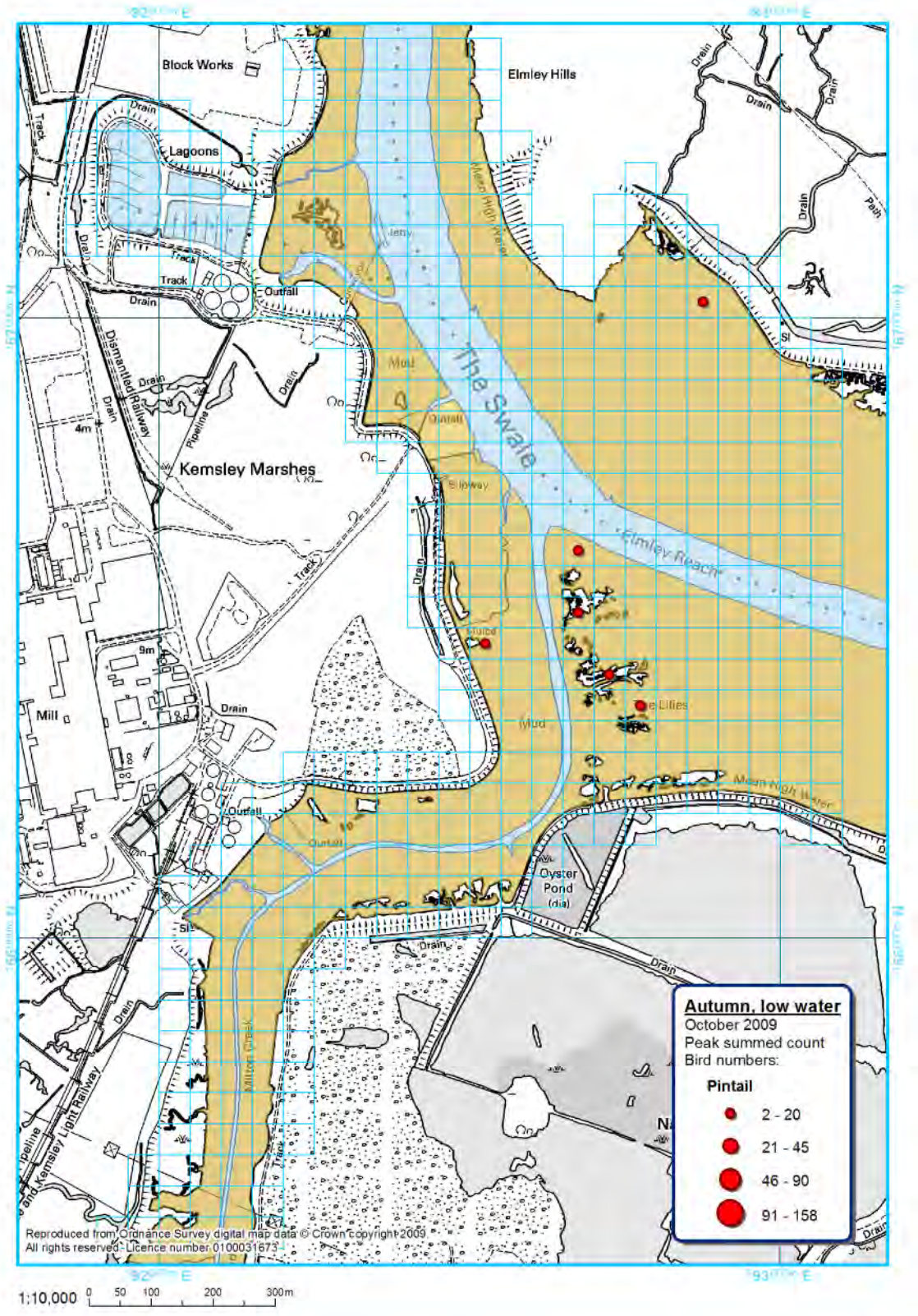

Figure C.24: Spatial distribution of Pintail over high water, Nov 2009 - Jan 2010

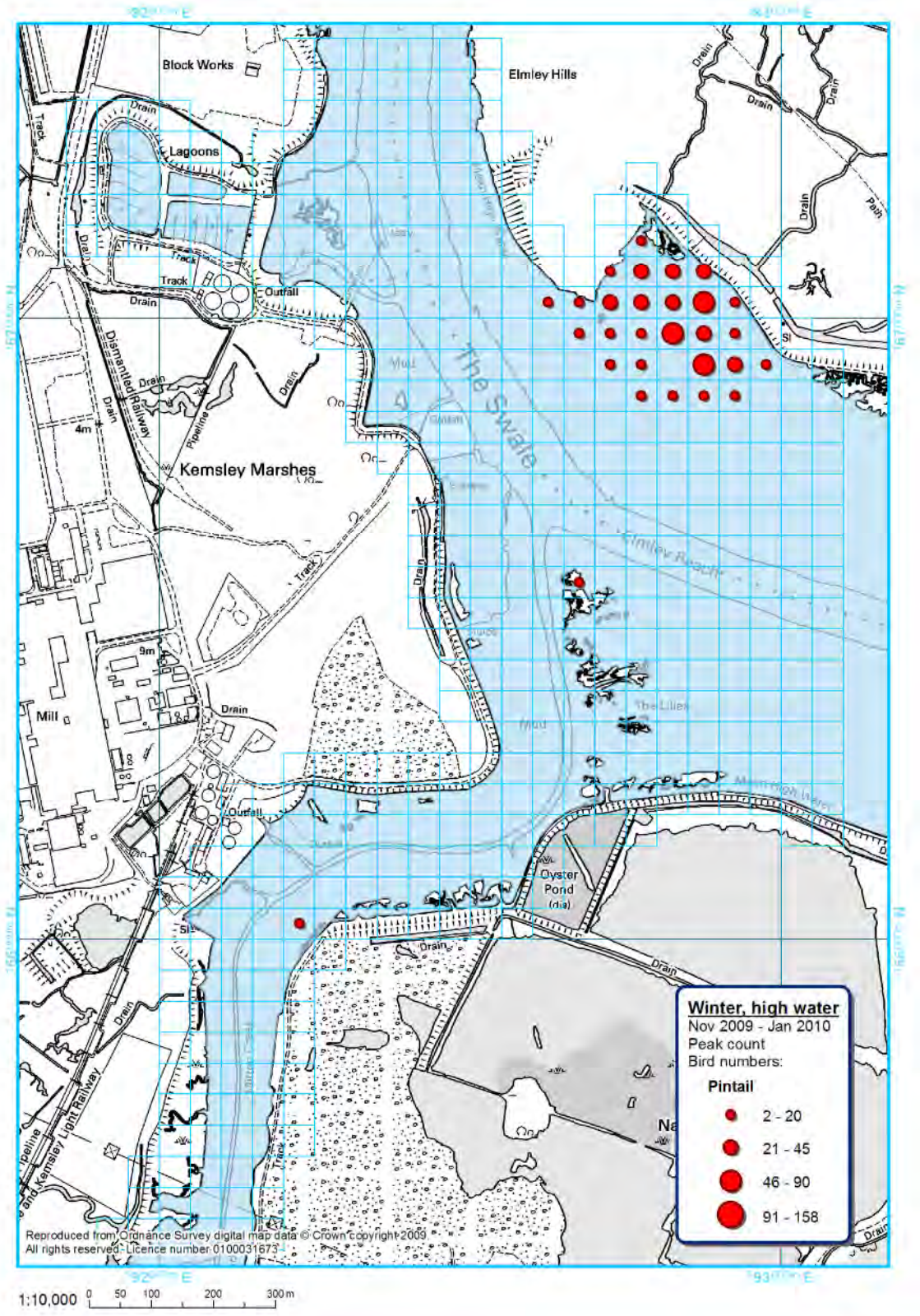

Figure C.25: Spatial distribution of Pintail over low water, Nov 2009 - Jan 2010

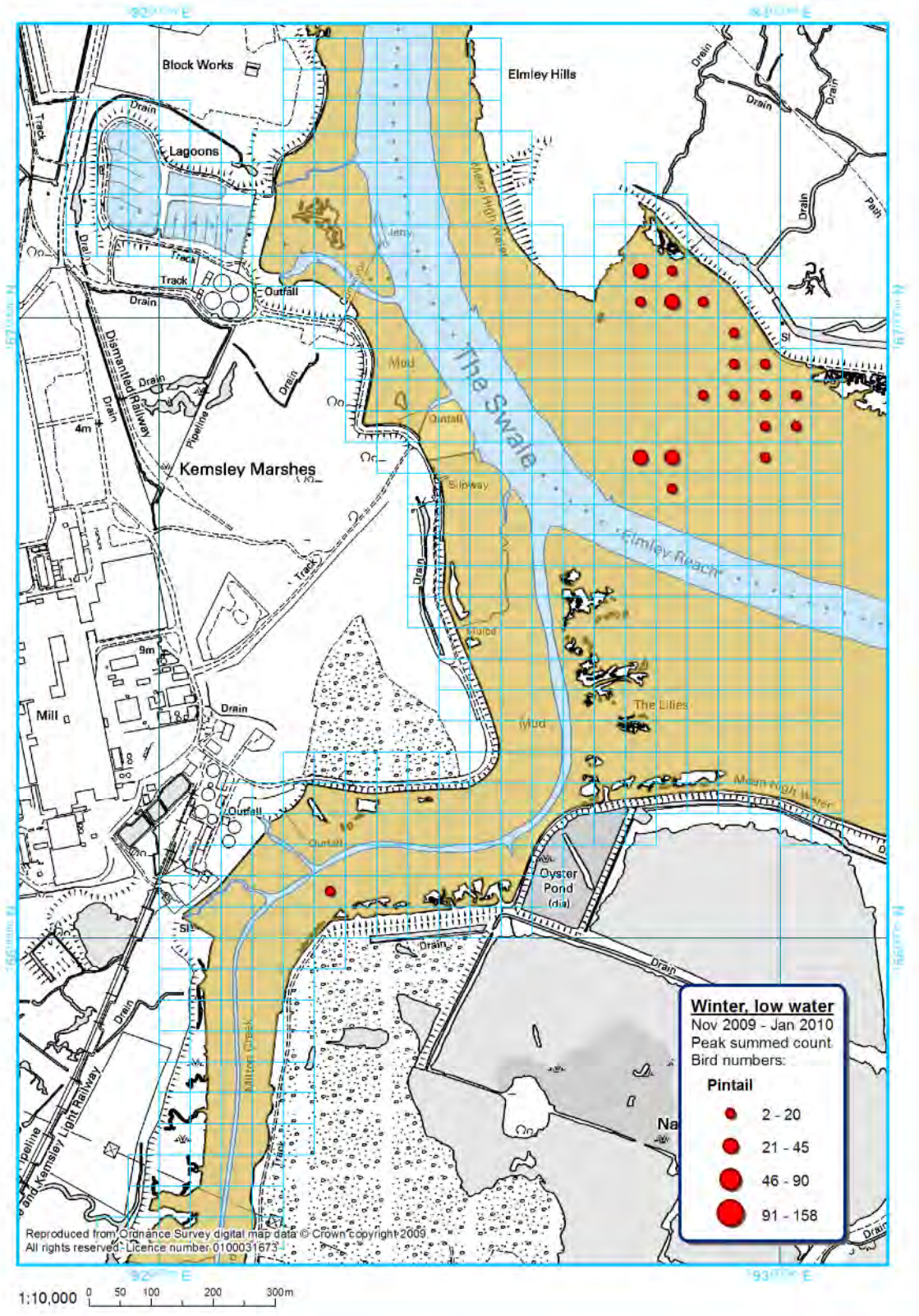

Figure C.26: Spatial distribution of Oystercatcher over high water , Oct 2009

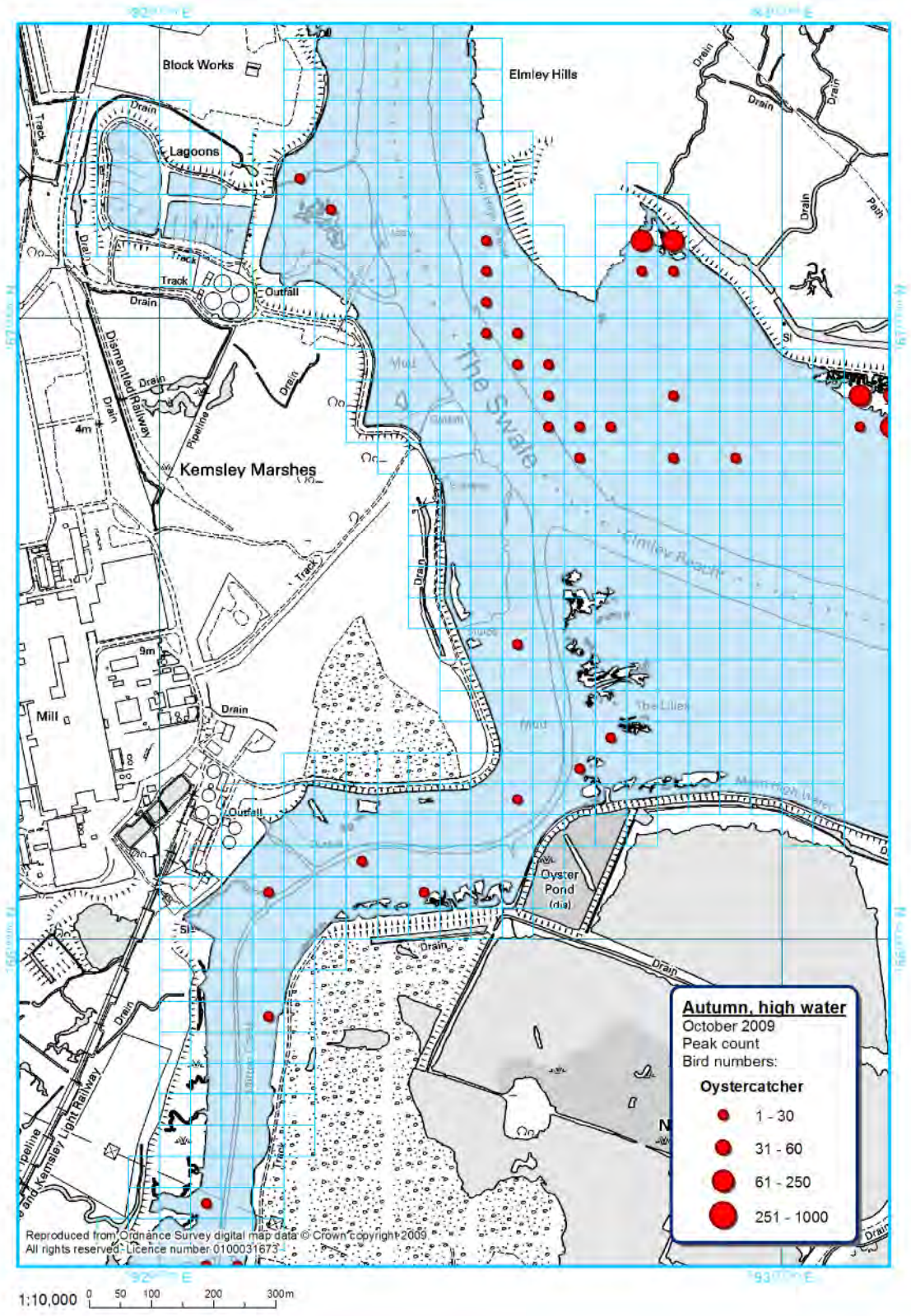

Figure C.27: Spatial distribution of Oystercatcher over low water , Oct 2009

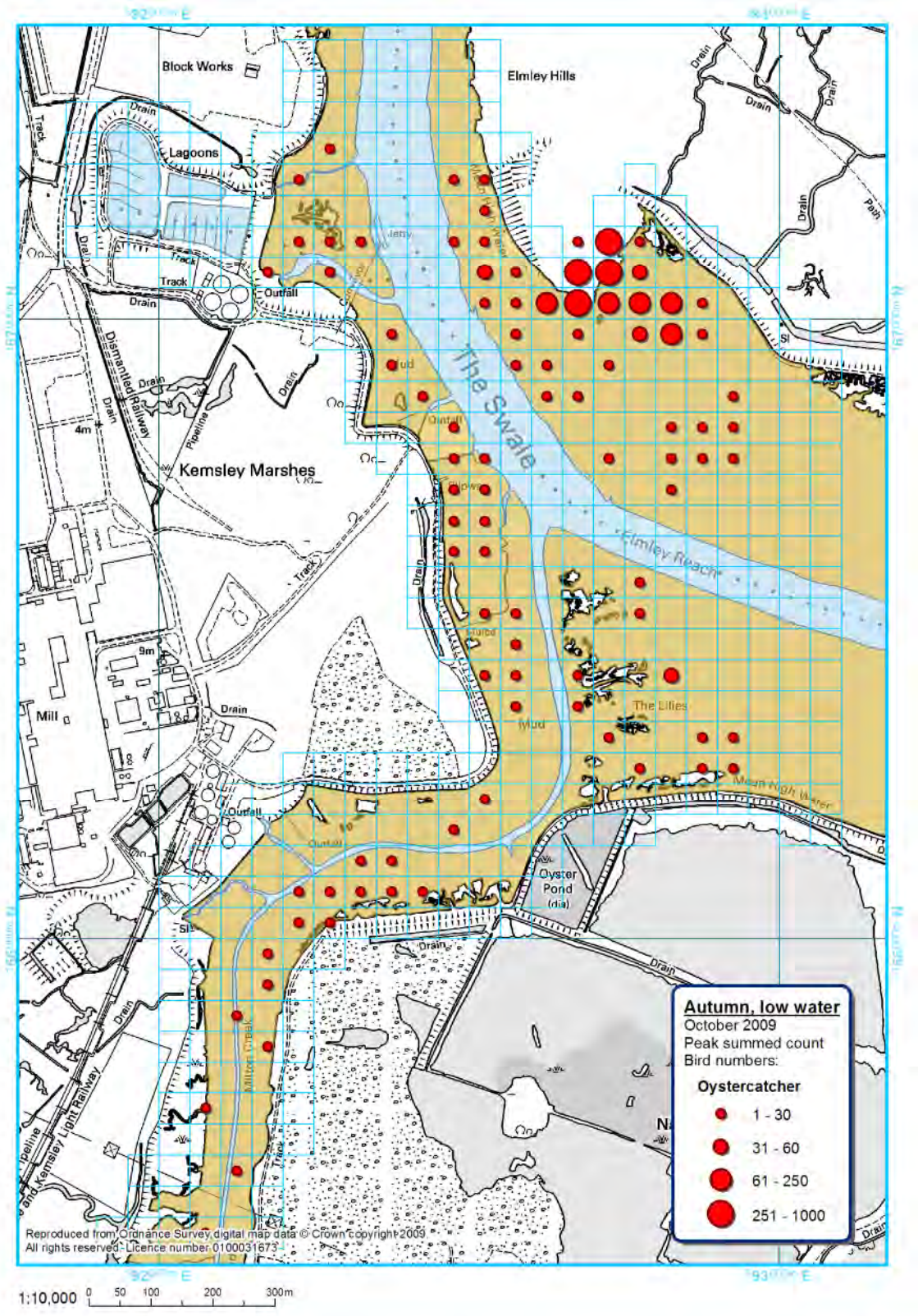

Figure C.28: Spatial distribution of Oystercatcher over high water, Nov 2009 - Jan 2010

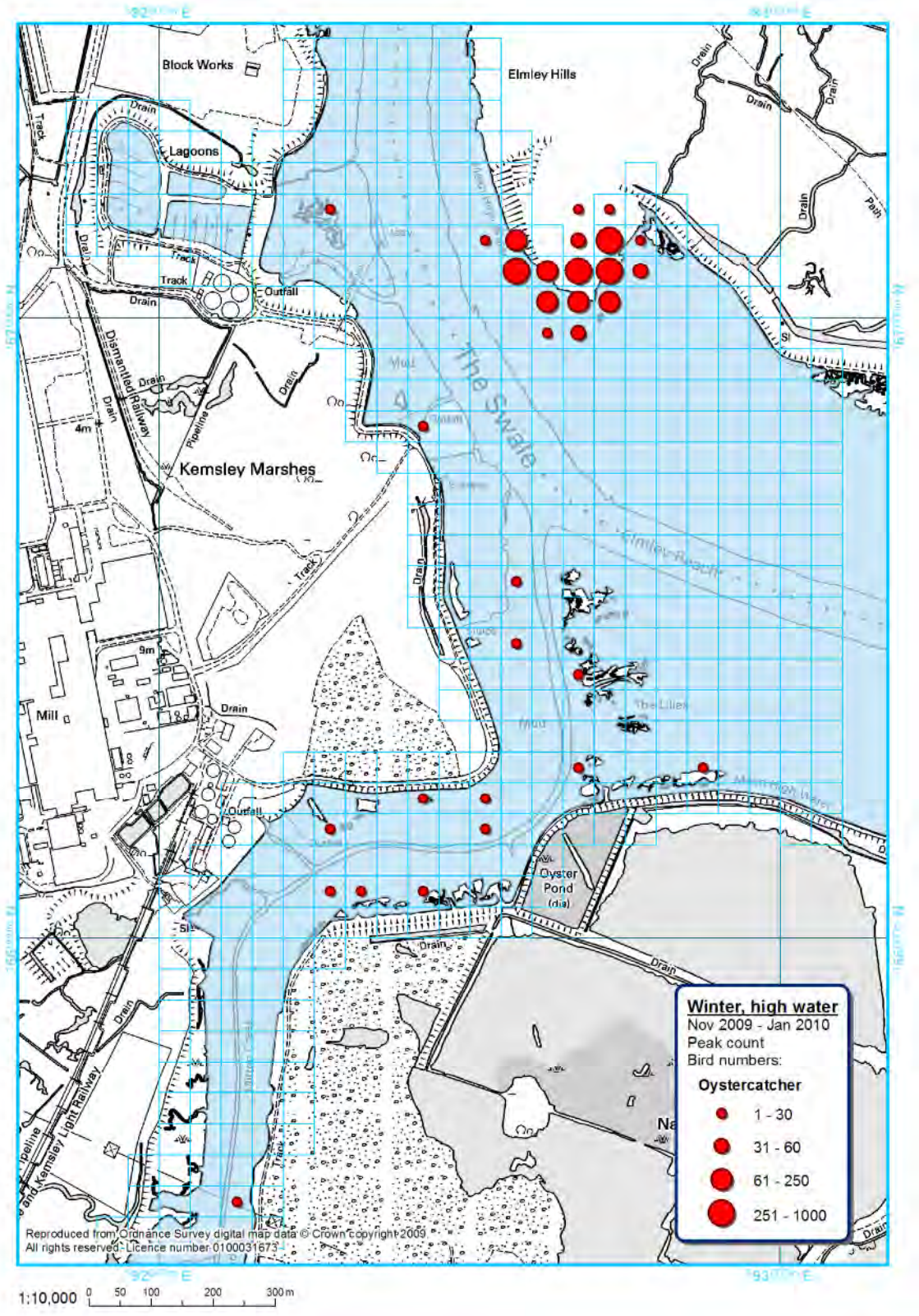

Figure C.29: Spatial distribution of Oystercatcher over low water, Nov 2009 - Jan 2010

