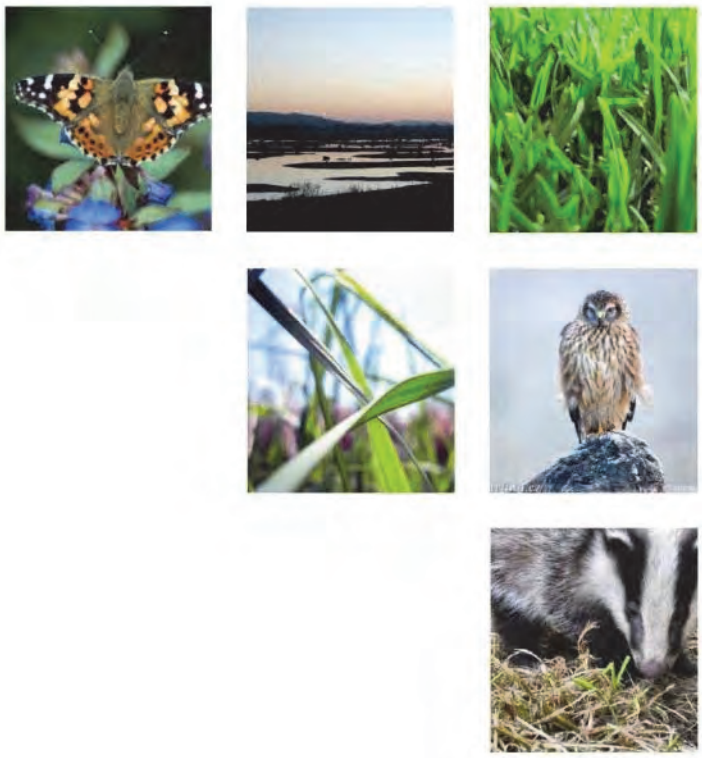

APPENDIX 11.2

BRENT GEESE SURVEY REPORT

Light-bellied Brent Goose presence on Alfie Byrne Road Green Space and Belcamp Park in Dublin City along route corridor for proposed aviation fuel pipeline

Brian Porter
CONTACT NATURE

SUMMARY

- Brent Geese rarely utilize the grazing on Alfie Byrne Geen Space.
- Brent Geese regularly utilize the grazing opportunity at Belcamp Park.
- A small area of Belcamp Park was utilized by the Brent covering most of two adjacent football playing pitches in the southwest quarter of the Park.
- Brent Geese were regularly recorded flying right over the grassland at Alfie Byrne Road from the River Tolka Inner Estuary without dropping in to feed.
- The 2 records of geese landing onto the grass at Alfie Byrne Road came from the closest adjacent mudflat of the estuary.
- On several occasions Brent flew right over the feeding area of Belcamp, even circling over it without landing to feed even when there was no identifiable disturbance present.
- From November to January gulls, largely Black-headed Gull, were ever present at Belcamp Park. Numbers fell in February with no gulls recorded in March
- Small numbers of waders were recorded utilizing the grassland at Belcamp mainly from November to January and none in March.
- Typical numbers of waders, wildfowl, gulls and all other water bird species were counted each hour within a defined area of the most westerly section of the River Tolka Inner Estuary on each visit.

INTRODUCTION

A presentation of the method and results of a series of five visits from November 2013 to March 2014 to monitor the presence of Pale–bellied Brent Geese *Branta bernicla hrorta* (hereafter called Brent or Brent Goose) on two grasslands along the route corridor of a proposed aviation fuel pipeline from Dublin Docklands to Dublin Airport as requested by Dublin City Council.

Dublin bay is the most important site for Brent Geese in the Republic of Ireland providing reliable access to food, fresh water and a safe roosting location (Benson L, 2009). Alfie Byrne Road Green Space is adjacent to the River Tolka estuary north of The River Liffey and is protected as part of the South Dublin Bay And River Tolka Estuary SPA (Special Protection Area) Site Code: 004024 which holds internationally important numbers of Brent, greater than the flyway threshold of 260 individuals occurring regularly annually. Both Alfie Byrne Road Green Space and Belcamp Park are thought to provide important grazing for Brent each season.