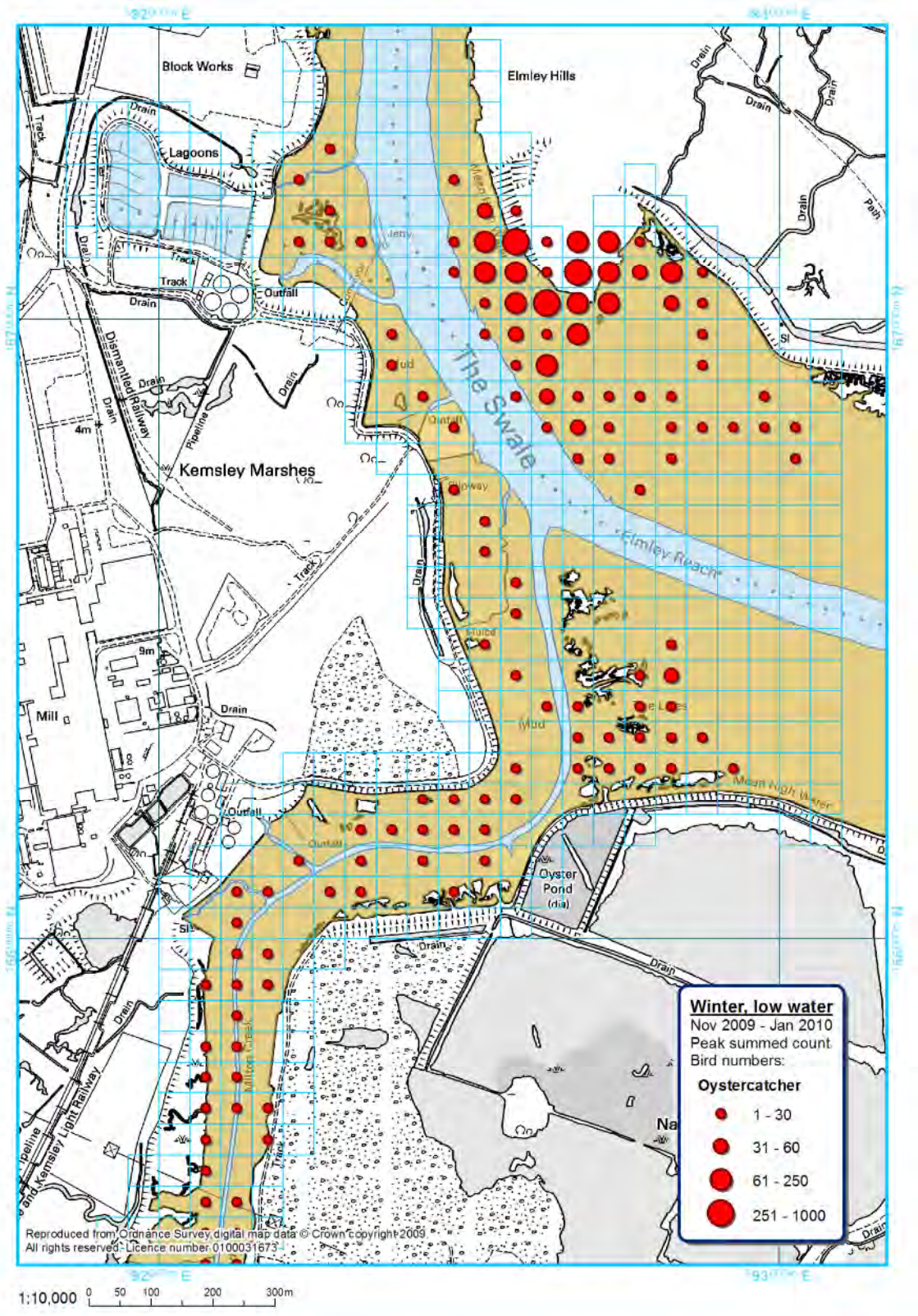

Figure C.30: Spatial distribution of Avocet over high water , Oct 2009

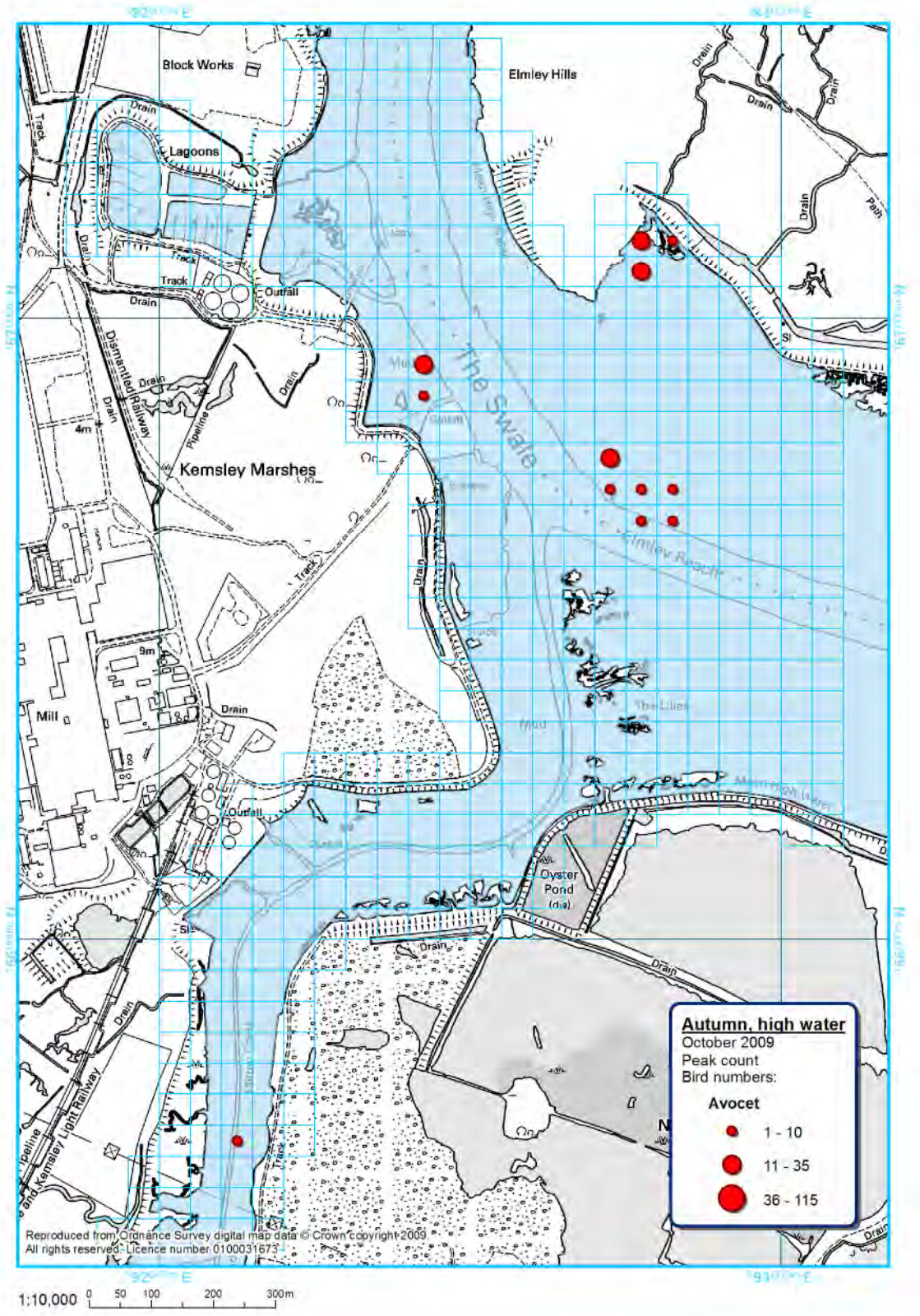

Figure C.31: Spatial distribution of Avocet over low water , Oct 2009

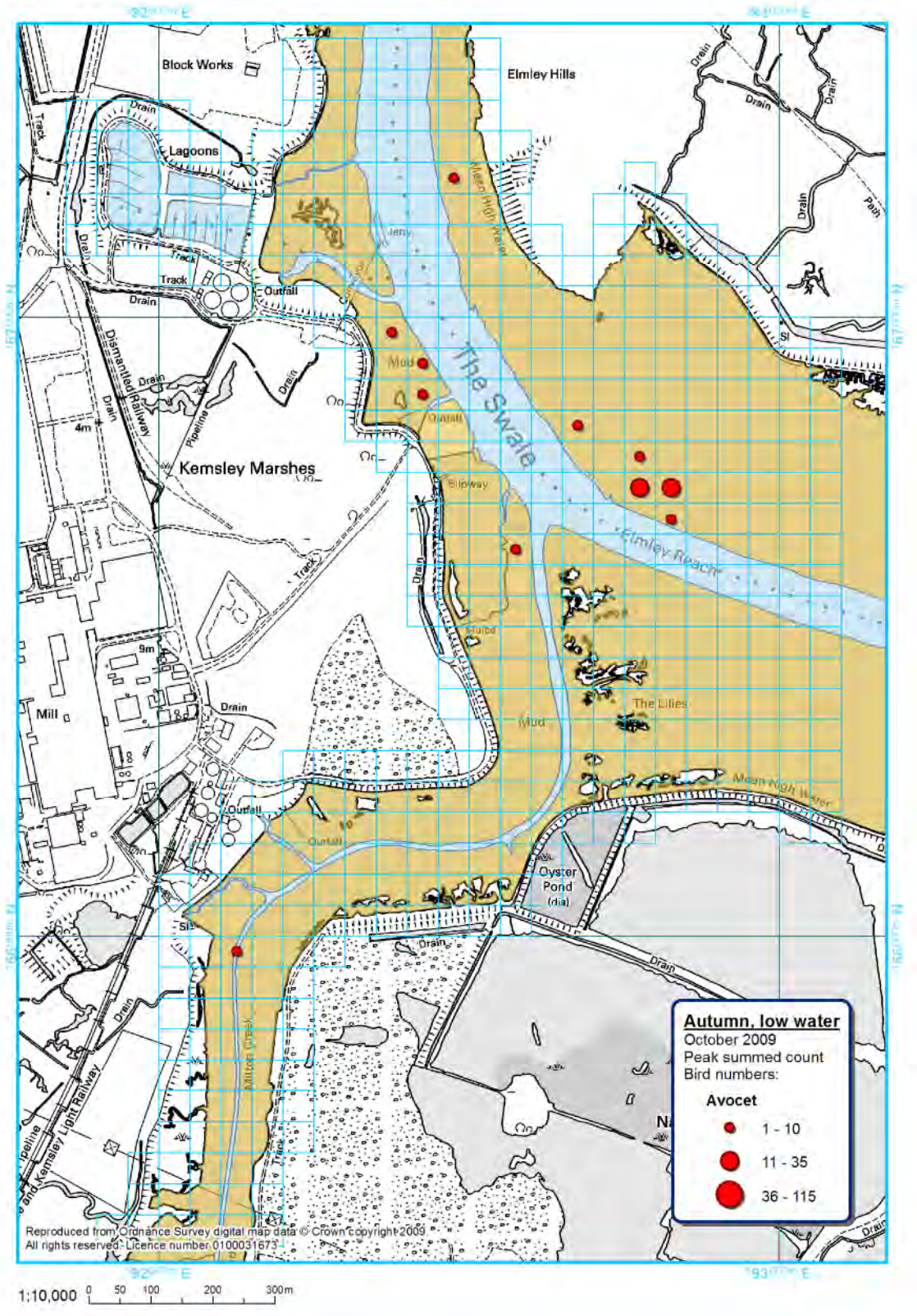

Figure C.32: Spatial distribution of Avocet over high water, Nov 2009 - Jan 2010

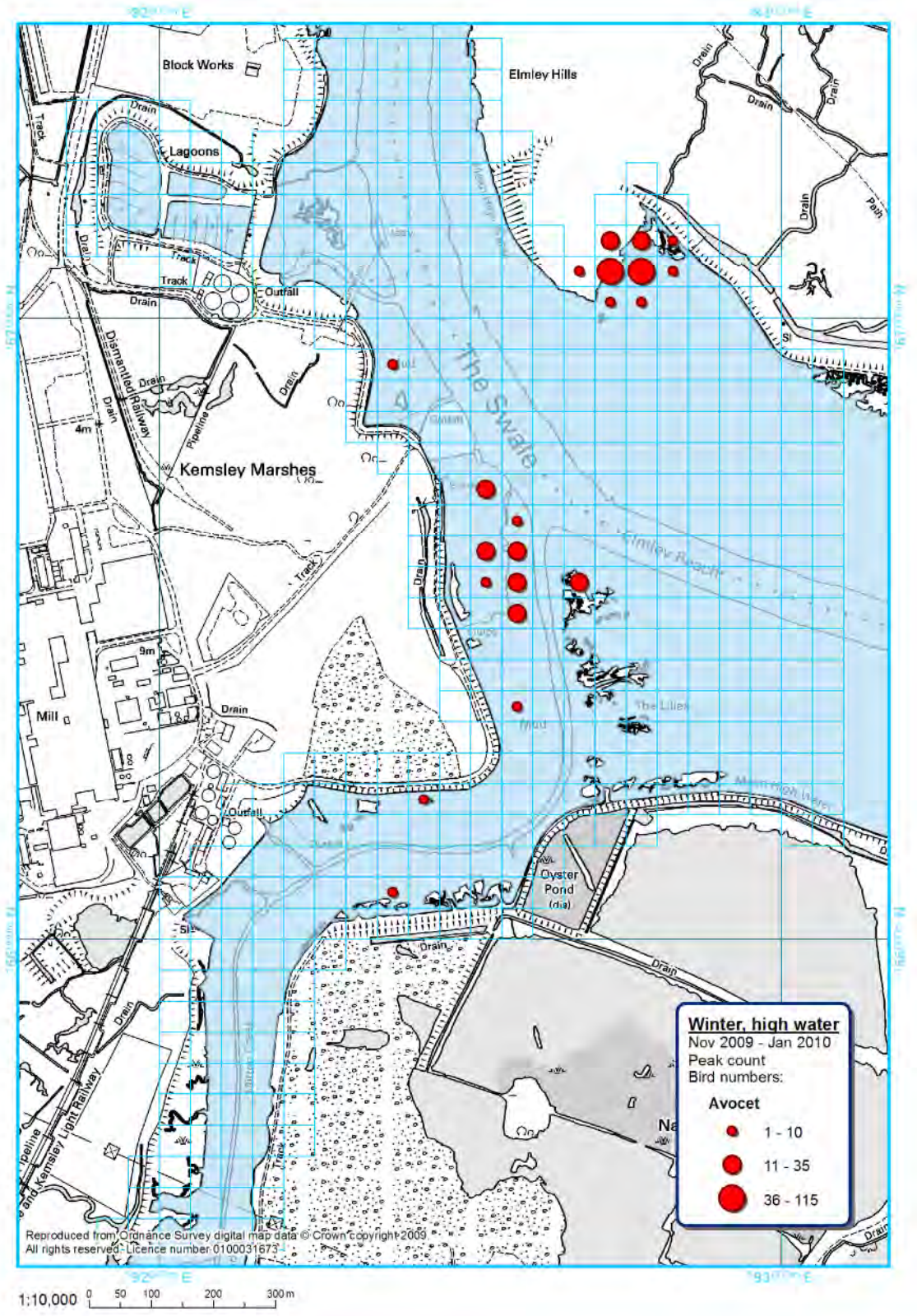

Figure C.33: Spatial distribution of Avocet over low water, Nov 2009 - Jan 2010

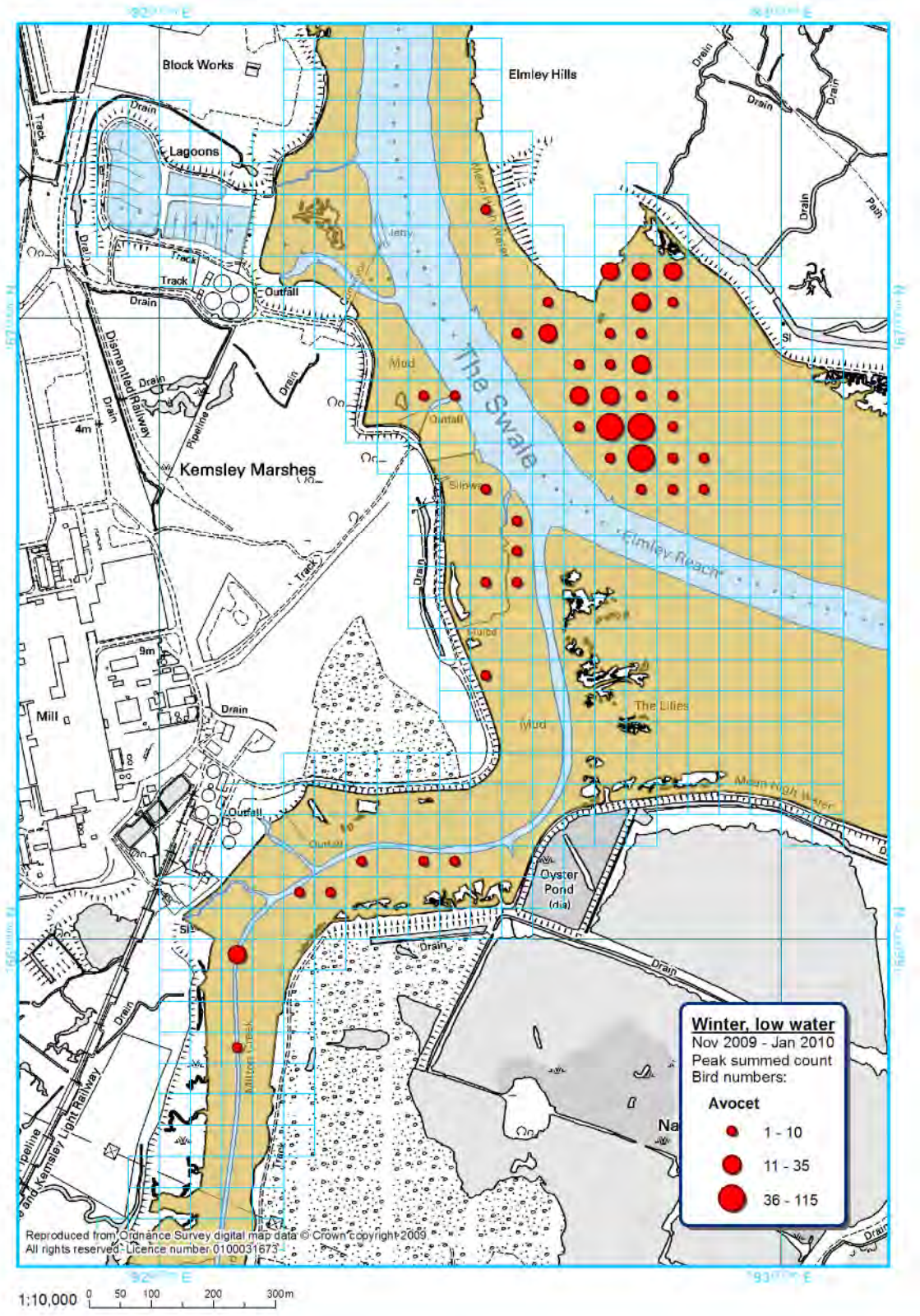

Figure C.34: Spatial distribution of Ring Plover over low water , Oct 2009

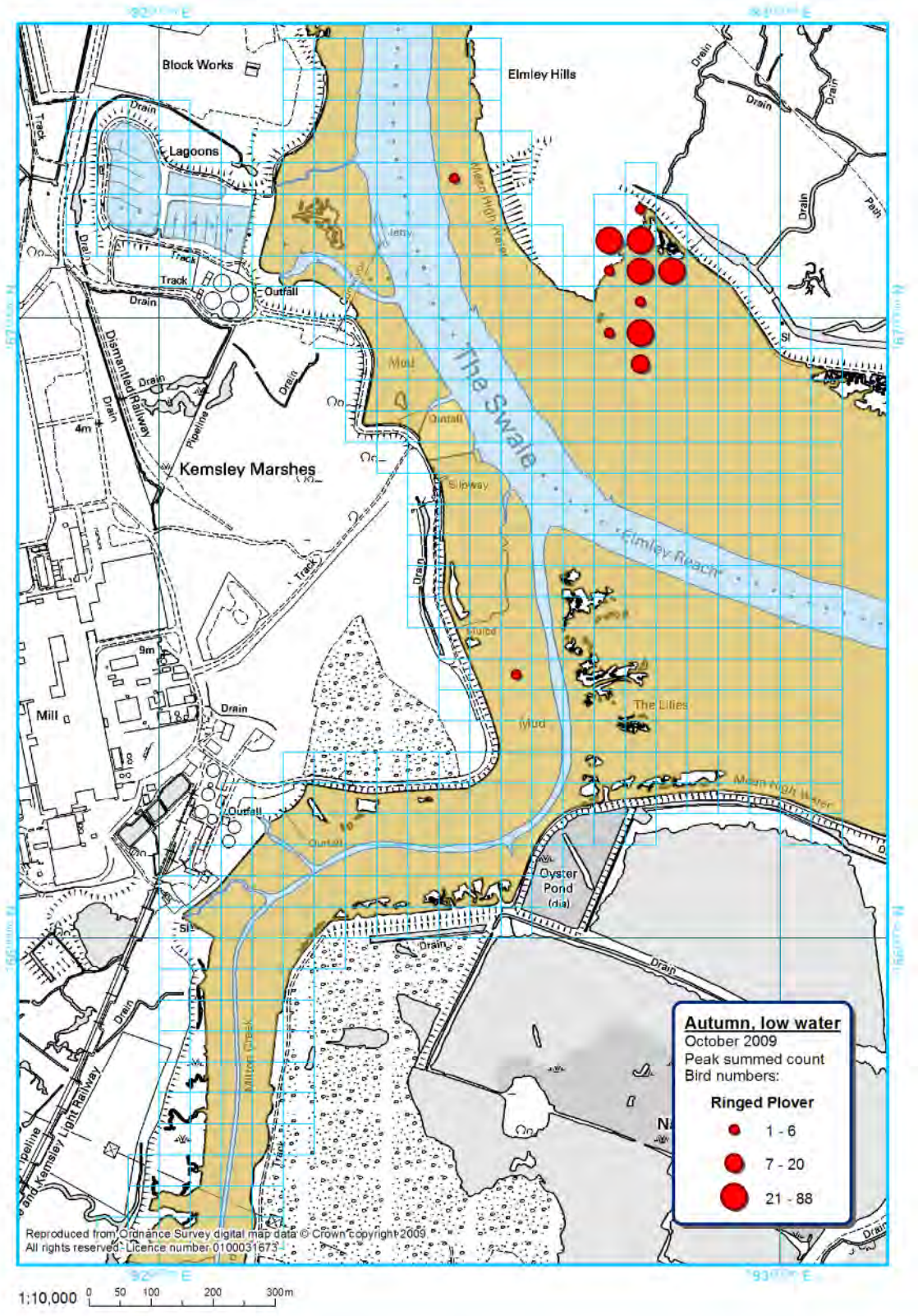

Figure C.35: Spatial distribution of Ring Plover over high water, Nov 2009 - Jan 2010