The feeding ecology of Brent in Dublin Bay includes extensive and regular use of public green spaces. The movement of Brent from inter-tidal to inland feeding sites in Dublin have been studied for some time O'Brian and Healy in 1991, Coveney in 1999 and most recently Benson 2009. This study is limited to five visits to count the numbers of Brent and calculate the amount of time they spend on the two grassland sites during the five visits. Flight line activity of the Brent were mapped with the intention of seeing which direction the main flight paths took.

In addition numbers of Brent occurring, feeding and roosting, in the River Tolka Estuary mudflat were monitored to compare with their occurrence on the adjacent Alfie Byrne Road Green Space. Numbers of all other bird species were counted on the River Tolka Inner Estuary as useful up to date base line data which could be used to compare with data during and/or post construction of the fuel pipe line.

METHOD

Two observers each at a fixed vantage point one date per month from November 2013 to March 2014. One observer at a fixed vantage point to observe and monitor the birds on the River Tolka Inner Estuary and the Alfie Byrne Road Green Space (Alfie Byrne) and at exactly the same time each visit the second observer at Belcamp Park (Belcamp). There would be no double counting of Brent by observers when counts were done simultaneously.

Each observer is practiced and experienced at surveying estuarine birds, both of whom are familiar with these bird species and the localities from previous surveys undertaken. The most up to date and best quality optical equipment available used throughout this survey.

At both sites two survey methods were applied simultaneously.
1. Counts of all bird species present within defined areas at each site at regular intervals during each visit
2. Flight line activity of Brent coming and going to and from each sites throughout the period of each visit.

The visit period at both sites started at either the exact low water time or high water time, using Dublin Docks datum, varied over the five visits where practicable due to weather and observer availability.

<u>Alfie Byrne</u>
Fixed Vantage Point at grid reference O18747/36074
Start Time: Low or High Water
Counts: 7, each starting on the hour on and after the start time.
All Brent, waterbird and gull species observable within the defined area (MAP A) of the estuary were counted, starting at each count time, with a separate count for those birds on the grass at Alfie Byrne.
All Brent flight lines were recorded within each hourly period during each visit with numbers of individuals noted along with the disturbance types (Appendix 3). A map was drawn for each hourly period where Brent occurred on the estuary and/or on the grass and the flight lines of Brent flying in and out of the site illustrating their directions.
Each visit lasted just over the six hours from one tide state to the following tide state to monitor the changes in the presence and activity of Brent and all other water birds throughout the visit as mudflat becomes exposed on a falling tide or covered by a rising tide. The activity of the Brent on the mudflat compared to those utilising the grass could be monitored through the changing tide states.
Mean and Maximum totals calculated for each species.
Abiotic factors noted each hour plus date of each visit.

<u>Belcamp</u>

Fixed Vantage Point at grid reference O18839/41271
Start Time: Low or High Water
Counts: 12, each starting on the hour and half hour on and after the start time.
All Brent, waterbird and gull species observable from the fixed vantage point on the grass of the park was recorded and not those flying over the park and housing estates.
All Brent flight lines were recorded continuously within each hourly period during each visit with numbers of individuals noted along with the disturbance types. A map was drawn for each flight line of Brent flying in and out or over the park illustrating their directions.
Mean and Maximum totals calculated for each species.
Abiotic factors noted each visit plus the date.
Site walked in February to map the area of the park covered by goose droppings to establish usage area.

DATA COLLATION

From the flight line data it could be shown how many flight lines were of Brent flying in to, out of and or merely over /through the Tolka, Alfie Byrne and Belcamp. Counts of Brent at Belcamp from the flight line data could be added to the half hourly counts to give a truer picture of the numbers occurring there.

From the data collated it was possible to calculate the numbers of each species recorded for each site, for each count and for each visit. Also the mean and max' totals of each species across the five months of the survey and at each site to show their increases and decreases there over the winter.