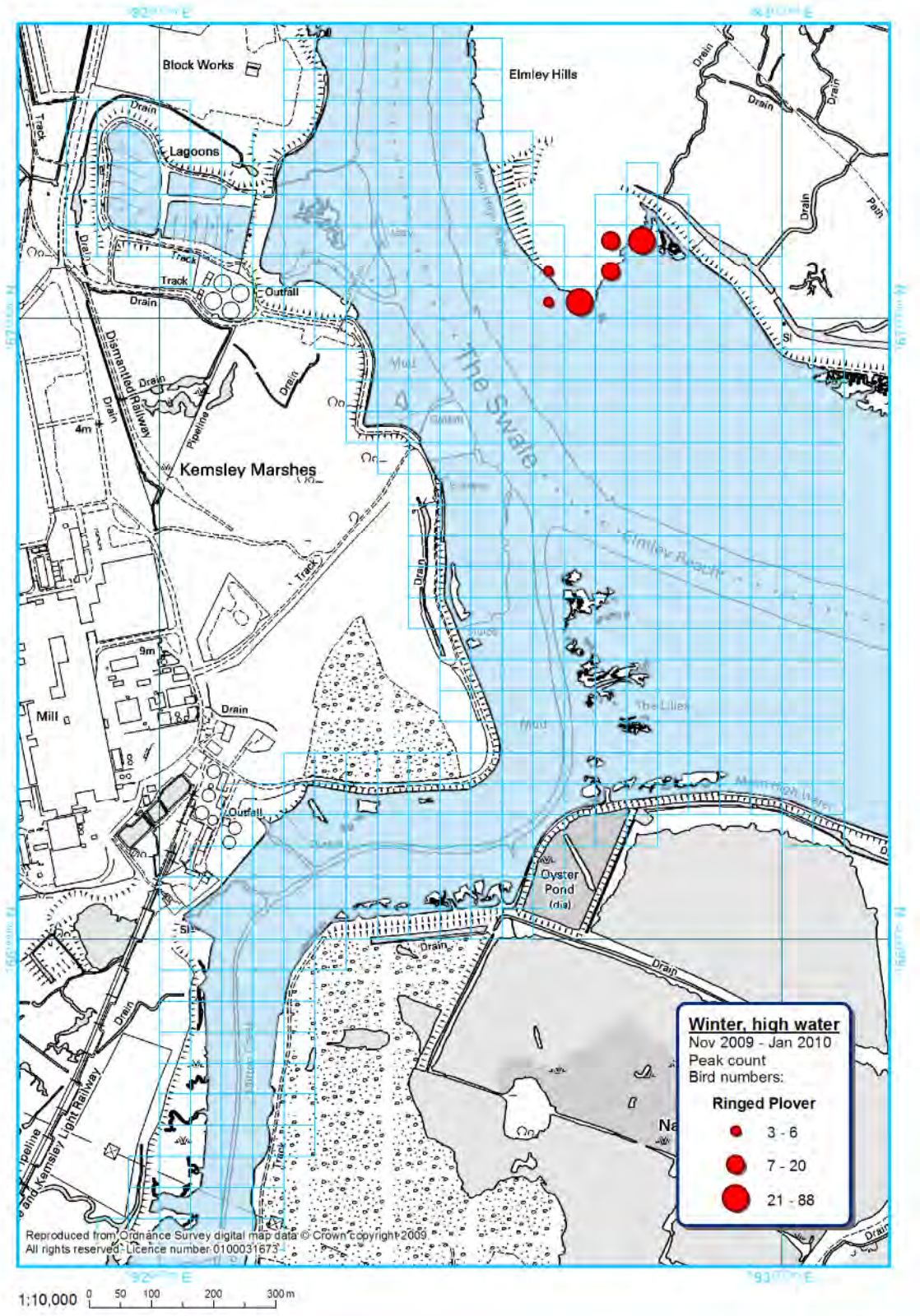

Figure C.36: Spatial distribution of Ring Plover over low water, Nov 2009 - Jan 2010

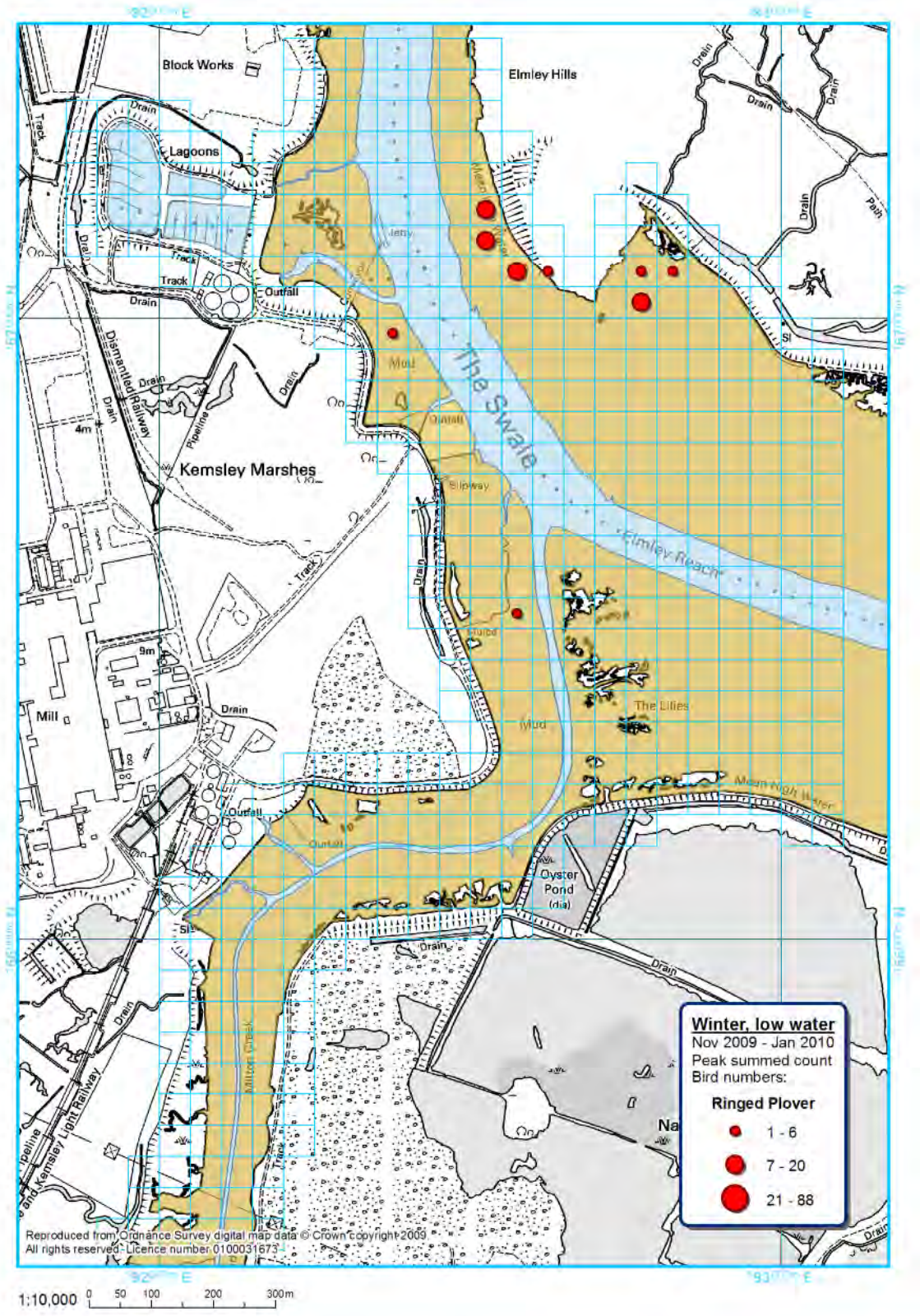

Figure C.37: Spatial distribution of Grey Plover over high water , Oct 2009

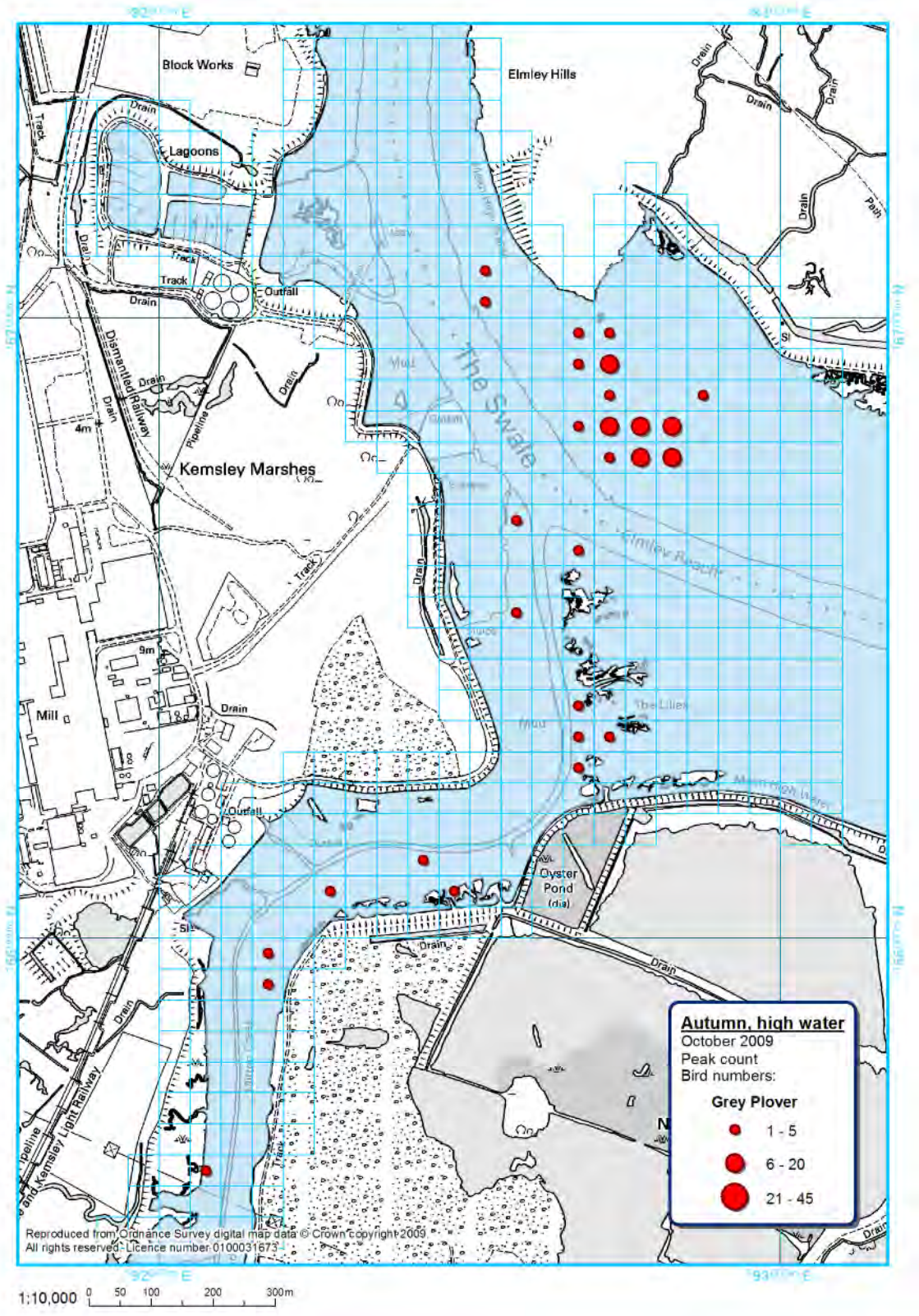

Figure C.38: Spatial distribution of Grey Plover over low water , Oct 2009

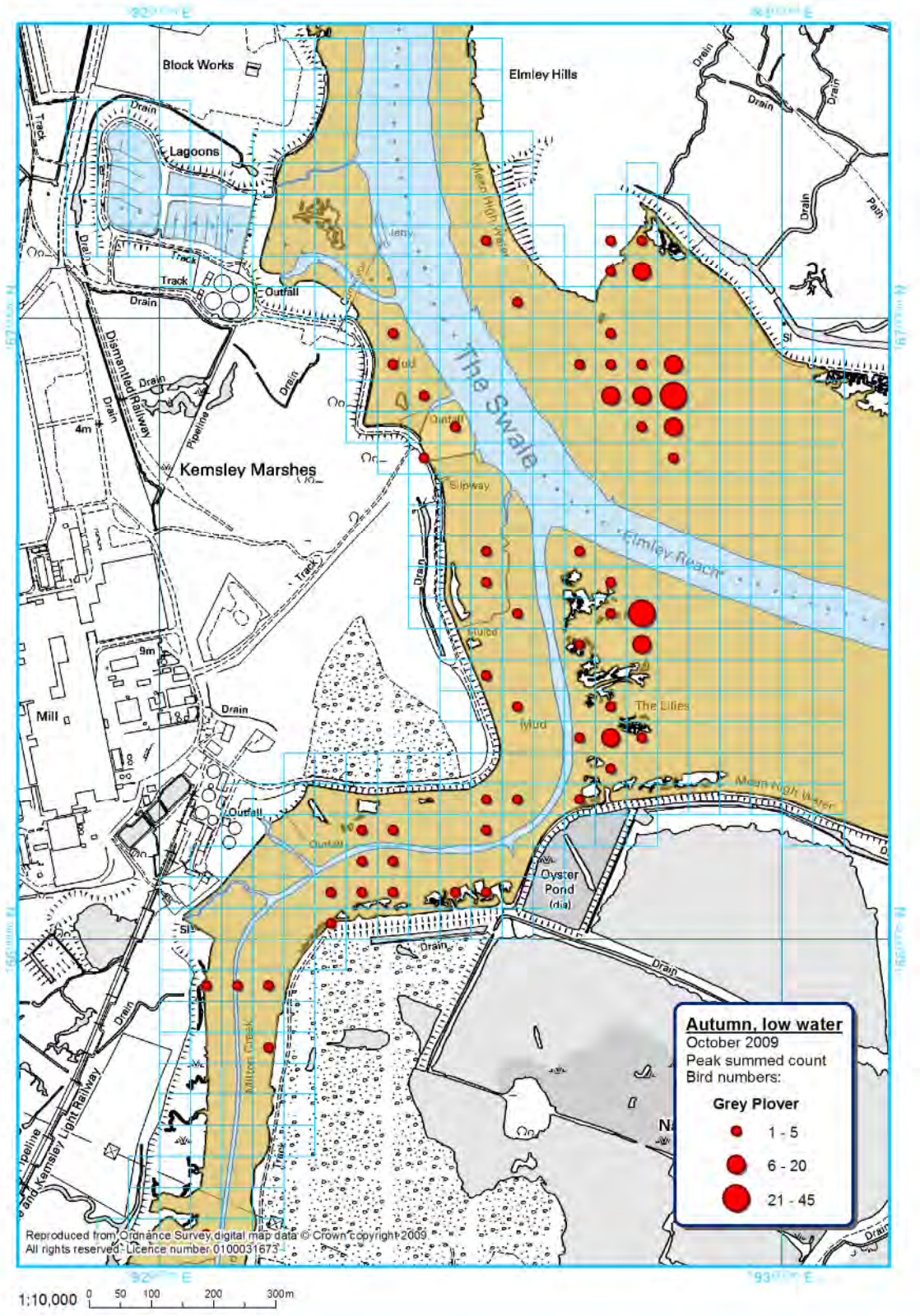

Figure C.39: Spatial distribution of Grey Plover over high water, Nov 2009 - Jan 2010

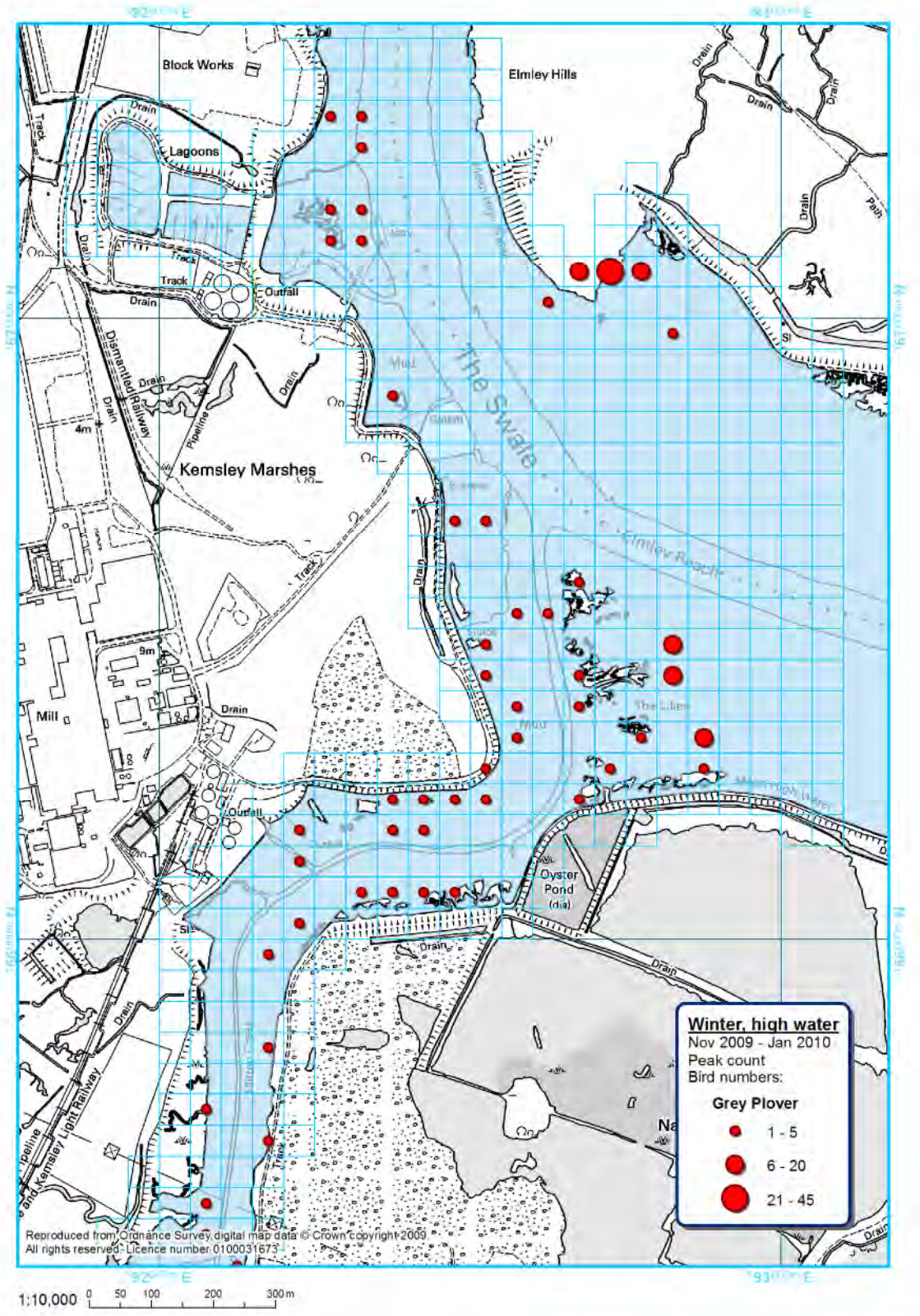

Figure C.40: Spatial distribution of Grey Plover over low water, Nov 2009 - Jan 2010