RESULTS

Five visits were achieved each month:
28/11/13 – starting 07.37 hrs (high water 07.37hrs) on falling tide
22/12/13 – starting 08.28 hrs (high water 14.28 hrs) on rising tide
28/01/14 – starting 09.06 hrs (high water 09.06 hrs) on falling tide
28/02/14 – starting 10.33 hrs (high water 10.33 hrs) on falling tide
21/03/14 – starting 07.38 hrs (low water 07.38 hrs) on rising tide

Brent Flightline activity :

Tolka and Alfie Byrne see Table 3

Of the 68 flight lines recorded only 1 was on to the grass at Alfie Byrne Road, from the estuary and 2 of geese leaving the grass back onto the estuary. 16 flight lines were however of the geese flying over it whereas only once did the geese fly right over the surveyed area of the Tolka rather than to or from it. Smaller flocks of Brent tended to filter 'up' the estuary from the east (as illustrated in Maps 1,2,10,15 & 27 for example) indicated by 47 flight lines 'IN' to the study area at the Tolka and 18 'OUT' of it. December is the month when there was least activity recorded with only 6 flight lines. 2 flight lines were from the south but none leaving that direction. In the direction inland, i.e. southwest to northeast 6 flight lines were to and from the north while 10 were to or from the west. None from the southwest and only 2 from northeast.

Belcamp (playing pitches) see Table 4

No flight activity in November, one in February of geese leaving the park shortly after start of visit and 3 in March of 2 flocks arriving in and the whole flock leaving together. In December and January however there was more activity with 8 flight lines and 15 respectfully. Brent flew over the feeding area of Belcamp and other parts of the park plus over the adjacent housing estate on 7 occasions. Birds also circled over the feeding area without landing to feed even when there was no identifiable disturbance present.

Brent level of presence on grasslands :

Alfie Byrne Road Green Space, see Table 3

Brent were on the grass on two dates.
December 22nd: A single bird for 30 minutes during hour 4-5 (Map 10).
March 21st: One flock of 197 Brent landed up on to the grass at Alfie Byrne Road from the mudflat as shown on Map 28. The birds were disturbed back onto the mudflat. 98 returned then a further 21. These 119 were disturbed again back onto the estuary mudflat (Map29). Total Brent presence on grass in March was 82 minutes.
A total of 112 minutes of Brent presence on the Alfie Byrne Road Green Space which equates to 6.22% of the whole time the area was been monitored . Multiplying the numbers of birds with the number of minutes gives 11594 single goose minutes on grass.

Belcamp (playing pitches) see Table 4.

Brent spent time on the playing pitches at Belcamp on four of the five survey dates.
November 28th: no presence
December 22nd: 26 Brent landed in, stayed for 11 minutes then left. A flock of 130 dropped in then another flock of 30 birds joined them. Most,156, left 2 minutes later but 4 stayed, then just a single bird stayed feeding for longer. As 2 flocks arrived separately but 4 then 1 stayed longer it couldn't be determined which flock the 4 birds came in with so as a minimum Brent were present on grass at Belcamp for 93 minutes in December.
January 28th: Flock of 237 arrived at 10.05hrs and stayed feeding for 18 minutes. Another flock of 77 arrived at 11.19 and stayed for 6 minutes. At 11.58 a flock of 286 arrived, joined by a small flock of 22 then the whole flock of 304 left at 13.22 giving a presence total of 91 minutes. Two more flocks arrived during the last hour of monitoring. 163 birds still feeding when monitoring stopped. A total of 140 minutes of goose presence.
February 28th: 201 Brent were present at start of survey at 10.33 but left 2 minutes later.
March 21st: 98 Brent were joined by 106. The flock of 204 fed for a short while then flew off southwest. Present for 36 minutes in total.

A minimum of 271 minutes of Brent presence on the playing pitches of Belcamp Park or 16.42% of the total survey time, or 36408 single goose minutes.

Brent grazed on only a small area of the park, as drawn on Belcamp Map 5. A walk over survey in February throughout the park identified that the two adjacent playing pitches in the south west quarter of the park had significant amounts of goose droppings indicating regular feeding here. No other part of the park had goose droppings.