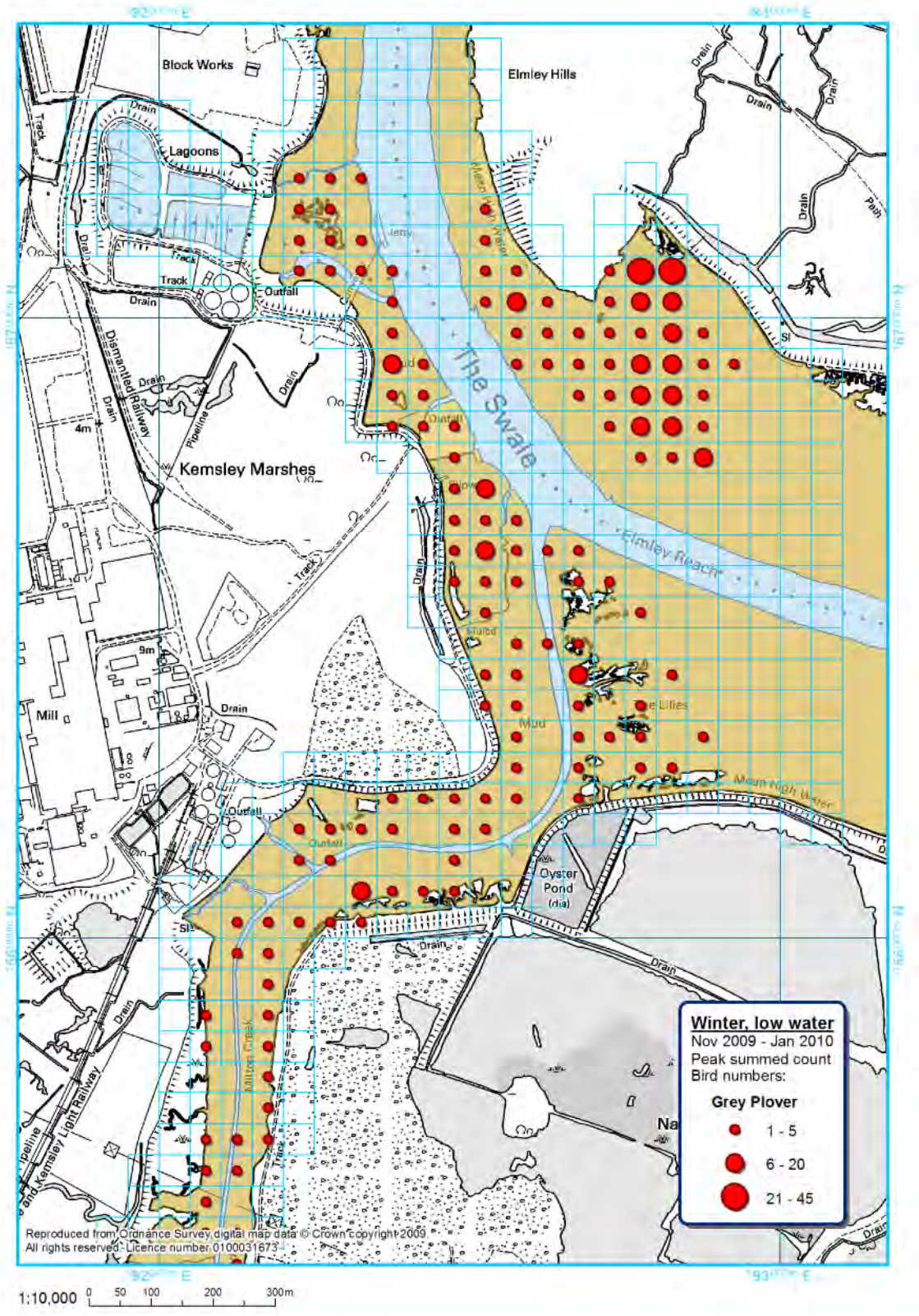

Figure C.41: Spatial distribution of Lapwing over high water , Oct 2009

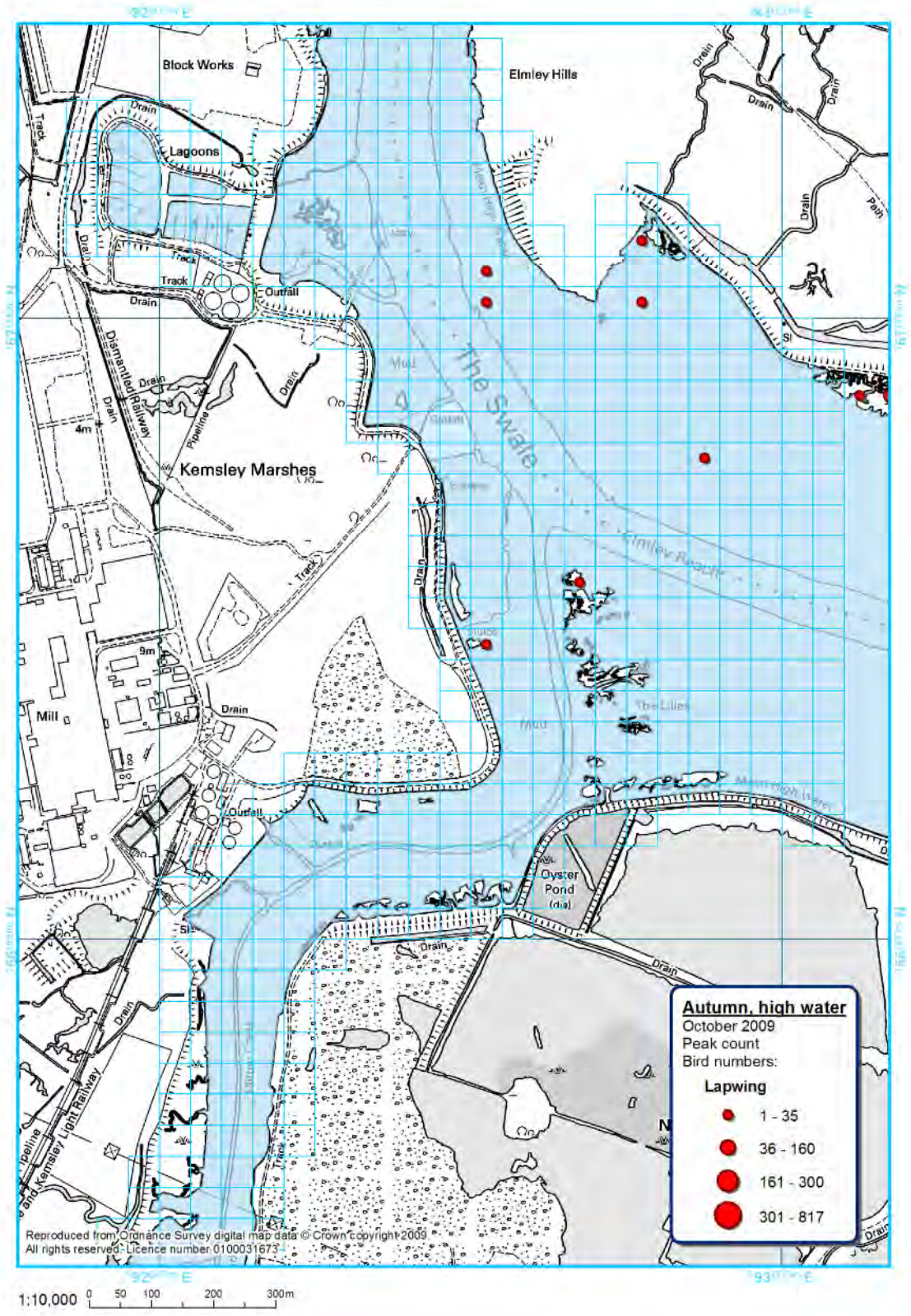

Figure C.42: Spatial distribution of Lapwing over low water , Oct 2009

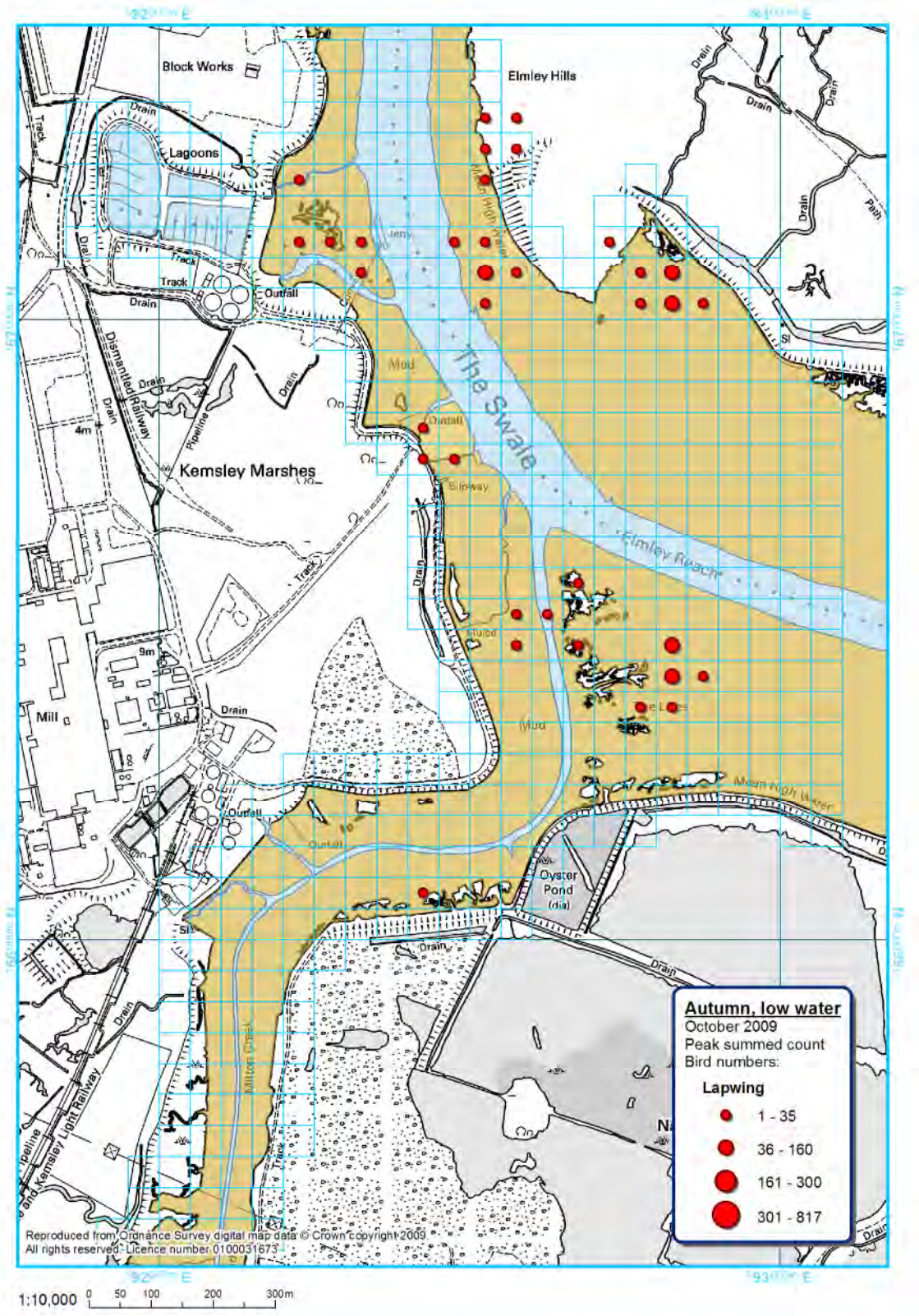

Figure C.43: Spatial distribution of Lapwing over high water, Nov 2009 - Jan 2010