Disturbance to feeding Brent on grass:

The type of disturbance to the Brent and the effect it had on them was identified on each disturbance occasion using codes as used on Birdwatch Ireland surveys for Brent and other species being monitored in public parks and intertidal zones. (Appendix 2)

Alfie Byrne Road Green Space

On two occasions Brent left the grassland feeding due to disturbance . 197 birds were disturbed by dogs but some returned in two flocks within the same hour (count period). A moderate response created by a short/discrete event. 119 birds were later disturbed off the grass by joggers (a short event) but no birds returned till end of visit giving a high response level.

Belcamp (playing pitches)

In December and March Brent came and went and in February the flock present on arrival to the site left but no disturbance was identified. They just got up and left.

In January the large flock of 237 Brent left but no disturbance could be identified except there was an aircraft landing close by at Dublin Airport. Planes landing are not that close and the birds would have expected to be acclimatized. Later a flock of 77 Brent may have stayed longer than 6 minutes but were disturbed by a walker crossing right through the playing pitches. When the large flock of 286 Brent landed in they were disturbed a lot by a dog off the leash which made them walk away and break from their feeding. This flock was joined by a flock of 22 then the whole flock of 308 were finally pushed off the grassland by a dog off the leash. During the final hour of monitoring up to 104 had gathered feeding on the playing pitch and were disturbed by a walker but again they stopped feeding, heads all up and walked away from the human disturbance and did not fly off.

Counts of Brent:

Tolka (estuary) see Table 1.
Mean numbers over five visits each month were 108.03. Present all months with a max count of 747 in February.

Alfie Byrne (grass) see Table 1.
One Brent on grass in December and a flock of 197 in March gave a mean of 9.06 individuals over the winter. No Brent recorded on grass during the other 3 visit dates.

Belcamp (playing pitches) see Table 2.
Brent not present in November only. From the half hourly count data a max of 286 geese were present at any one time but when analysing the flight line data the maximum number of geese at any one time grazing on site was 308 in January. The Brent came and went frequently in various numbers so at each half hourly count time numbers could be low or absent resulting in a mean across the five visits of 24.85 individuals but rising to 140.65 when the counts of geese from the flight line data (a result of continuous monitoring) are added.

At Tolka during December and February and Belcamp in January international and nationally important numbers of Brent were recorded. 1% of the International flyway population is 260 birds and the National (all Ireland) threshold is the same at 260 (Crowe,O. 2005) . Figures above this for a single site is ecologically significant (Benson,L 2009).

Counts of waterbirds and gulls:

Tolka (estuary) see Table 1.
31 different species were recorded throughout the survey. Of these only Black-tailed Godwit and Bar-tailed Godwit were present for part of the time in nationally important numbers, 140 and 160 respectfully as 1% of national population. Records for each month show as expected the numbers across the hours of each visit rose and fell with the tide as mudflat became exposed and covered. This study resulted in base line data which could be comparable with Birdwatch Ireland I-Webs data for a similar section of Dublin Bay and with further surveys undertaken during and post construction of the aviation fuel pipeline.

Alfie Byrne (grass) see Table 1:
Field Sheets (Appendix 1). Black-headed Gull used this site from November to January moving onto it around high tide in small numbers, max 72 in January. Oystercatcher were recorded on two single counts, one in November and one in December involving 7 birds each time.

Belcamp (playing pitches) see Table 2.
3 species of gull, 3 species of wader and one lone Heron occurred throughout the survey except in March when no birds landed into the park other than the Brent geese. A mean of 25.65 Black-headed Gull over the winter showed that they were by far the most numerous gull. 2 Black-tailed Godwit made it over the houses to feed here within two half hour periods in January. Maximums of 19 Curlew and 64 Oystercatcher in December proved that grassland of this public park can be attractive to species other than Brent.

DISCUSSION:

The direction in which the Brent came and went, to and from the Tolka as illustrated on the flight line maps is an indication of their actual flight line only as Brent are very mobile as was seen over Belcamp. They can change direction constantly even when in a flock of over 100 birds. It is certain that the geese flying in and out from the east which flew low over the water were moving onto and from feeding and roosting areas of the estuary and North Dublin Bay as a whole whilst the geese flying in directions west and north away from the water indicates that they were heading inland to utilise the grass land sites of city parks including Belcamp and Darndale.