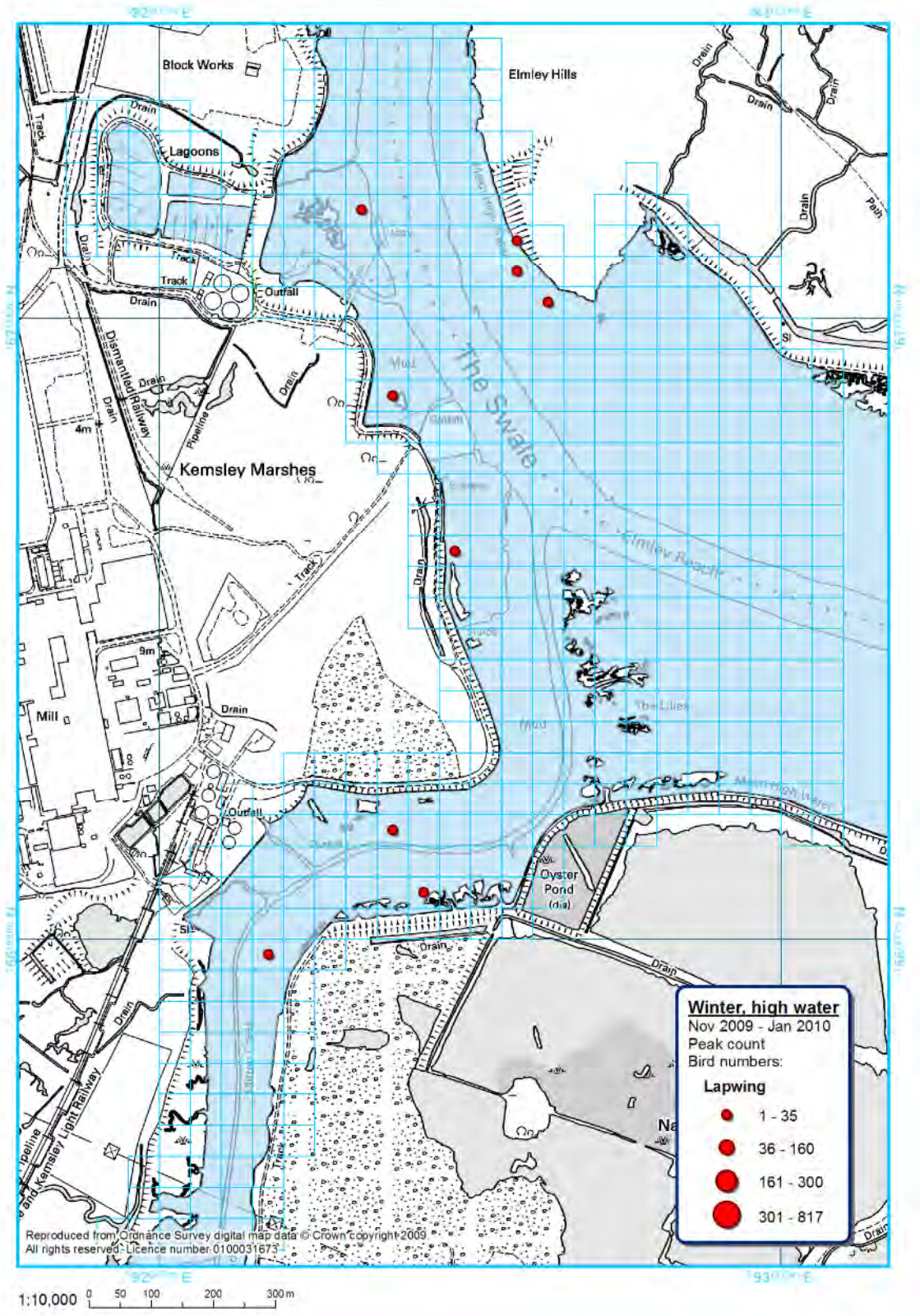

Figure C.44: Spatial distribution of Lapwing over low water, Nov 2009 - Jan 2010

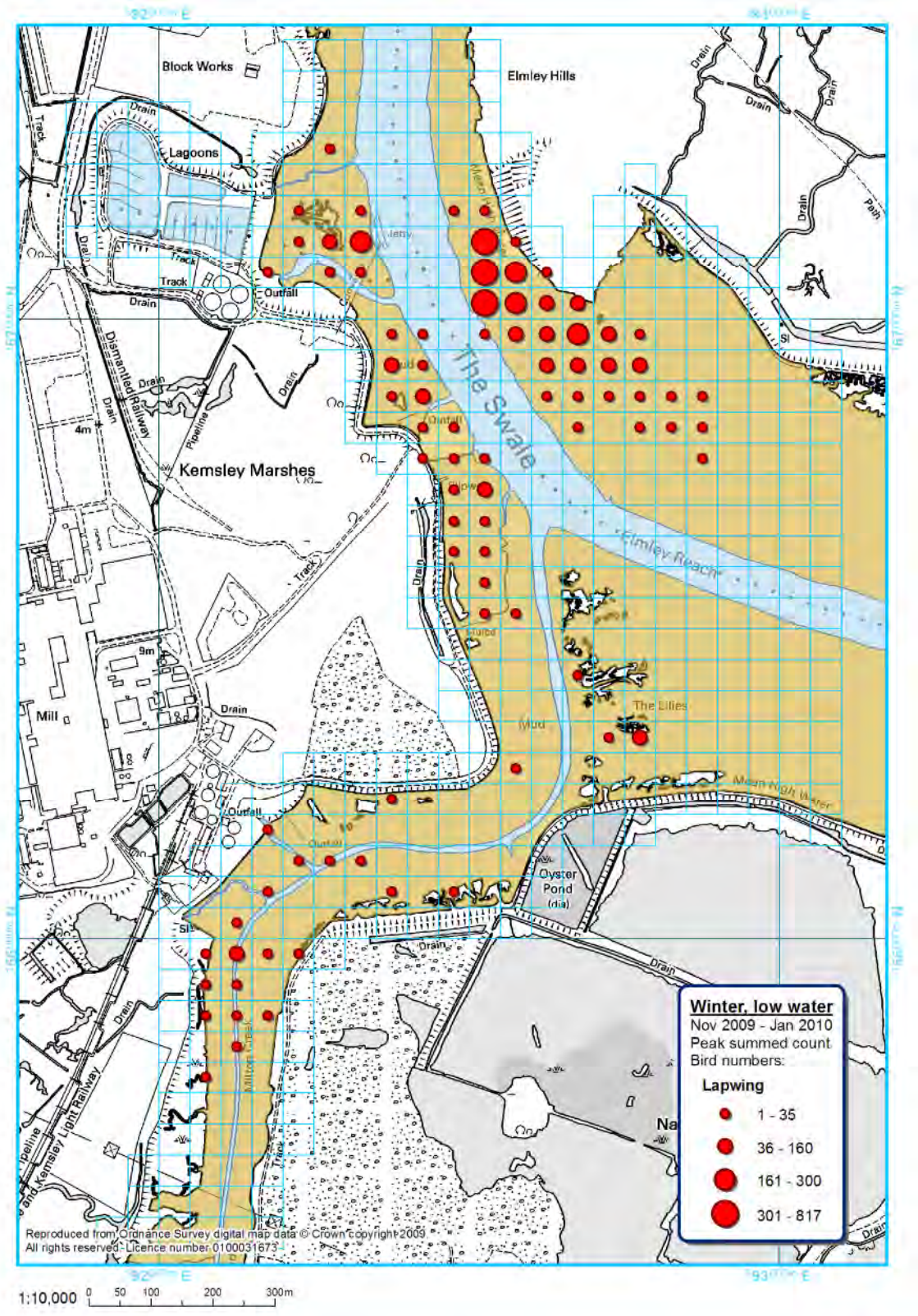

Figure C.45: Spatial distribution of Knot over low water , Oct 2009

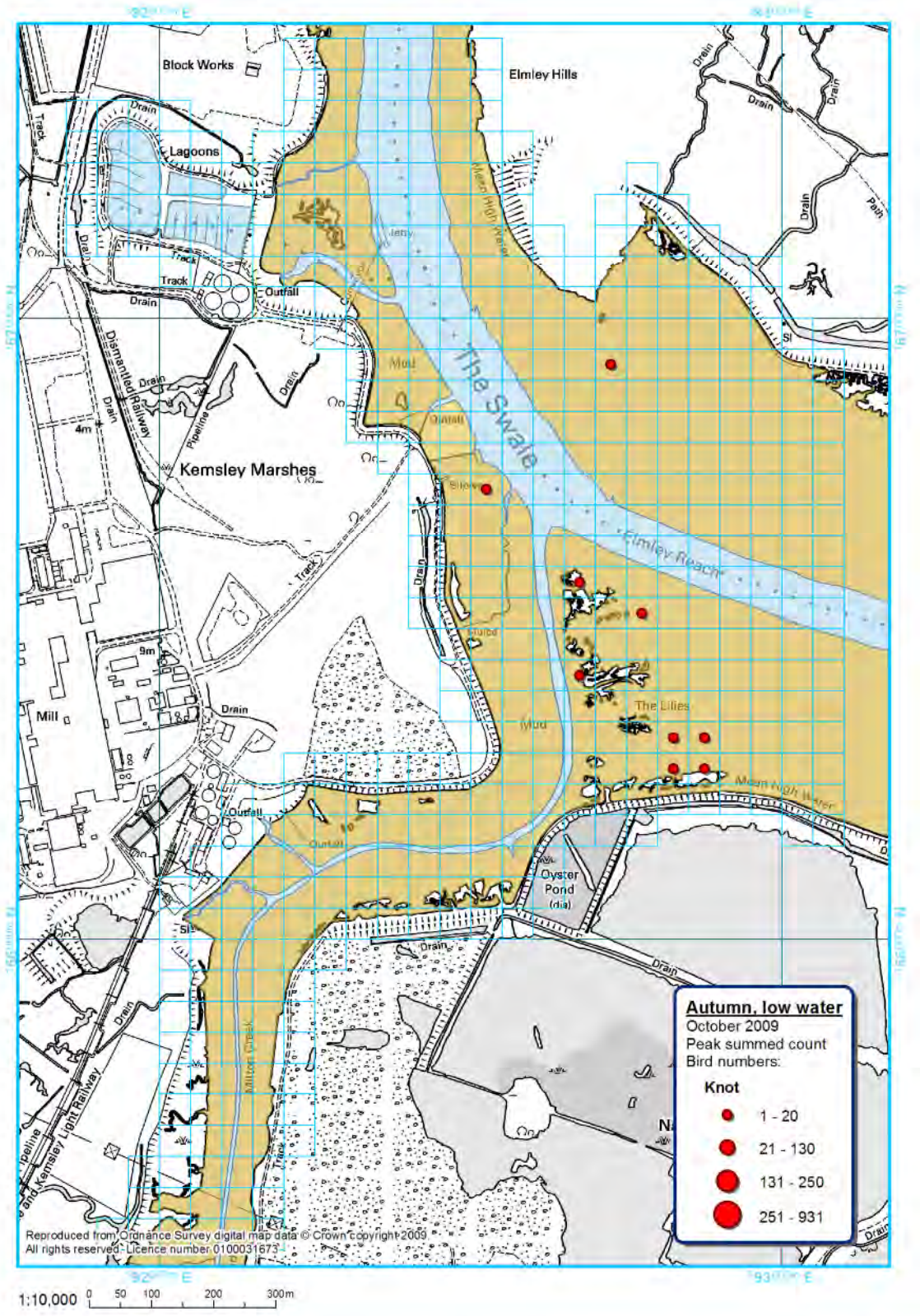

Figure C.46: Spatial distribution of Knot over high water, Nov 2009 - Jan 2010

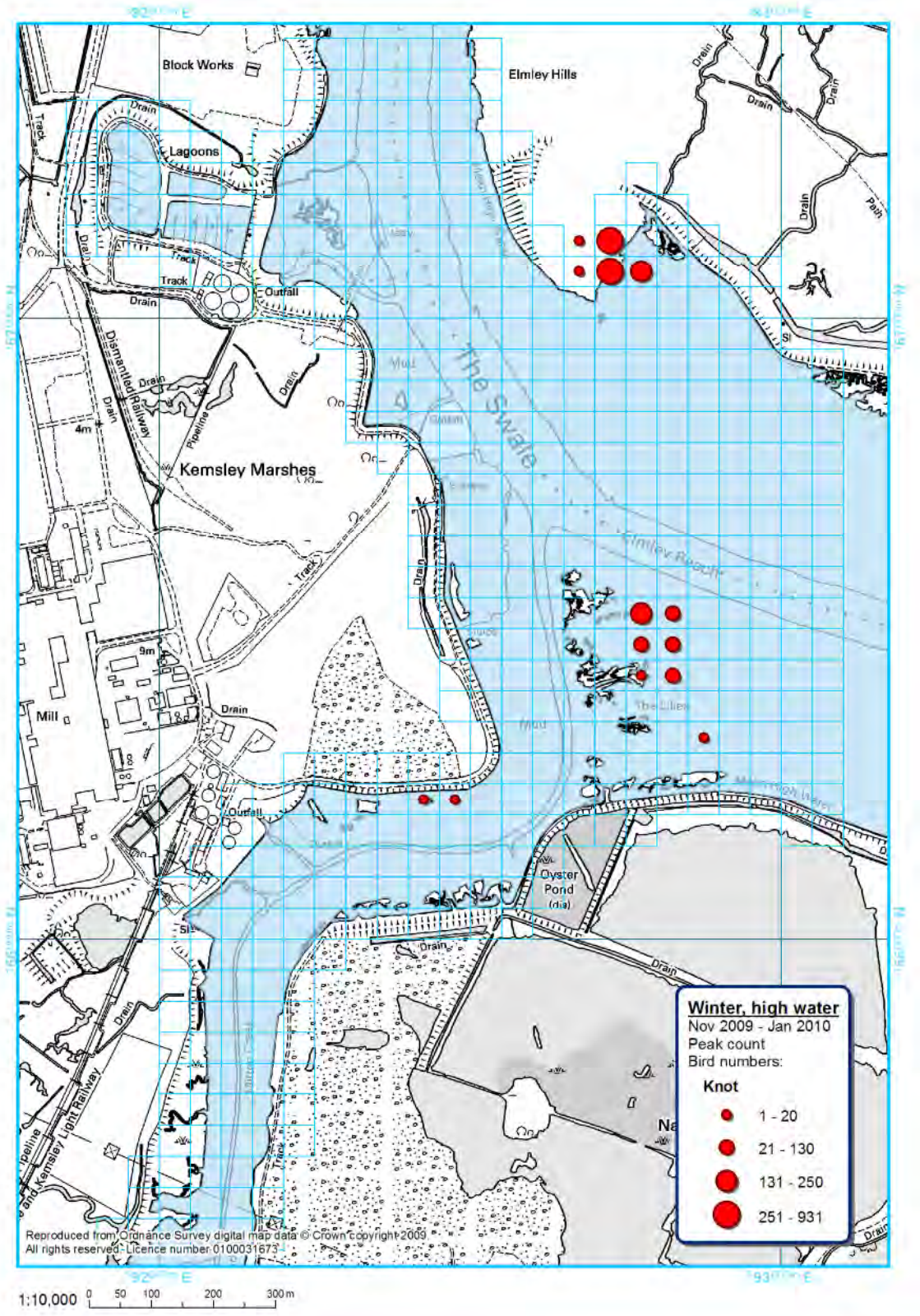

Figure C.47: Spatial distribution of Knot over low water, Nov 2009 - Jan 2010

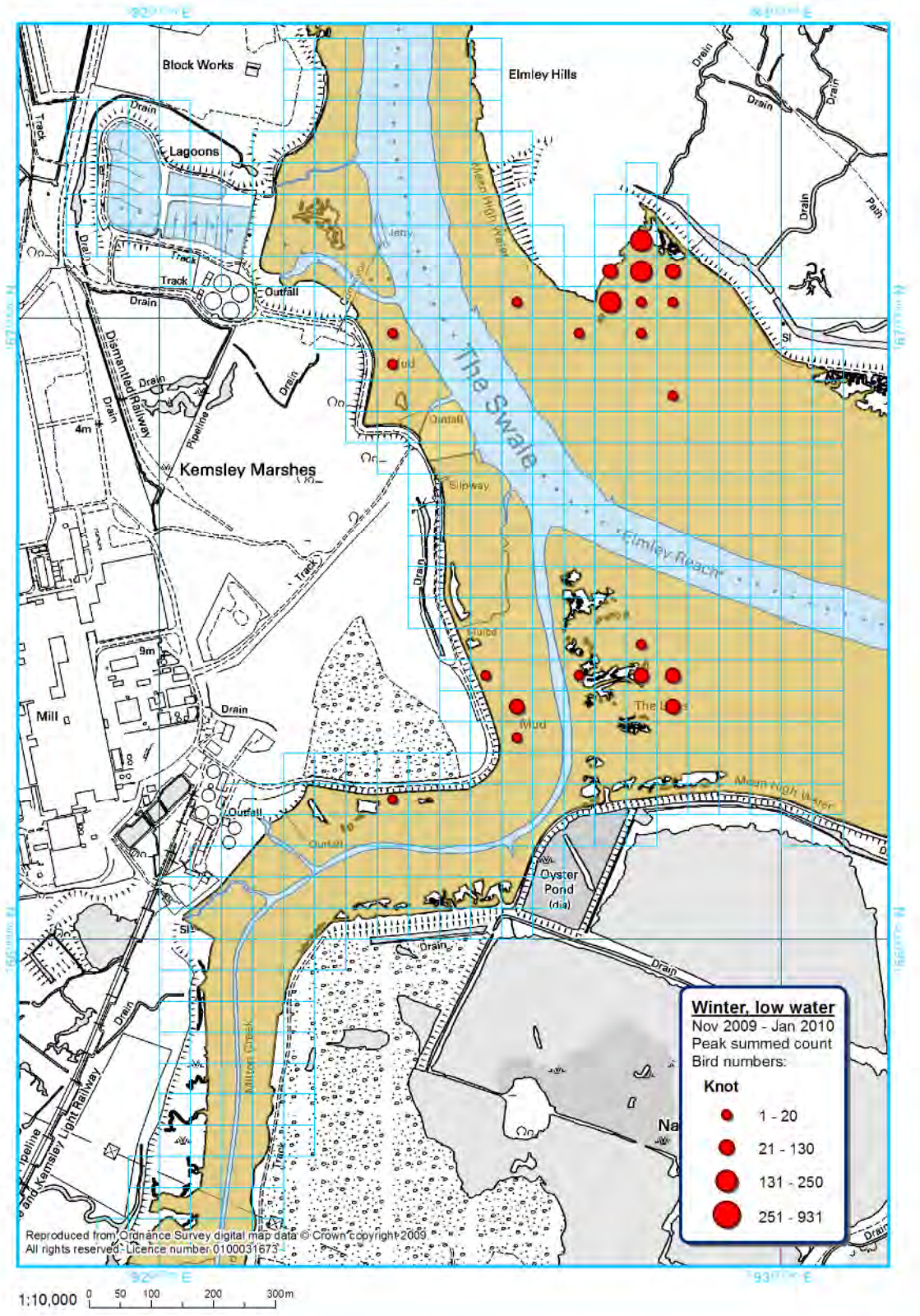

Figure C.48: Spatial distribution of Dunlin over high water , Oct 2009

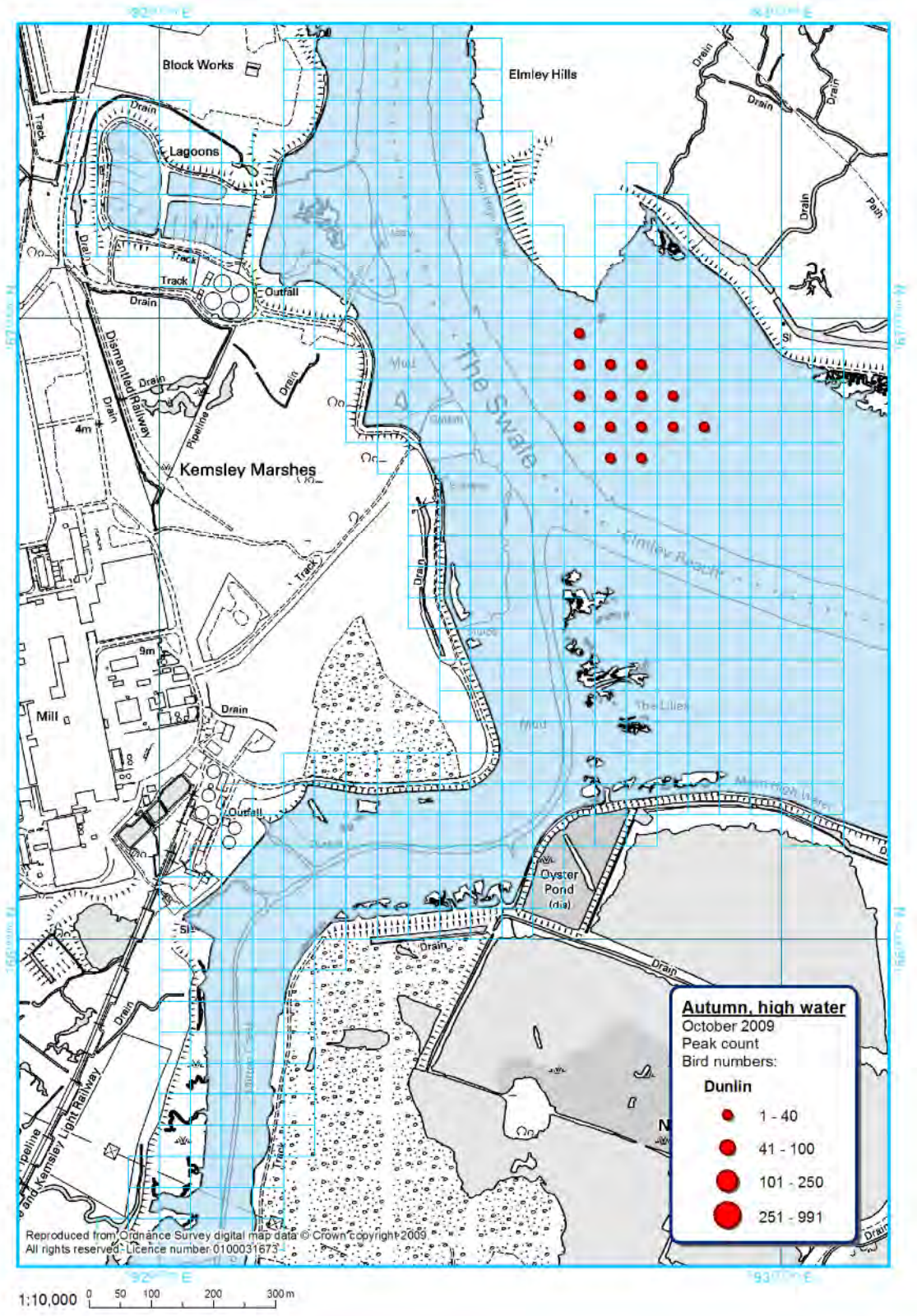

Figure C.49: Spatial distribution of Dunlin over low water , Oct 2009

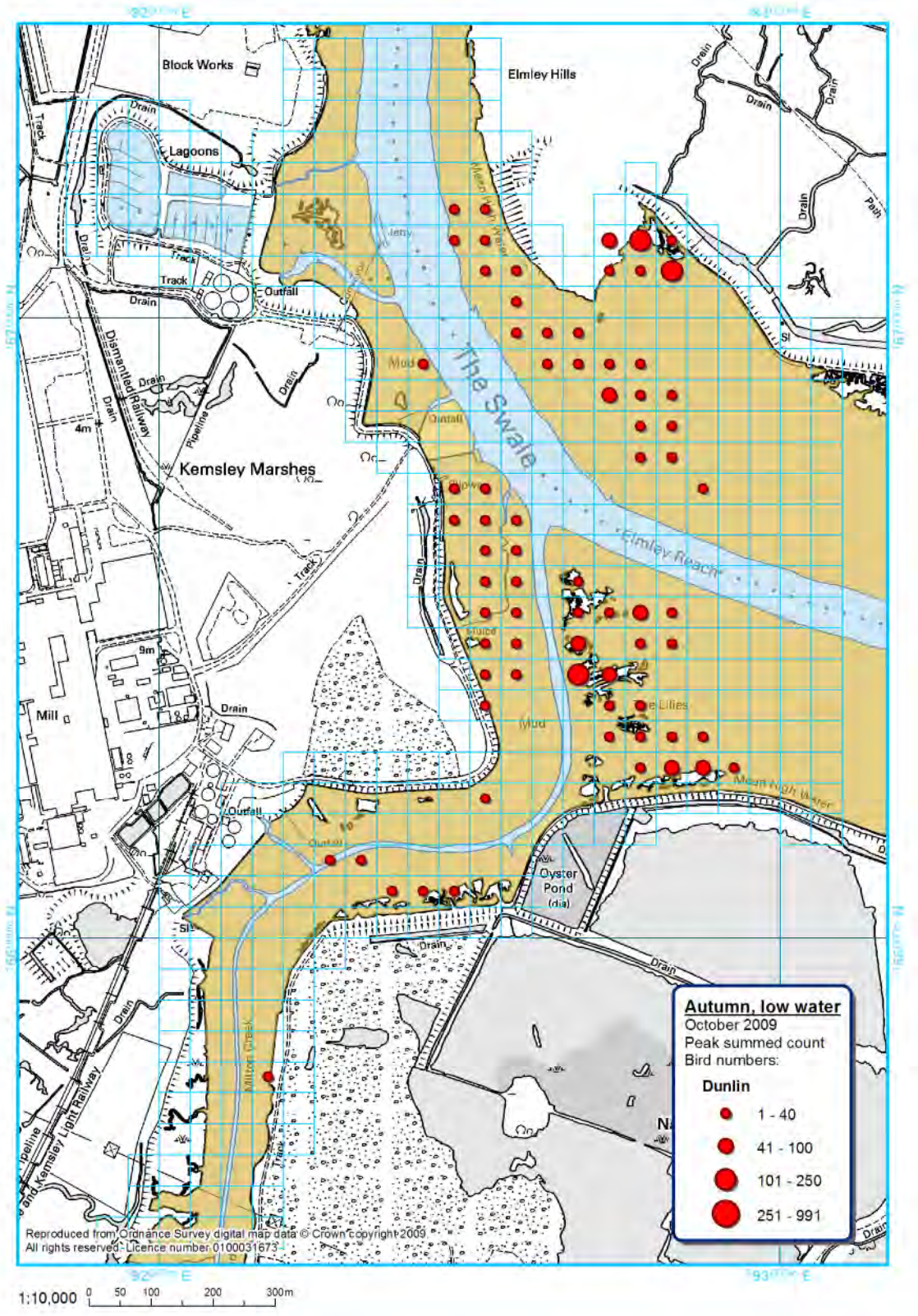

Figure C.50: Spatial distribution of Dunlin over high water, Nov 2009 - Jan 2010

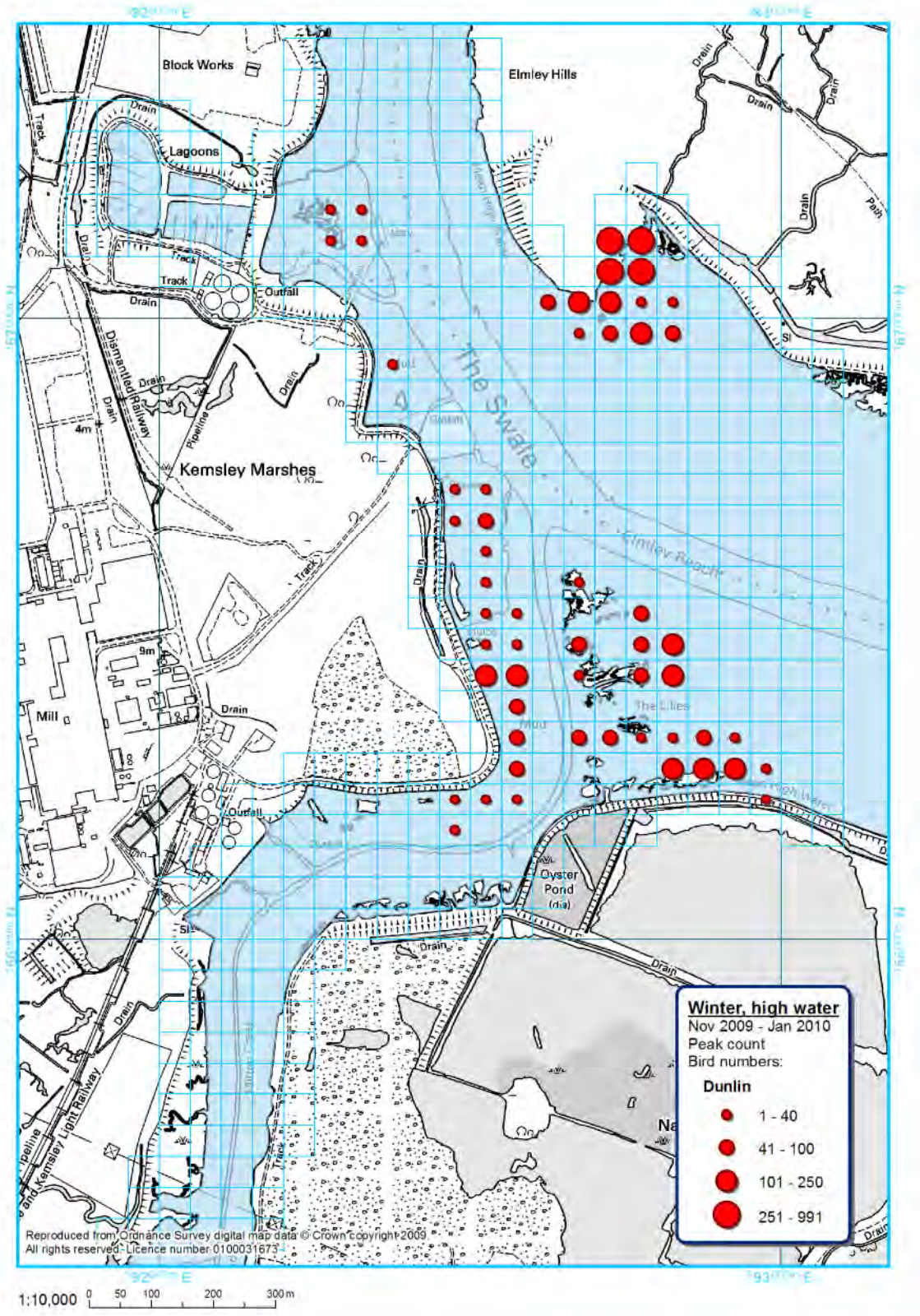

Figure C.51: Spatial distribution of Dunlin over low water, Nov 2009 - Jan 2010

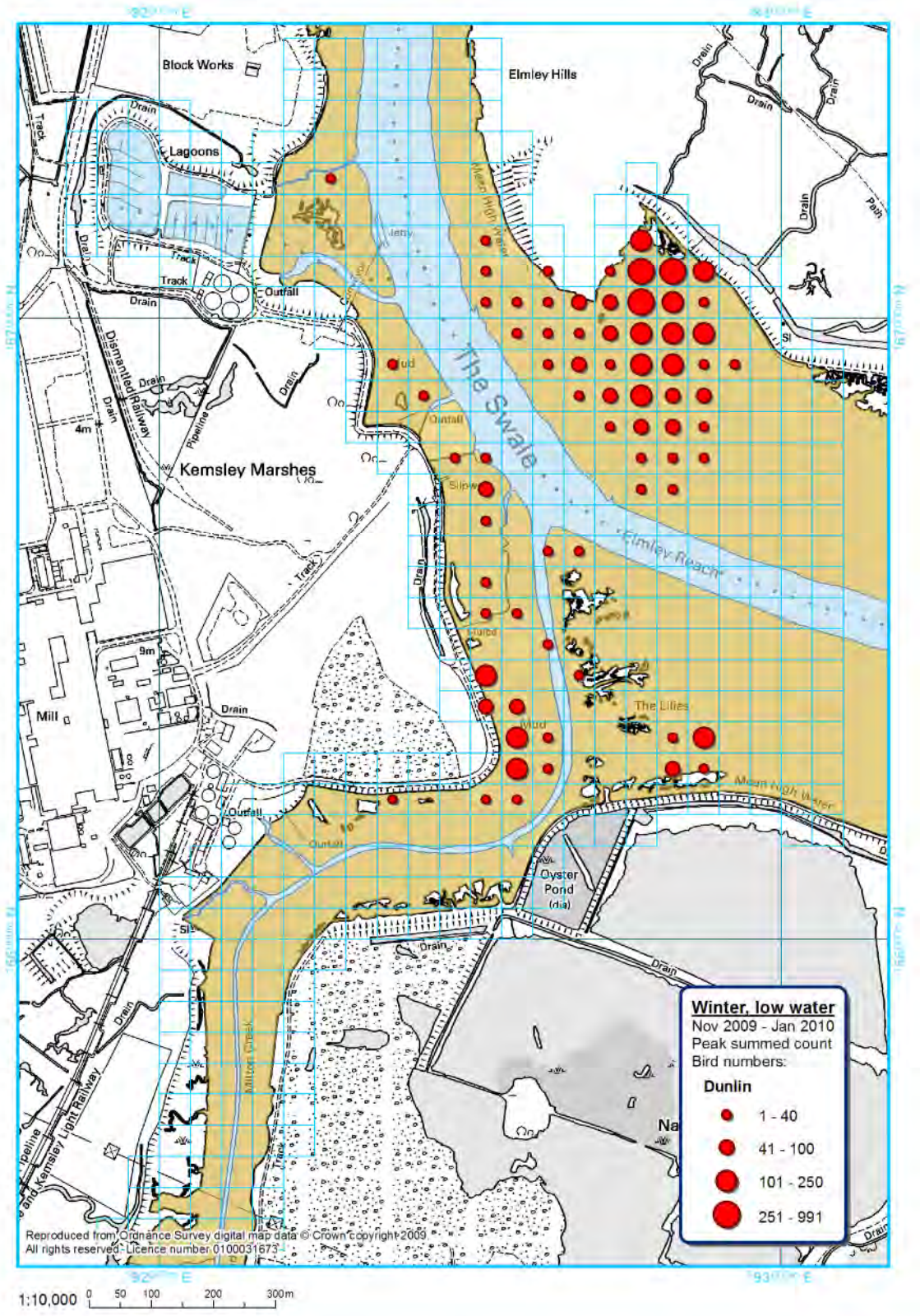

Figure C.52: Spatial distribution of Black-tailed Godwit over high water , Oct 2009

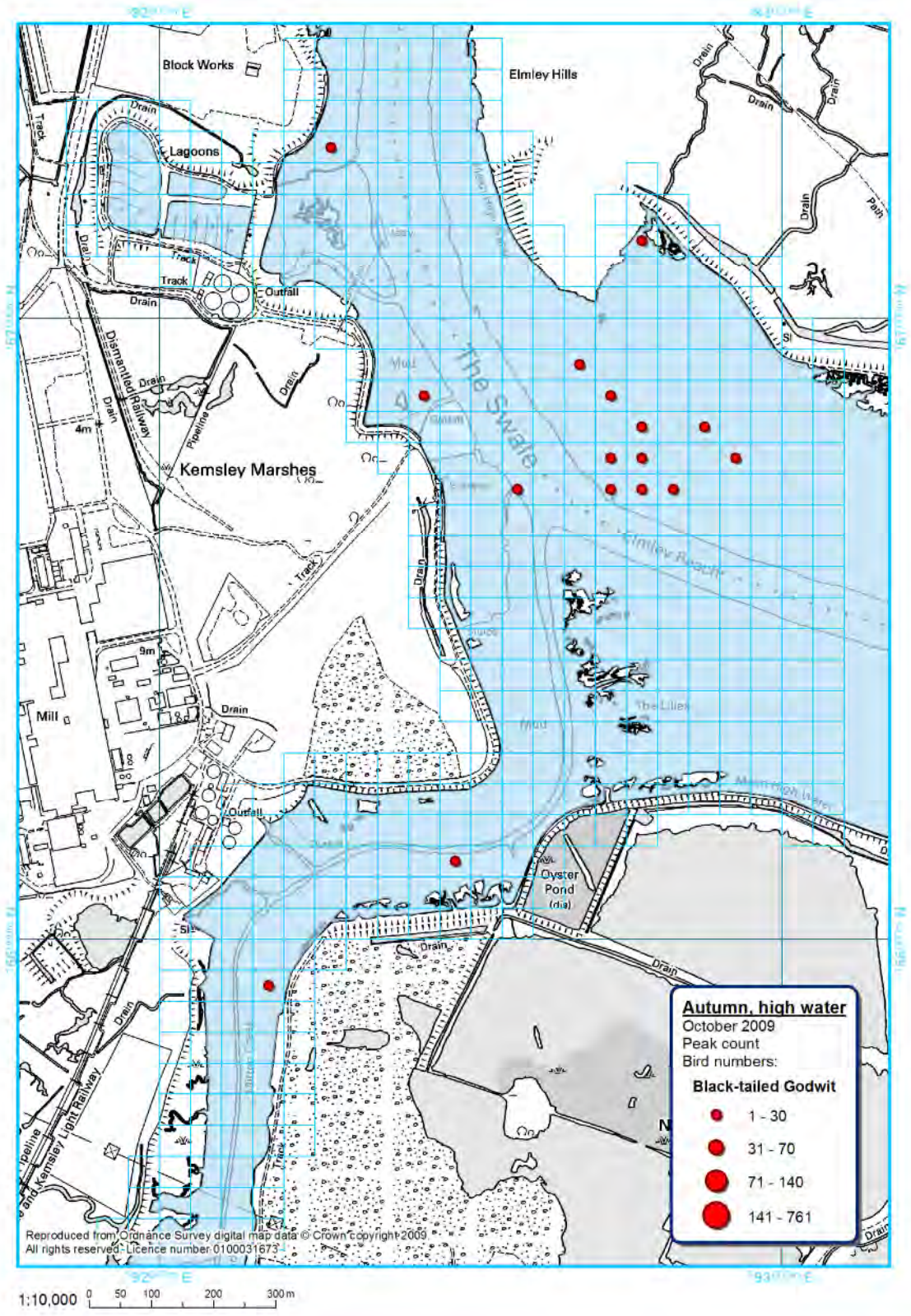

Figure C.53: Spatial distribution of Black-tailed Godwit over low water , Oct 2009

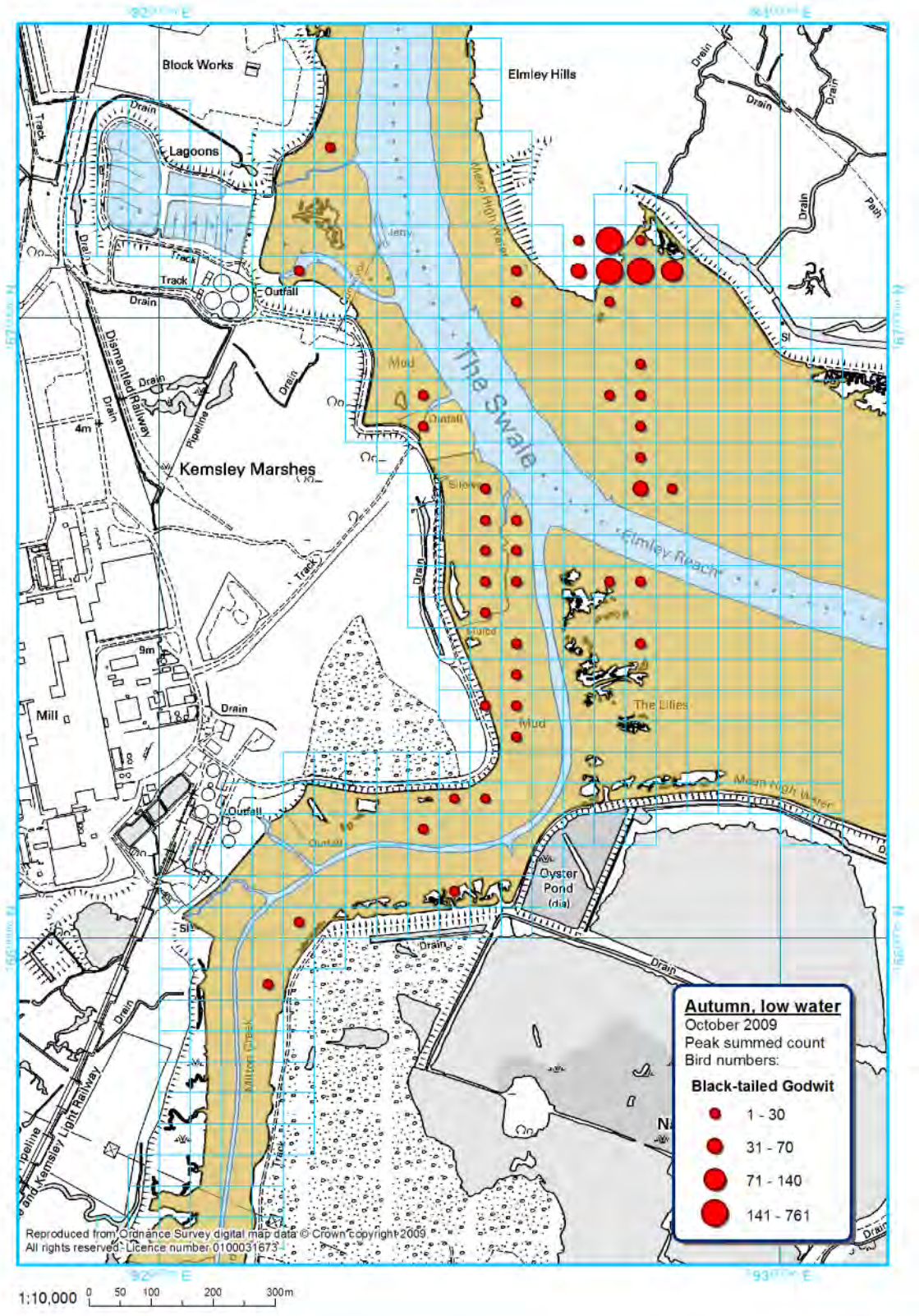

Figure C.54: Spatial distribution of Black-tailed Godwit over high water, Nov 2009 - Jan 2010

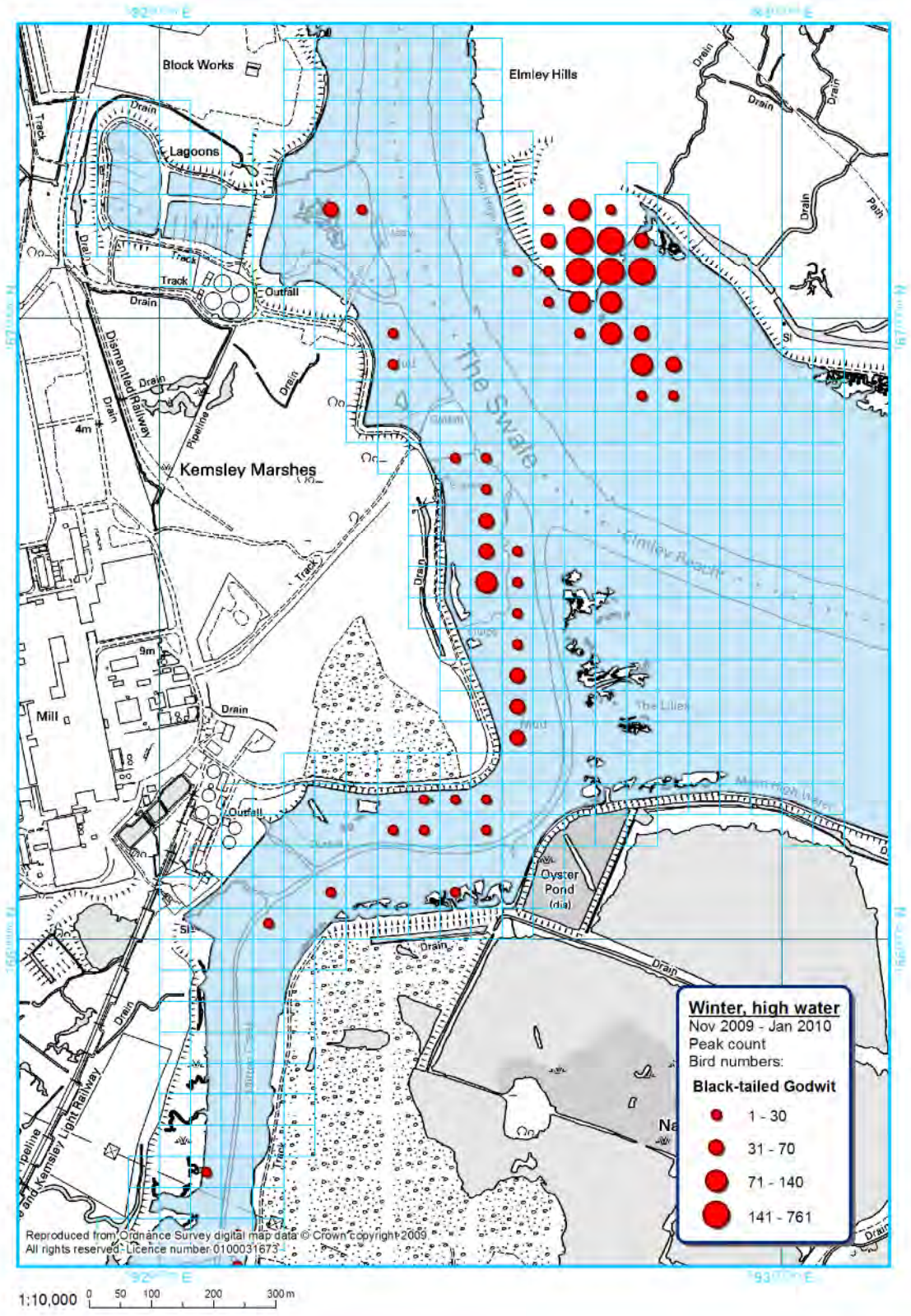

Figure C.55: Spatial distribution of Black-tailed Godwit over low water, Nov 2009 - Jan 2010