The flight lines recorded at Belcamp indicate that there is a lot of movement between inland grassland sites. Birds seem to fly in from parks or straight up from the Dublin Bay area from the south east or from the playing pitch at Darndale.

Brent clearly do not utilize the grass at Alfie Byrne Road on a regular bases to feed if hardly at all and certainly on the survey dates in the winter of 2013/14. On one occasion a flock was seen (outside the survey hours) feeding on the playing pitch between Alfie Byrne Road and the estuary but there was no recorded flight lines to and from this site.

A small area only of Belcamp Park playing pitches is regularly used and then only for part of the winter, particularly in December and January. It was surprising there was so little activity in both February and March with few other bird species present (none in March) and just one flock of Brent staying just 2 minutes in February and two flocks of Brent arriving fairly early in the day and leaving shortly in March. In both months leaving without disturbance. Brent switch from inter-tidal to inland food resources as the former becomes depleted during the first half of the winter (which may explain no Brent in November) and then as the spring migration season approaches birds 'site switch' to inland feeding sites no further than 3km from the roosting site (Benson L, 2009). It was noted also that the park was very dry by March 21st which may have effected feeding here.

The playing pitches at Darndale appear to be utilised by Brent also but a third observer would have been required to survey here simultaneously. Brent seem to be able to cope with regular disturbance so when they are chased from one grassland site the 'hop' over to the next one or back to Dublin Bay. If undisturbed they can continue to feed for up to four hours at the one site (Benson L, 2009).

The percentage of the daylight hours Brent were present on the grass for all the five visits was calculated as 3.96% at Alfie Byrne and 9.57% at Belcamp however observers were not present from dawn till dusk each visit date at each site so these percentages are an indication only.

CONCLUSION

It is considered unlightly that the construction of an aviation fuel pipeline along the route planned to run by the River Tolka Inner Estuary would have any adverse effect, if any effect at all, to the feeding and roosting of birds, including Brent Geese, on the mudflat and on the water. Similarly due to such occasional use of the grassland feeding by Brent on the Alfie Byrne Green Space that any construction would have minimal effect but it is would be good advise none the less to limit construction to outside the months when Brent occur in Dublin Bay.

It is considered important to limit construction of the aviation fuel pipeline at Belcamp and other grassland sections of the route to outside the months when Brent occur in Dublin Bay even though in this study they appeared not to feed here during every month they spend in Dublin.
Perhaps a request to Dublin City Council for more signage for dog owners to keep dogs on their leash within the park plus signs informing the public of the fact that Brent Goose is a protected species and could the public not disturb them while they are grazing.

REFERENCES

Benson, Lorainne (2009). Use of inland feeding sites by Light-bellied Brent Geese in Dublin 2008-2009. M.Sc Project. School of Biology and Environmental Science, University College Dublin.

Coveney, J. (1999) unpublished data.

Crowe,O. (2005) Ireland's Wetlands and their Waterbirds: Status and Distribution. BirdWatch Ireland, Newcastle, Co Wicklow

Inger, R, Ruxton G. D., Newton, J., Colhoun, K., Robinson, J.A, Jackson, A.I., Bearhop, S. (2006) Temporal and Intrapopulation variation in prey choice of wintering Geese determined by stable isotope analysis, Journal of Animal ecology,. 75, 1190-1200.

Ó Briain, M., Healy, B. (1991) Winter distribution of Light-bellied Brent Geese *Branta bernicla hrota* in Ireland, ARDEA 79: 317-326