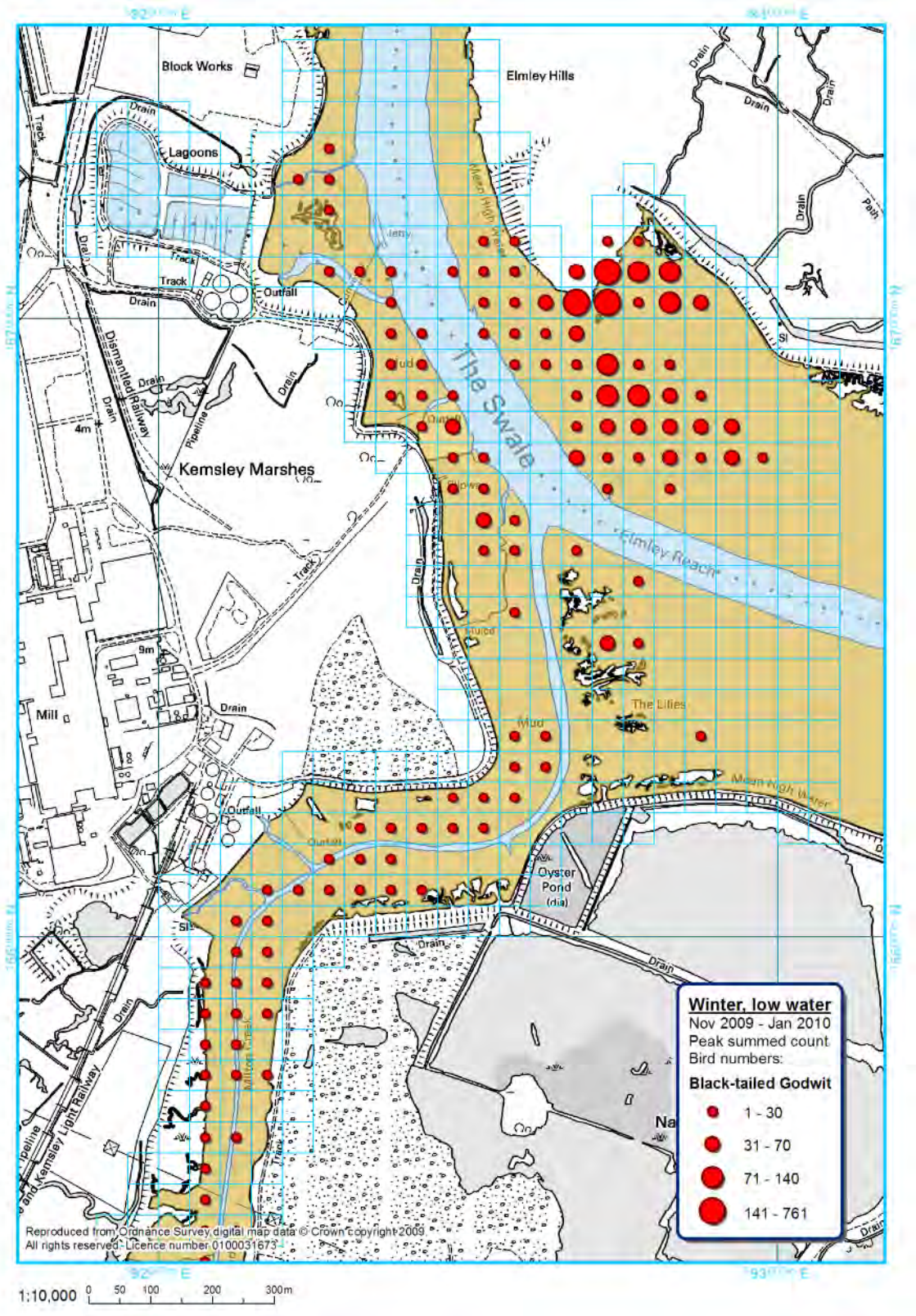

Figure C.56: Spatial distribution of Curlew over high water , Oct 2009

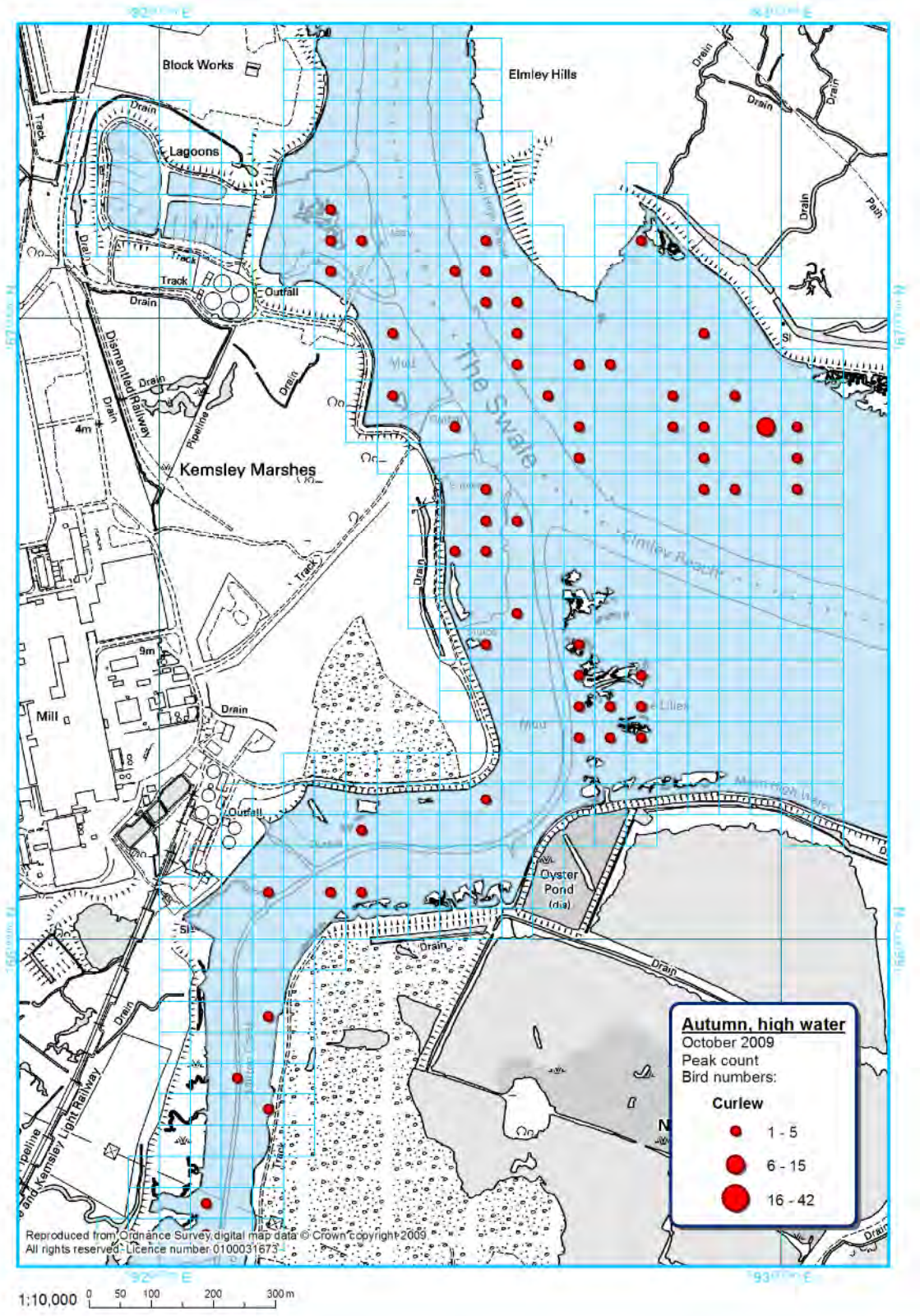

Figure C.57: Spatial distribution of Curlew over low water , Oct 2009

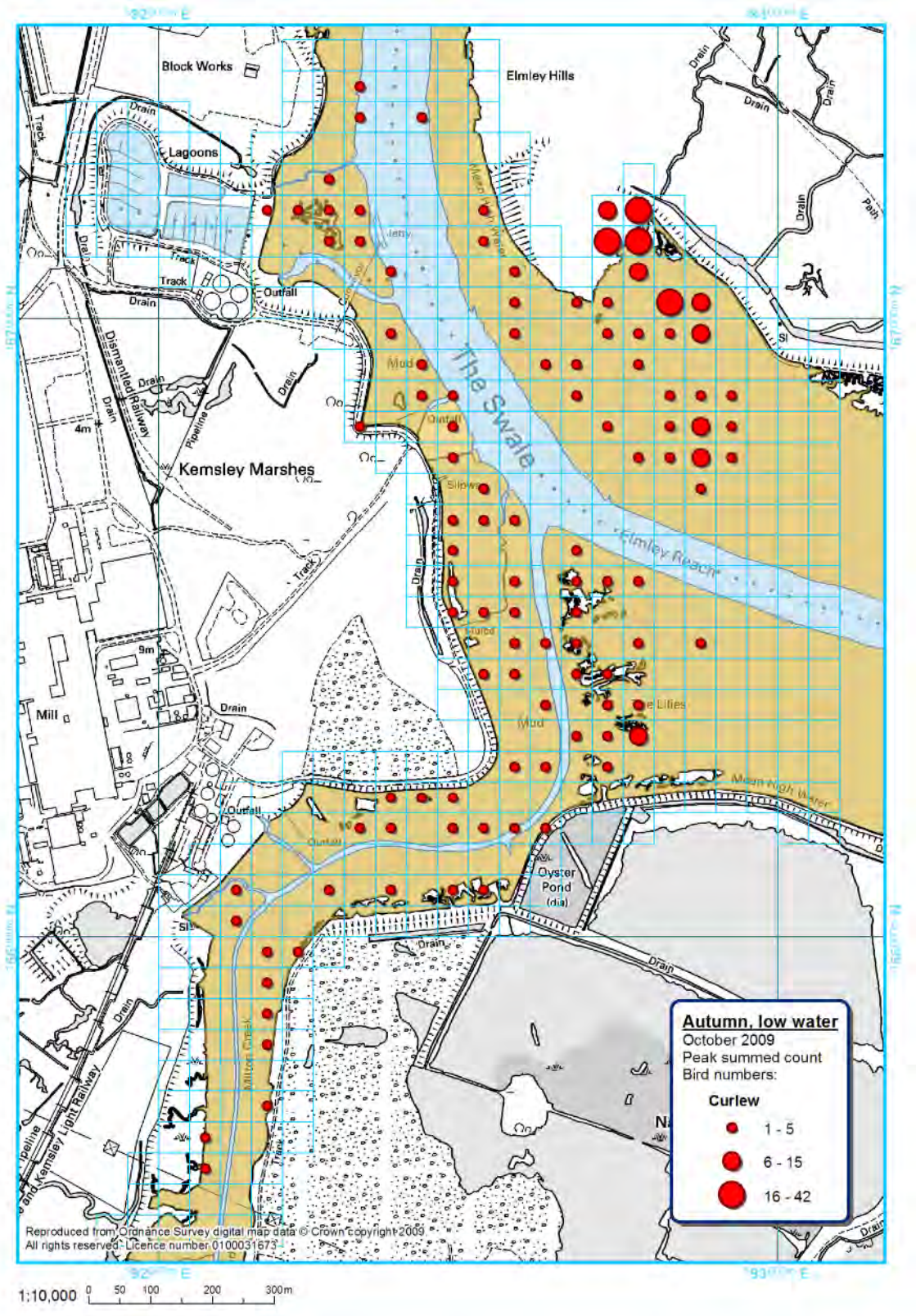

Figure C.58: Spatial distribution of Curlew over high water, Nov 2009 - Jan 2010

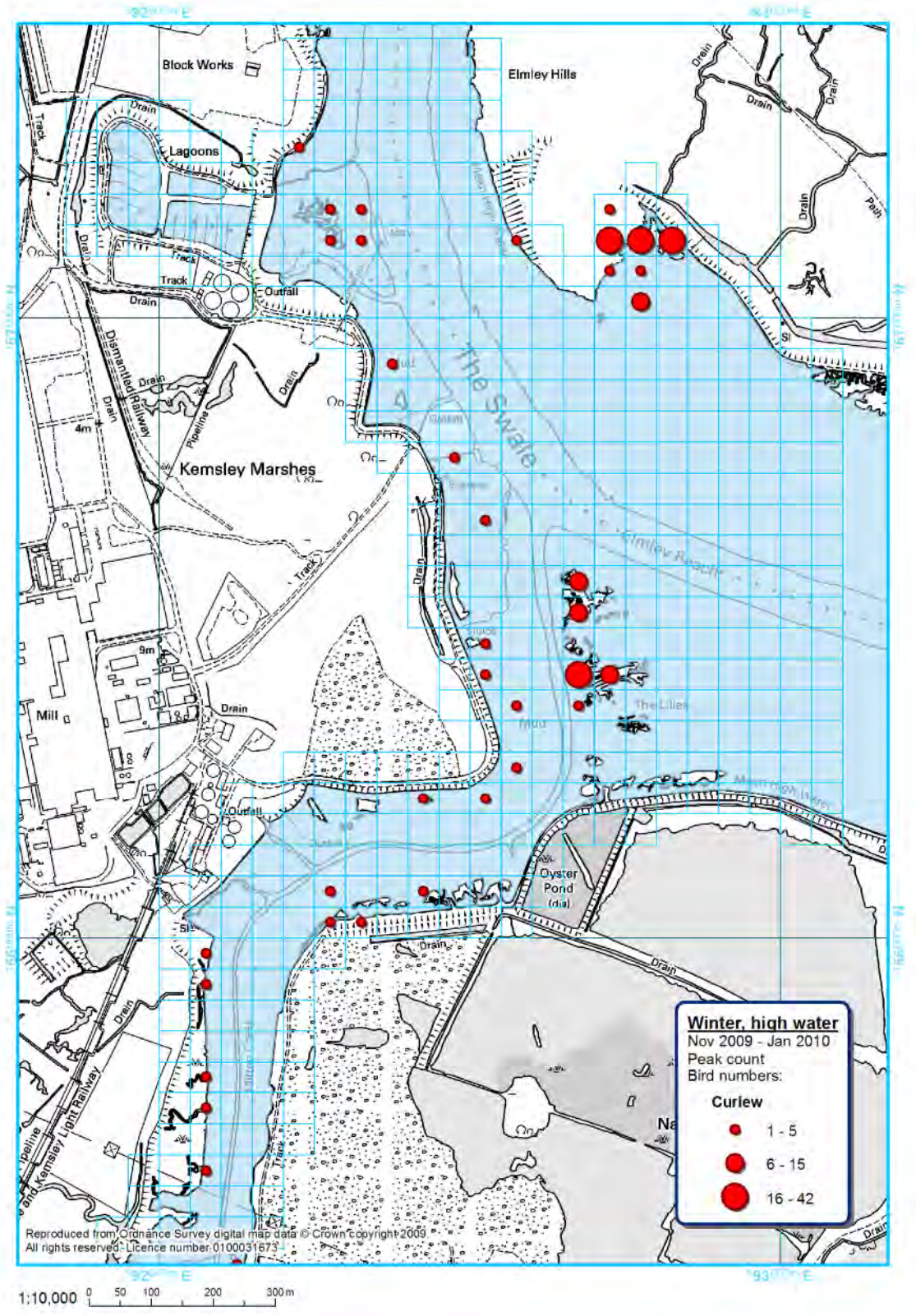

Figure C.59: Spatial distribution of Curlew over low water, Nov 2009 - Jan 2010

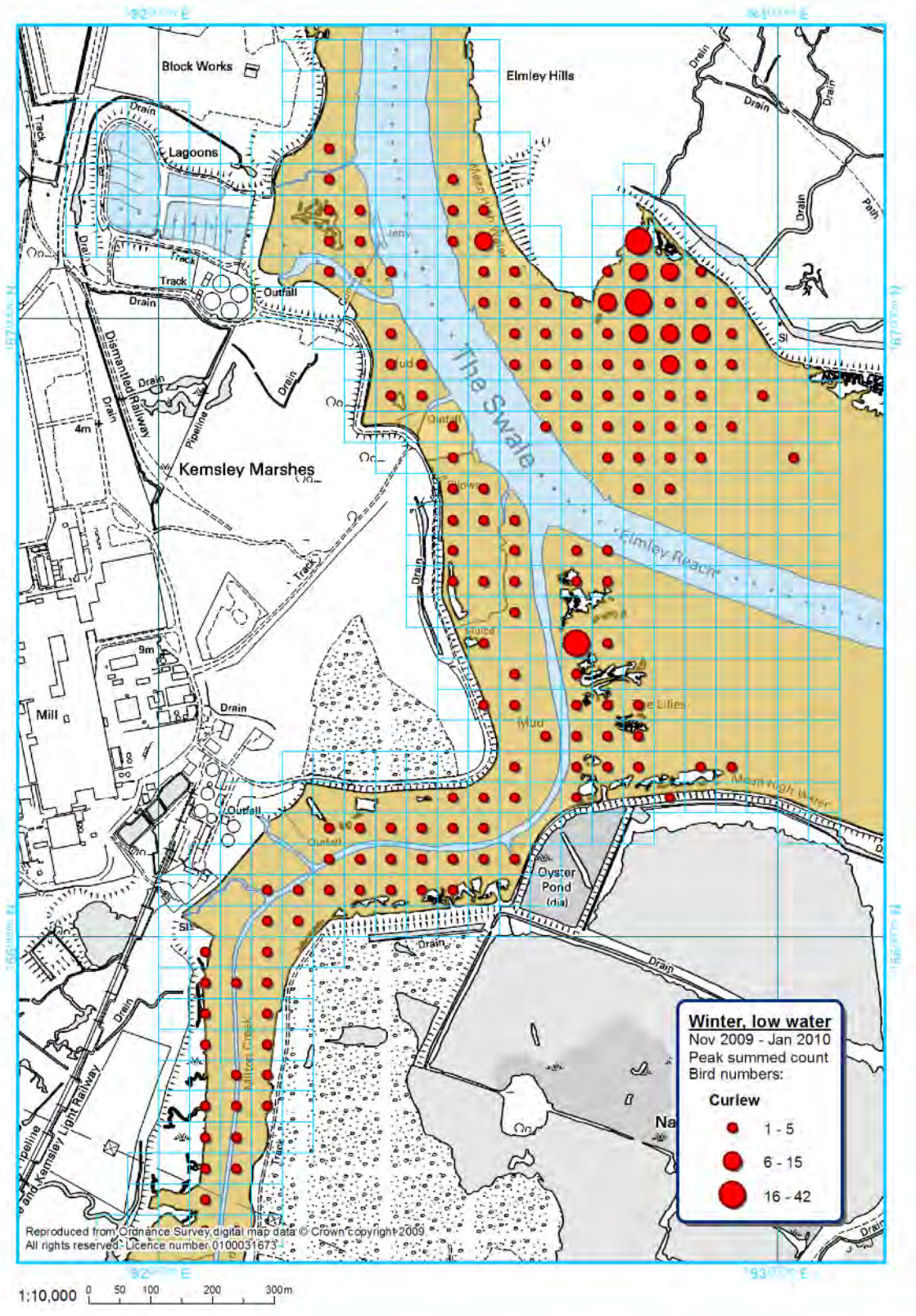

Figure C.60: Spatial distribution of Redshank over high water , Oct 2009

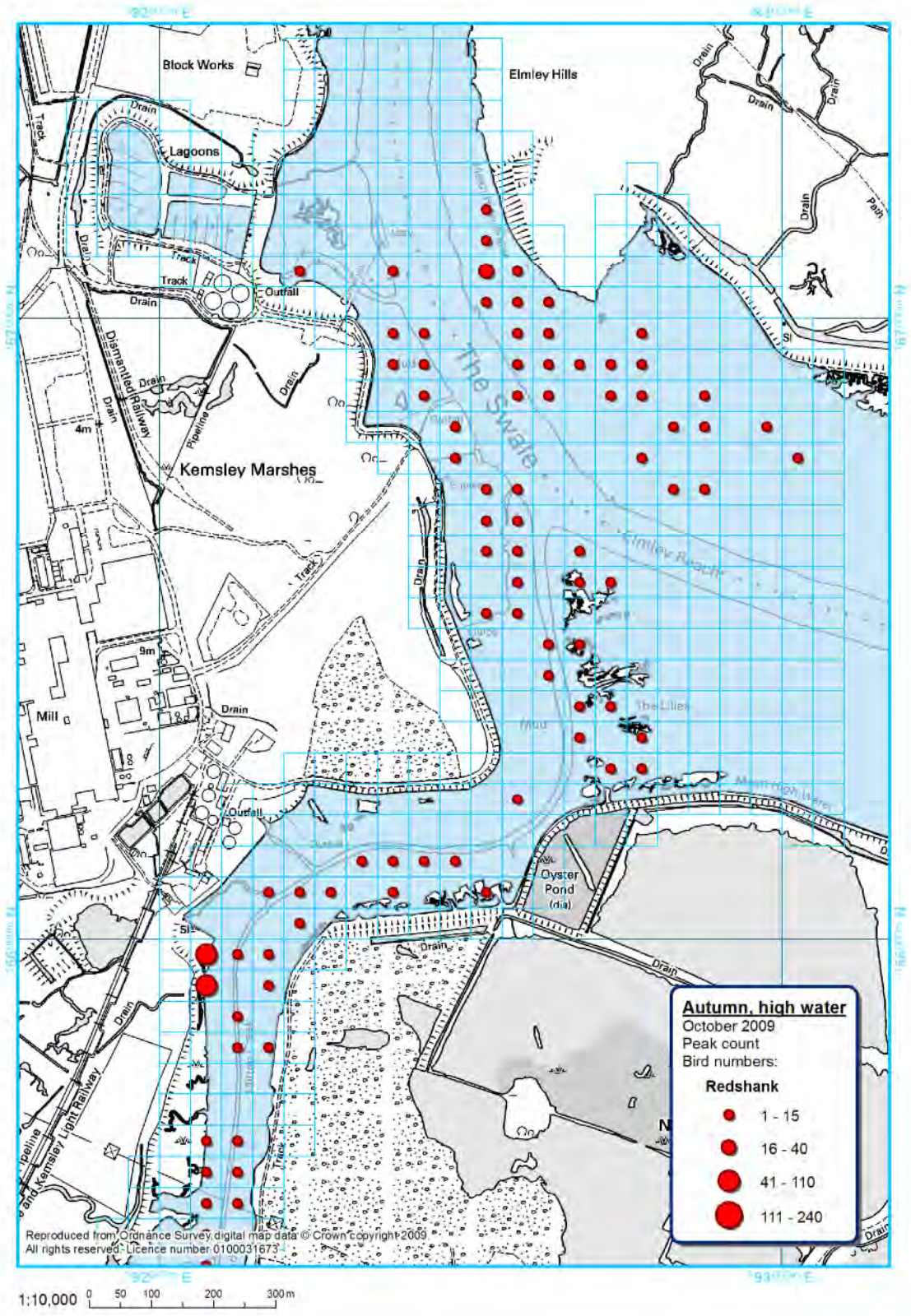

Figure C.61: Spatial distribution of Redshank over low water , Oct 2009

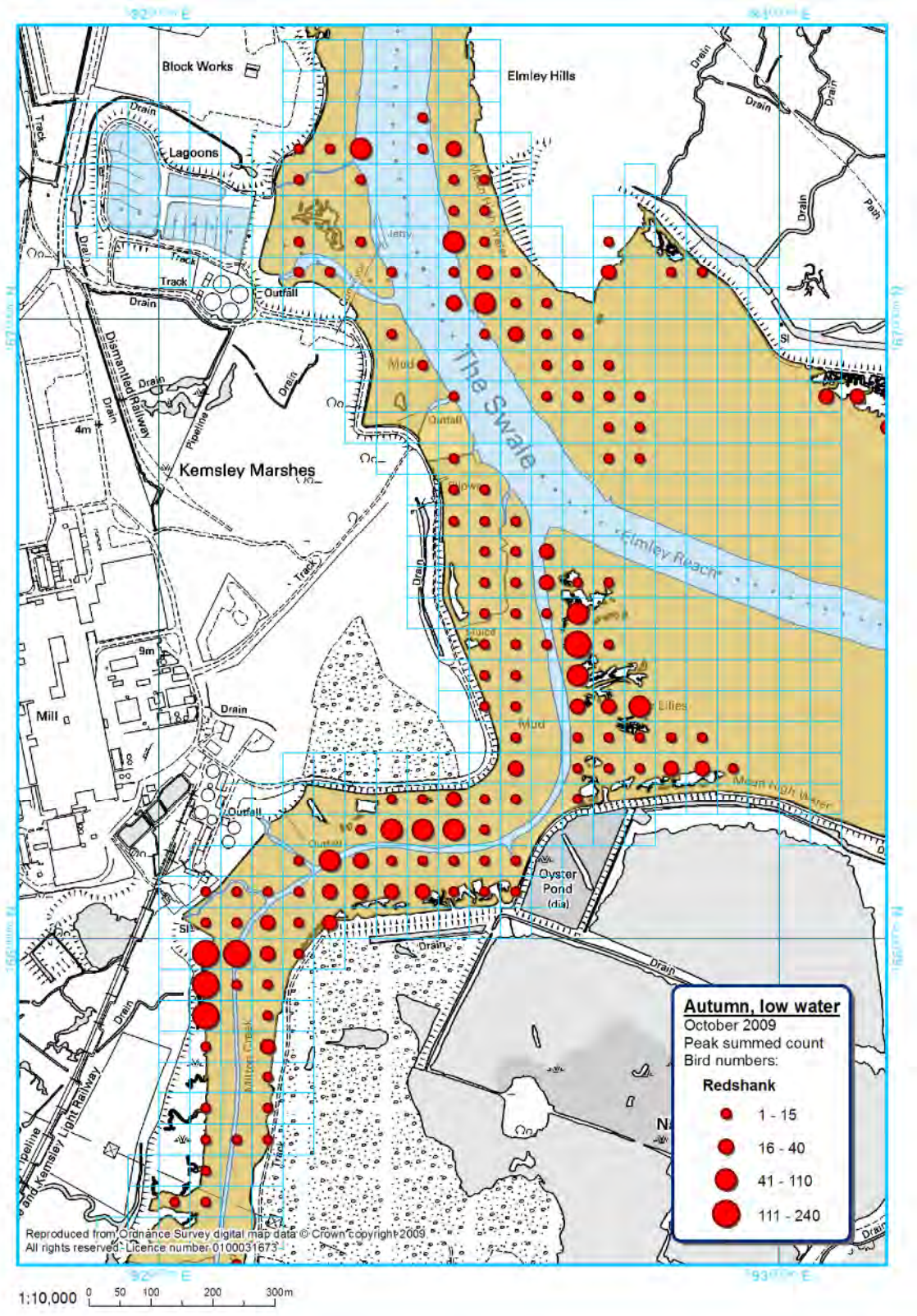

Figure C.62: Spatial distribution of Redshank over high water, Nov 2009 - Jan 2010

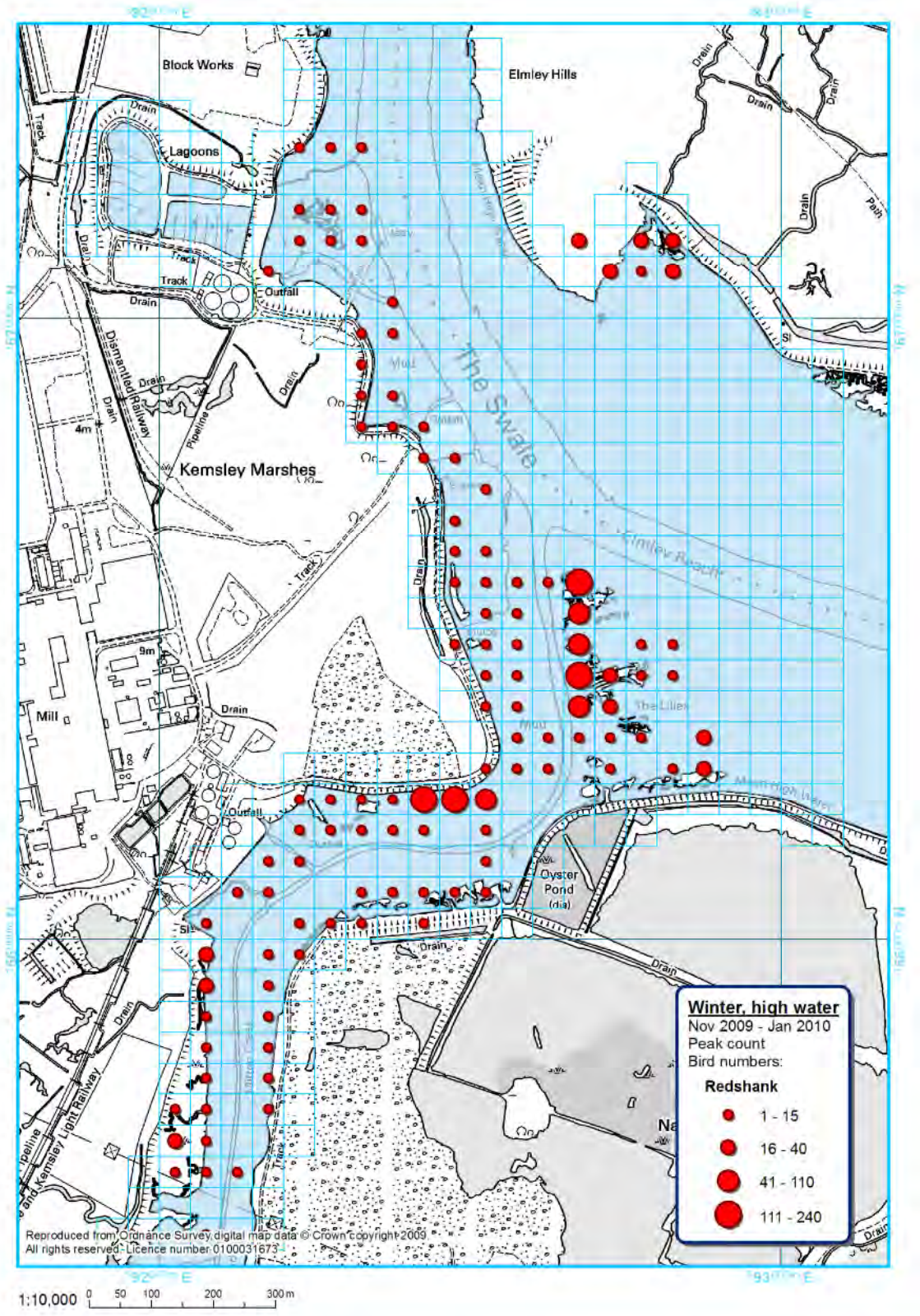

Figure C.63: Spatial distribution of Redshank over low water, Nov 2009 - Jan 2010