APPENDICES

Aviation fuel pipeline

Alfie Byrne Green Space/Tolka Estuary bird survey cumulative data sheet

TABLE 1	Nov-13		Dec-13		Jan-14		Feb-14		Mar-14		
SPECIES	Max total	mean	Max total	mean	Max total	mean	Max total	mean	Max total	mean	MEAN OVER 5 VISITES
Little Grebe	2	0.28	1	0.14	1	0.43	3	0.57			0.28
Great Crested Grebe							1	0.14	2	0.57	0.14
Cormorant	2	0.71	1	0.14	2	1.14	2	1.14	2	1.86	1
Little Egret									1	0.28	0.06
Grey Heron	2	0.71	7	4.43	3	1	4	1.57	1	0.71	1.68
Mute Swan	1	0.28	2	0.57	3	1.86	3	1.86	5	2.71	1.46
Brent Goose 1	61	16.57	282	61.71	106	15.86	747	385.86	153	60.14	108.03
Brent Goose 2			1	0.14					197	45.14	9.06
Shelduck	10	1.42					1	0.14	2	0.28	0.37
Wigeon			2	0.28	1	0.28					0.11
Teal	3	0.43	3	0.57					4	1.14	0.43
Mallard					4	1	3	1	2	0.43	0.49
Pintail											
Shoveler											
Tufted Duck											
Common Scoter											
Goldeneye					1	0.14					0.03
Red-breasted Merganser	2	1			8	2	3	1.14	18	12.43	3.31
Moorhen											
Oystercatcher	50	20.43	53	15.57	11	4.43	7	2.43			8.57
Ringed Plover											
Golden Plover											
Grey Plover	1	0.43	2	0.28	4	1.25	1	0.43			0.48
Lapwing											
Knot					14	2			17	2.71	0.94
Sanderling											
Purple Sandpiper											
Common Sandpiper											
Dunlin	397	152	53	14.86	300	76	151	21.57	294	64.86	65.86
Snipe											
Black-tailed Godwit	4	1.42	5	1.86	10	4.86	384	115.43	568	196.14	63.94
Bar-tailed Godwit	84	35.71	168	44.42	118	38	179	29.57	28	4.43	30.43
Curlew	84	40.71	16	3.43	43	17.14	27	11.43	39	11.71	16.88
Redshank	141	68.86	169	31.71	161	73.14	193	101.14	291	102.86	75.54
Greenshank			2	0.43	4	1.43	2	0.71	3	0.71	0.66
Turnstone	4	1.57	5	1.57	11	3.28	2	0.28	7	1	1.54
Common Guillemot											
Black Guillemot							2	0.57	3	0.86	0.29
Razorbill											
Black-headed Gull	852	511.71	161	106	555	257.28	674	318	166	107	260
Common Gull	18	11.43	3	1.86	11	4.14	7	5.28	12	4.57	5.46
L. Black-backed Gull			1	0.43	2	1.43	10	4.57	11	5.14	2.31
Herring Gull	224	118.86	36	18.28	144	50.28	140	70.43	119	62.43	64.06
Add additional species											
Great Black-backed Gull	4	2	4	2.14	3	1.86	3	2.28	7	2.57	2.17
Black-headed Gull 2	50	7.14	20	7.86	72	10.28					5.06
Oystercatcher 2	7	1	7	1							0.4
Mediterranean Gull					1	0.28					0.06
Great northern Diver							2	0.28			0.06
Shag							1	0.28			0.06

Aviation fuel pipeline

BELCAMP PARK BIRD SURVEY CUMULATIVE DATA SHEET

TABLE 2	Nov-13		Dec-13		Jan-14		Feb-14		Mar-14		
SPECIES	Max total	mean	Max total	mean	Max total	mean	Max total	mean	Max total	mean	MEAN OVER 5 VISITES
Pale-bellied Brent Goose			26 160*	2.5 15.5*	286	105	201	16.75	204*	17*	140.65* 24.85
Grey Heron	1	0.16									0.032
Oystercatcher	24	6.16	64	27.5	1	0.08	5	0.42			6.832
Black-tailed Godwit					2	0.25					0.05
Curlew	10	1.5	19	3							
Black-headed Gull	123	64.75	49	30.58	56	25.33	38	7.58			25.65
Common Gull	2	0.42	3	1.58	11	4.25	1	0.25			1.3
Herring Gull	2	0.58	5	2.08	5	2.83	1	0.17			1.13

* means when including geese that arrived and left Belcamp between half hourly counts, see flight line data.