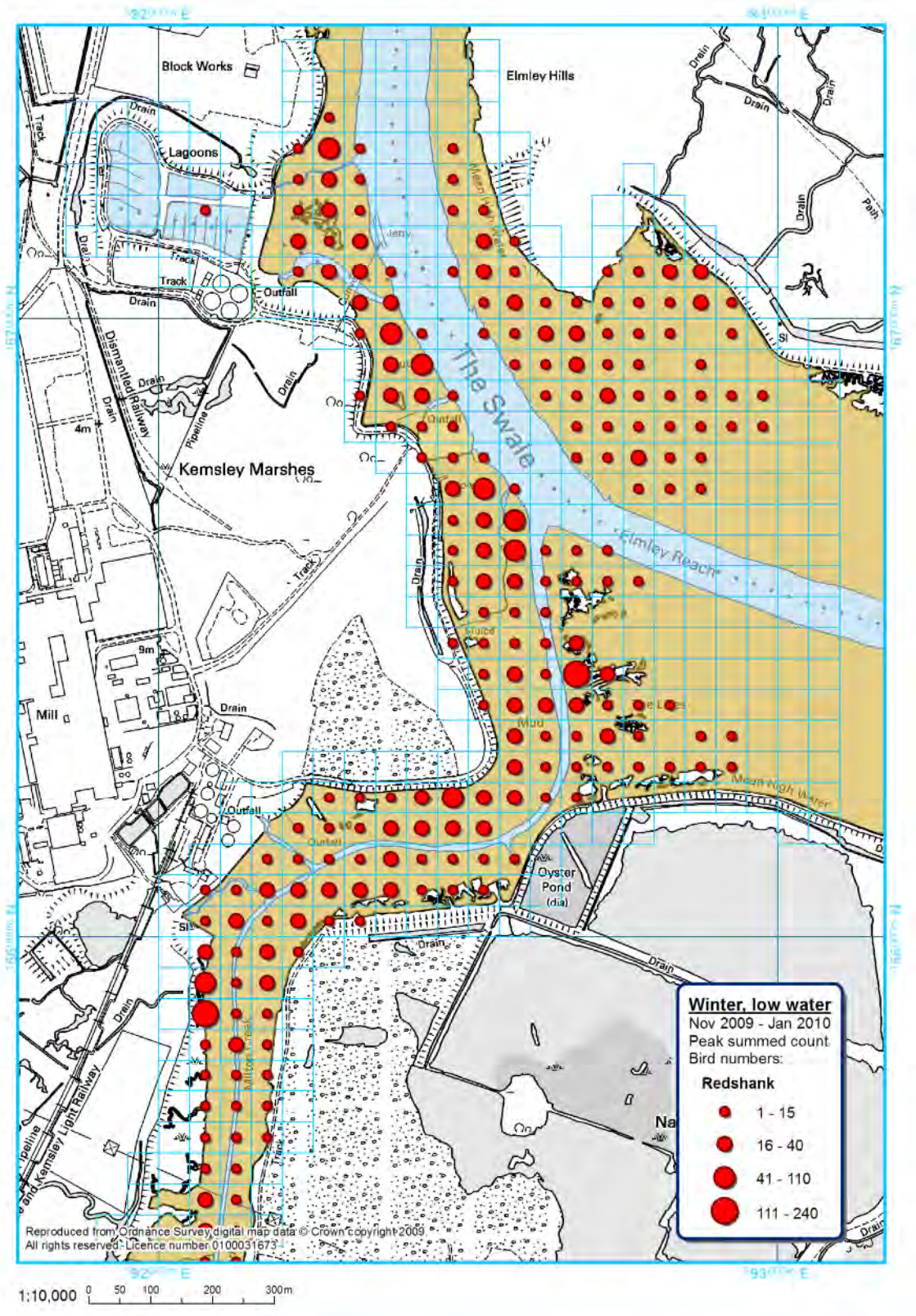

Figure C.64: Spatial distribution of Greenshank over high water , Oct 2009

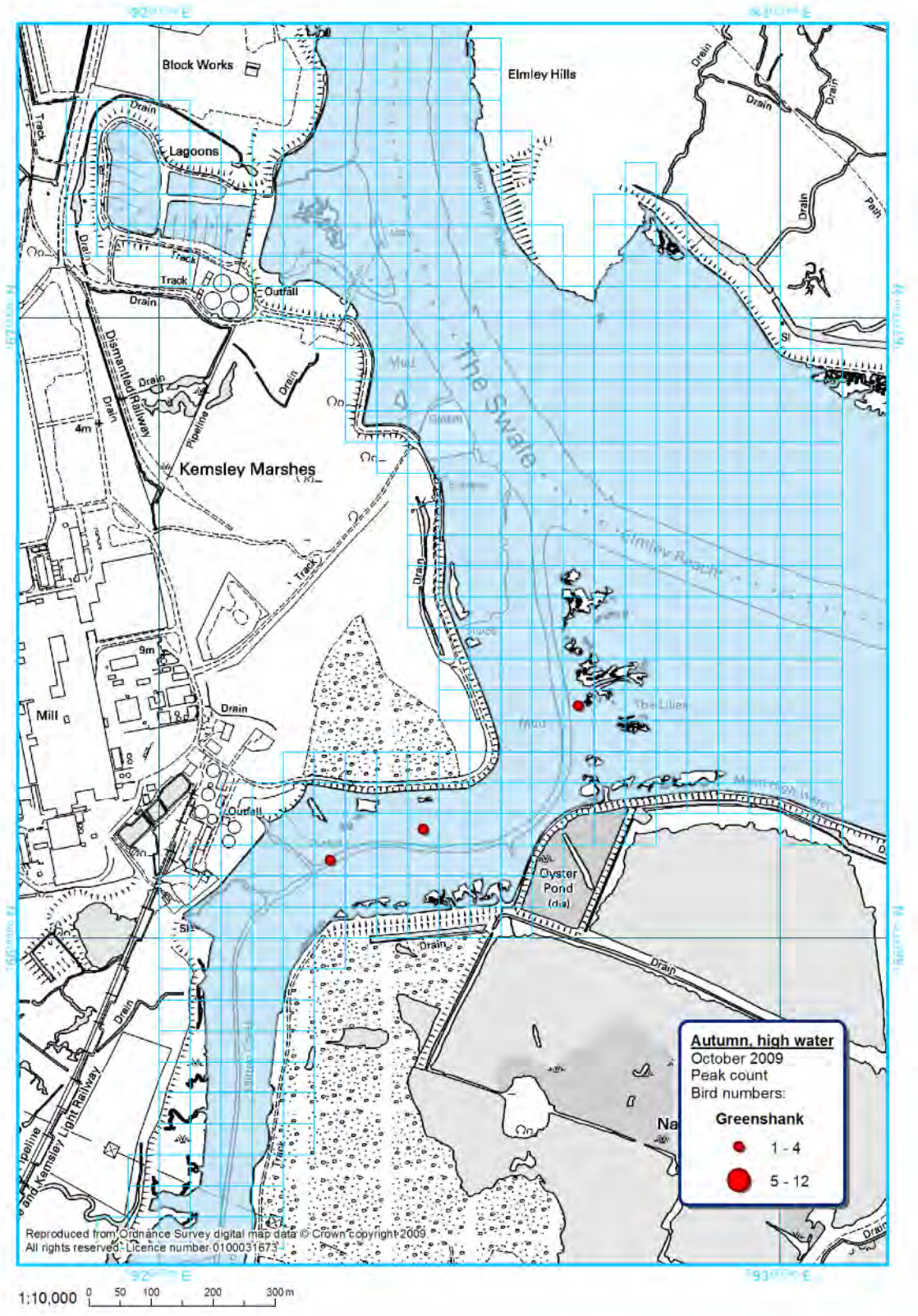

Figure C.65: Spatial distribution of Greenshank over low water , Oct 2009

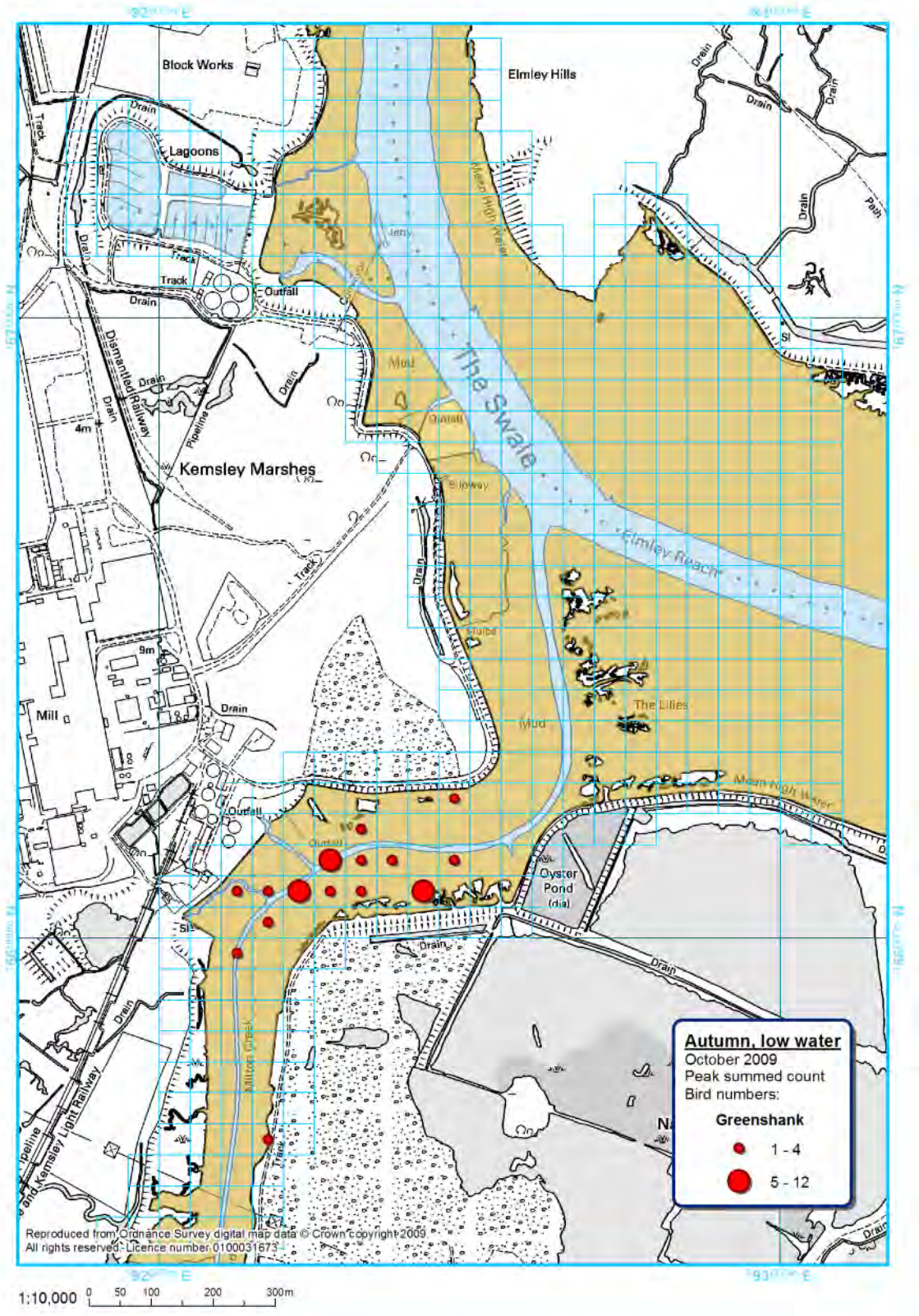

Figure C.66: Spatial distribution of Greenshank over high water, Nov 2009 - Jan 2010

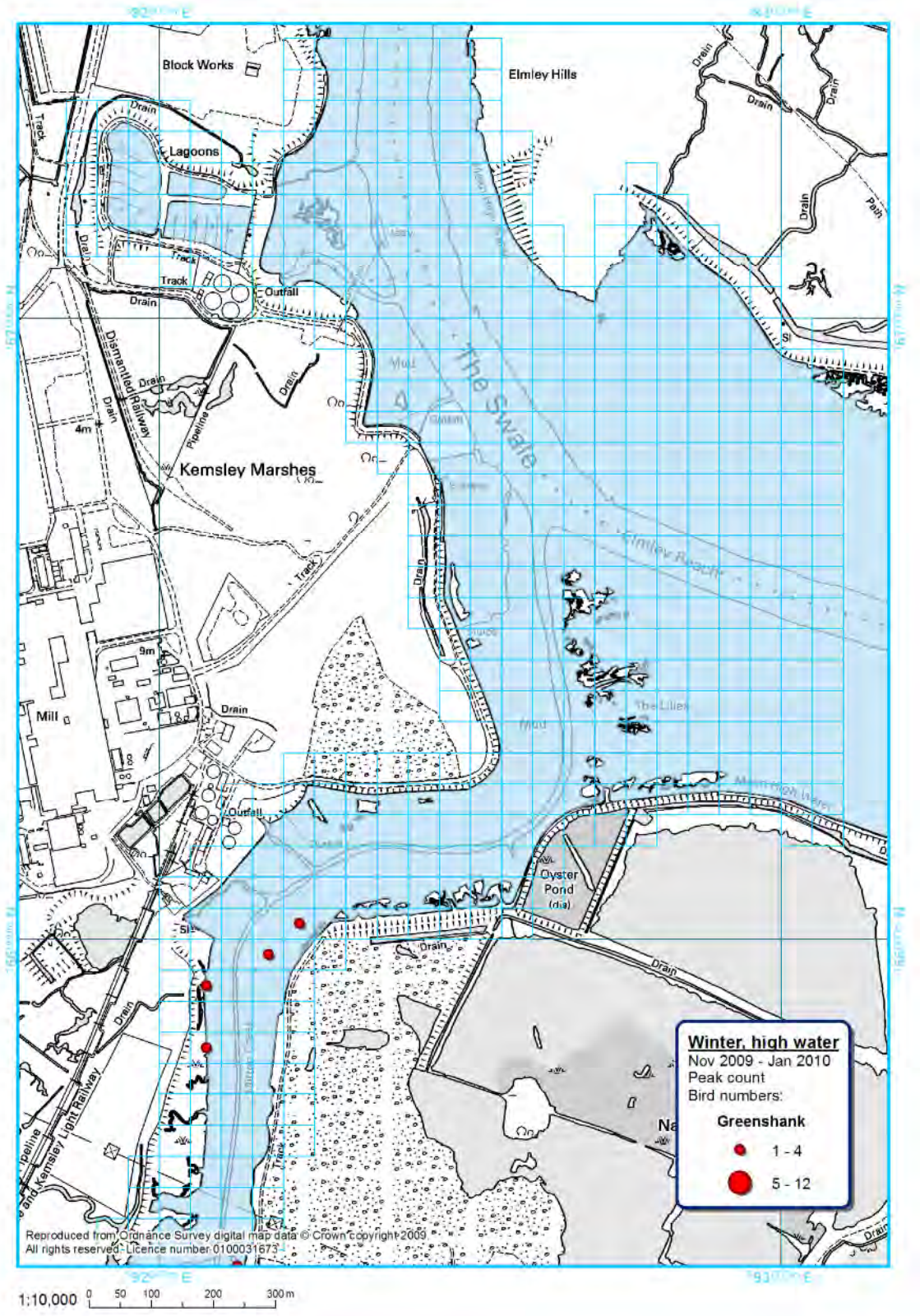

Figure C.67: Spatial distribution of Greenshank over low water, Nov 2009 - Jan 2010

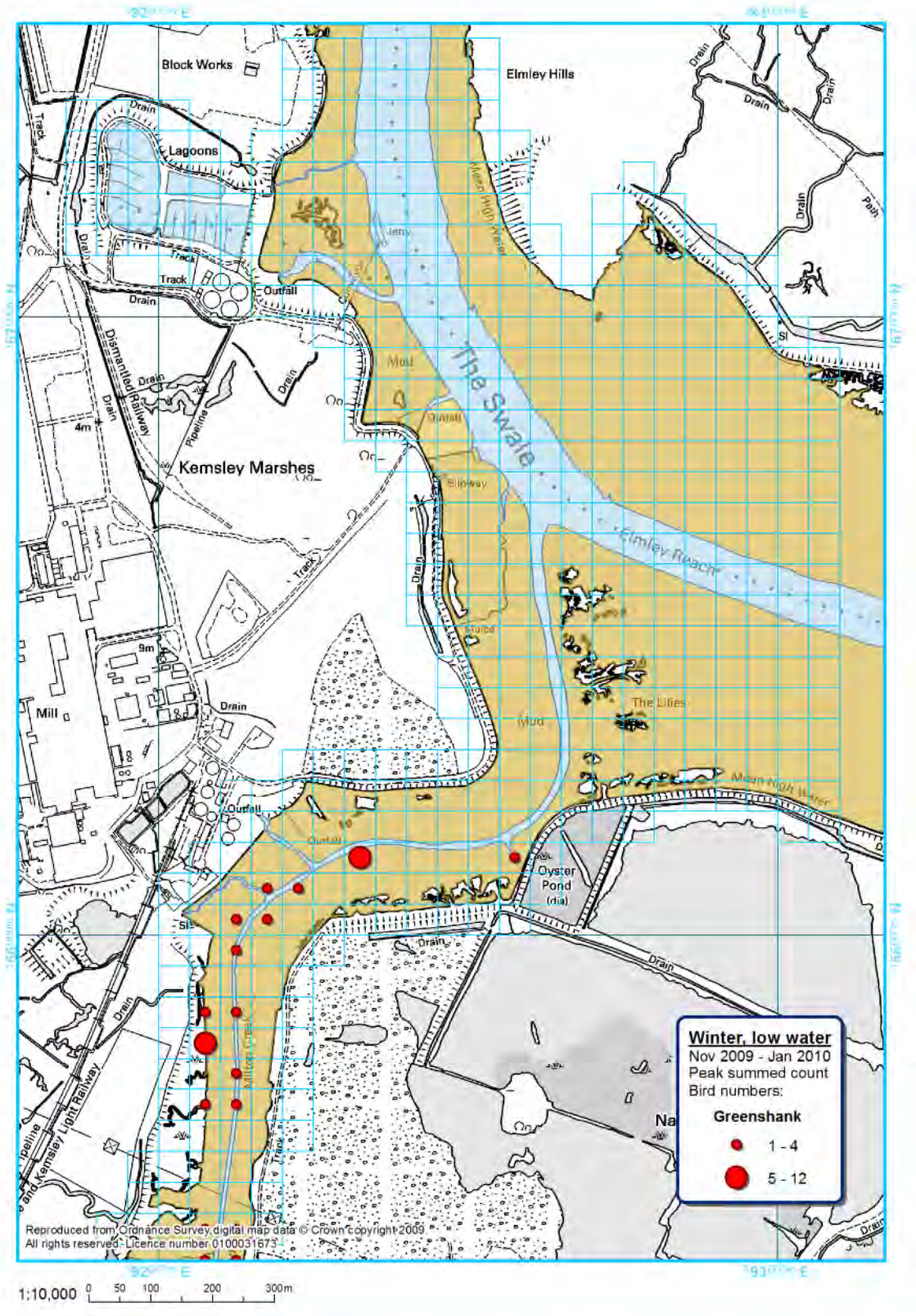

Figure C.68: Spatial distribution of Turnstone over high water , Oct 2009

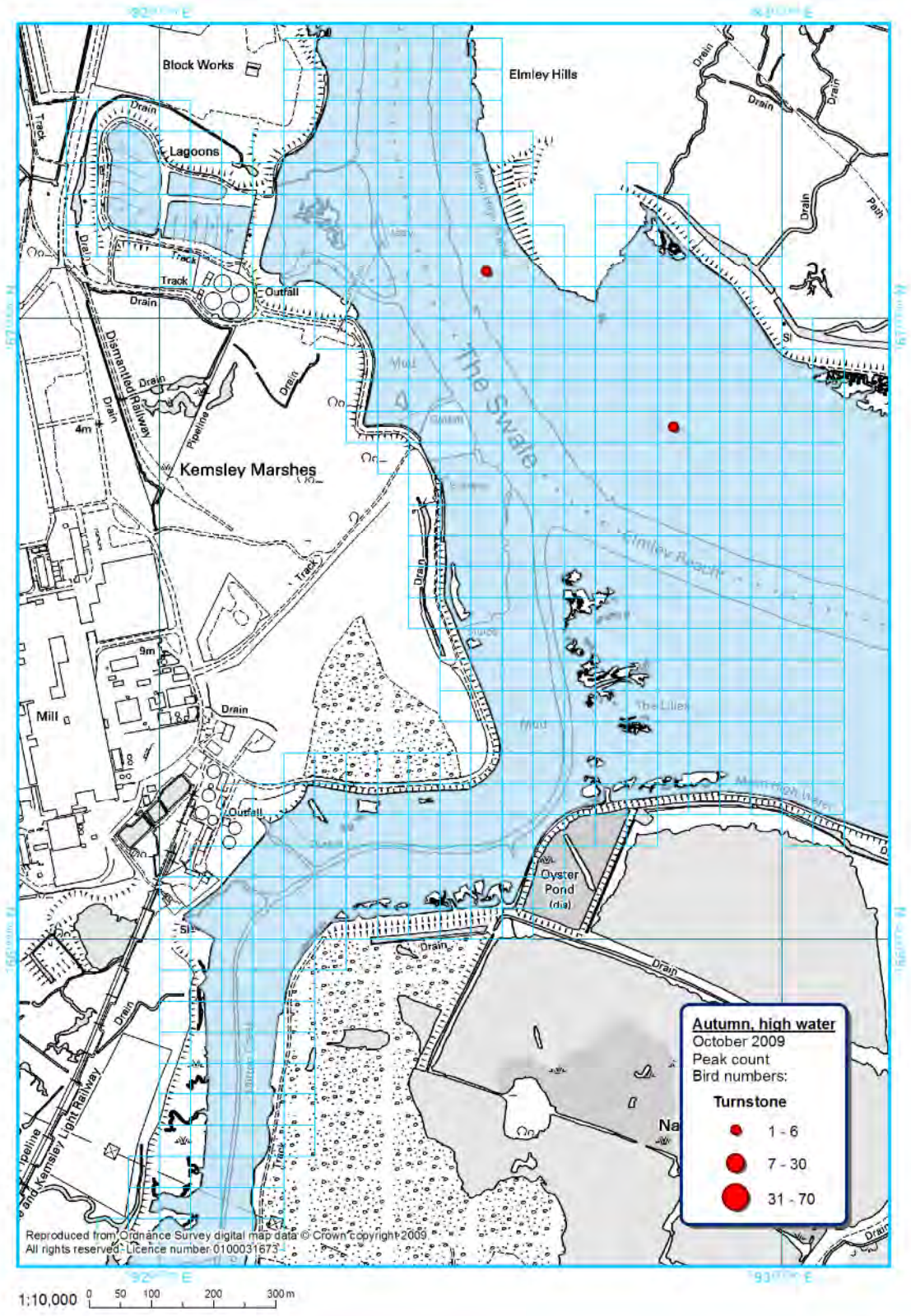

Figure C.69: Spatial distribution of Turnstone over low water , Oct 2009

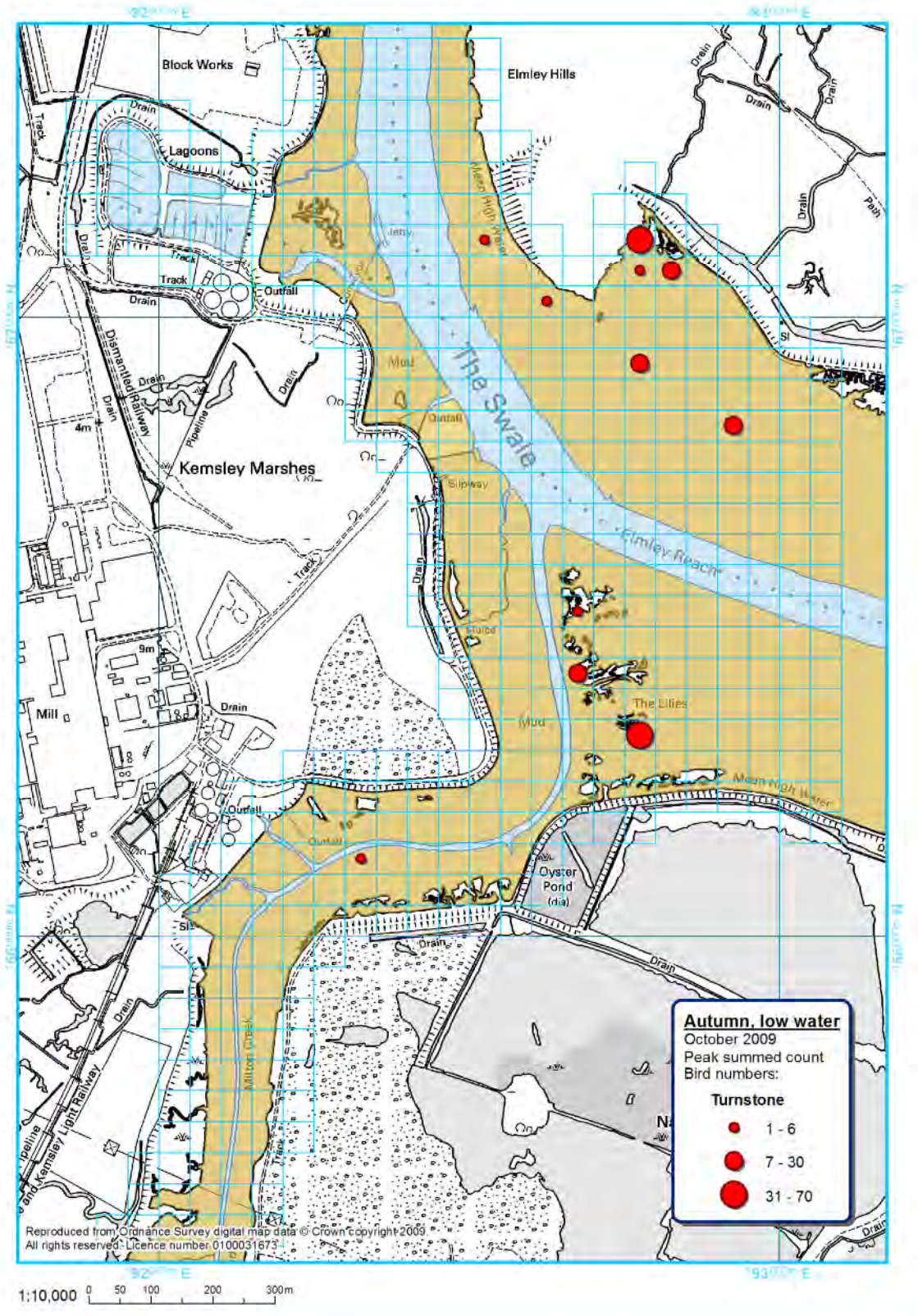

Figure C.70: Spatial distribution of Turnstone over high water, Nov 2009 - Jan 2010

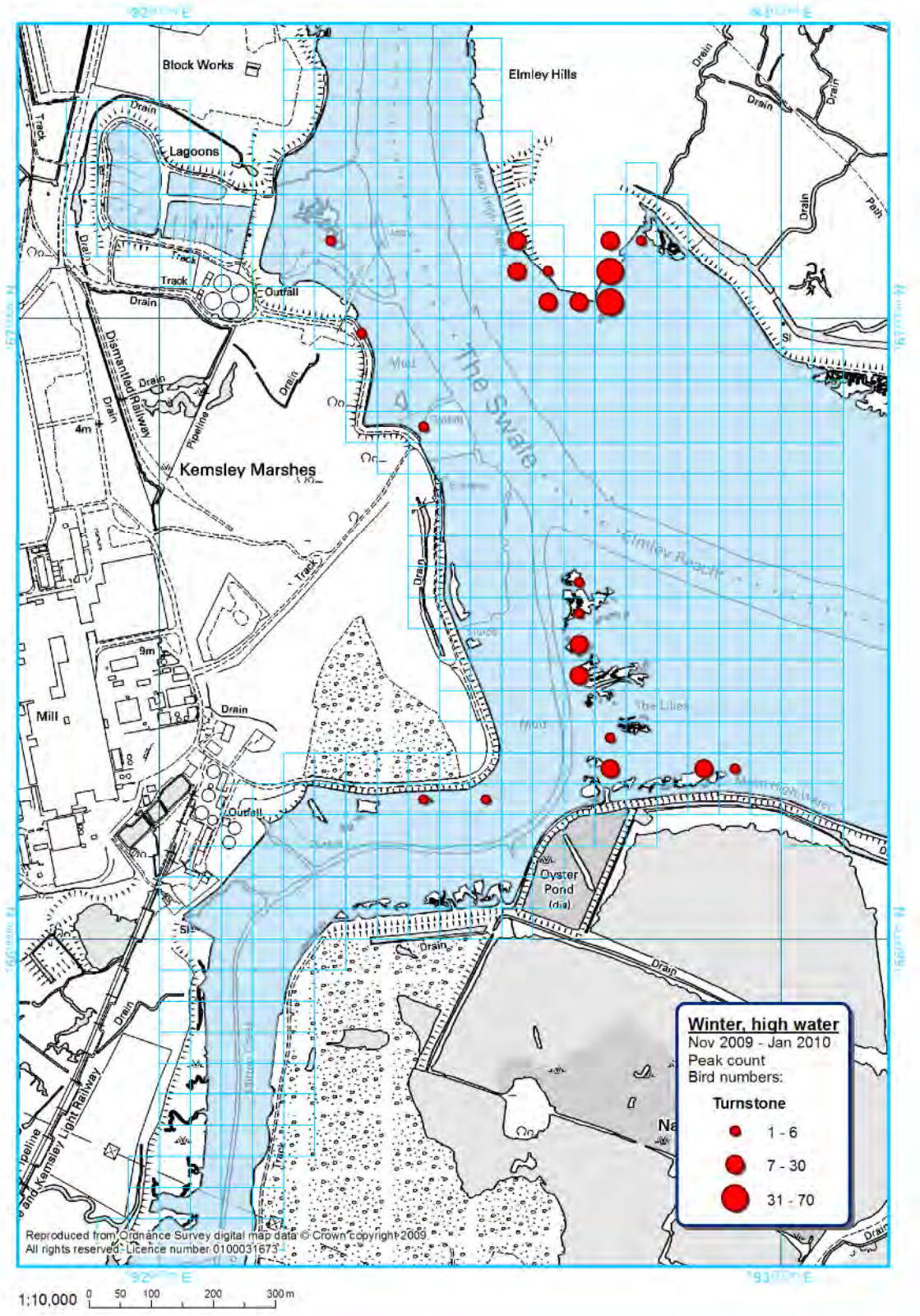

Figure C.71: Spatial distribution of Turnstone over low water, Nov 2009 - Jan 2010