Aviation Fuel Pipeline
Brent Goose flight lines Nov' 2013 - Mar' 2014

Number of geese flight lines each hour flying in to, out of or right over the Alphie Byrne Road Green Space and the Tolka Inner Estuary — TABLE 3

	TOLKA INNER ESTUARY			ALFIE BYRNE ROAD GREEN SPACE						
	IN	OUT	OVER	IN	OUT	OVER	TOTAL in & out only	no. of Brent on grass	Min's present on grass	per goose minutes on grass
November										
hour 0-1										
1_2	9		1			1	9			
2_3	6	1					7			
3_4	1						1			
4_5										
5_6		1					1			
6_7										
December										
hour 0-1										
1_2										
2_3										
3_4										
4_5	3	2				1	5	1	30	30
5_6										
6_7										
January										
hour 0-1		1					1			
1_2	3	2				2	5			
2_3	5	2				2	7			
3_4	4	2				2	6			
4_5	2					1	2			
5_6	1						1			
6_7										
February										
hour 0-1	2	4				6	6			
1_2										
2_3	2						2			
3_4										
4_5		1					1			
5_6	1						1			
6_7	1						1			
March										
hour 0-1										
1_2										
2_3	1						1			
3_4	4						4			
4_5	1	2		1	1	1	5	197	22	4334
5_6	1				1		2	121*	60	7260
6_7										
TOTAL	47	18		1	2		68	198	112	11594
Total over sites			1			16				

* part of same flock

Note 1 one or more geese present 112 minutes within minimum 1800 minutes of minitoring, or 6.22% of the time.

Note 2 one or more geese within 2831 minutes between sunrise & sunset on visit dates, or 3.96% of daylight time.

Aviation Fuel Pipeline
Brent Goose flight lines Nov' 2013 - Mar' 2014

Number of geese flight lines each hour flying in to, out of or right over Belcamp Park — TABLE 4

	IN	OUT	OVER	TOTAL in & out only	no of geese on site	Minutes present on site	per goose minutes on site
November 28th	no flight lines						
December 22nd							
hour 0-1	1		1	1			
1_2		1		1	26	11	286
2_3	2	3		5	130	8	1040
					30	2	60
					3	28 or 34*	minimum 84
					1	44 or 50*	minimum 44
3_4				*			
4_5							
5_6							
total						93	
January 28th							
hour 0-1	1		1	1			
1_2		1	3	1	237	18	4266
2_3	2	1	1	3	77	6	462
3_4							
4_5	1	1		2	286	84	24024
					22	7	154
5_6	2			2	59	14	826
					104	11	1144
total						140	
February 2th							
hour 0-1		1		1	201	2	402
1_2							
2_3							
3_4							
4_5							
5_6							
total						2	
March 21st							
hour 0-1	2	1	1**	3	98	25	2450
					106	11	1166
1_2							
2_3							
3_4							
4_5							
5_6							
total						36	
GRAND TOTAL	11	9	6 (or 7**)	19	1380	min' 271	36408

Note 1 one or more geese present 271 minutes within 1650 minutes of minitoring, or 16.42% of the time.

Note 2 one or more geese within 2831 minutes between sunrise & sunset on visit dates, or 9.57% of daylight time.

* cannot be certain which birds remained from which flock

** not over park but west of over houses

Aviation fuel pipeline

Brent Goose flight lines and disturbances field sheet

SITE: Tolka Estuay				VP Grid Ref'		DATE: 28/11/14	
VISIBILITY:		PREC':		WIND:		SUNRISE/SU	
START TIME:	hour 0-1	hour 1-2	hour 2-3	hour 3-4	hour 4-5	hour 5-6	Hour 6-7
Flight line reference		1	1	1		1	
number of birds		5	4	8		16	
time		08:44:00	09:55:00	10:38:00		13:02:00	
disturbance type		none	none	none		none	
disturbance codes		none	none	none		none	
MAP no.		1	2	3		5	
Flight line reference		2	2				
number of birds		9	1				
time		08:46:00	09:55:00				
disturbance type		none	none				
disturbance codes		none	none				
MAP no.		1	2				
Flight line reference		3	3				
number of birds		4	6				
time		08:47:00	10:05:00				
disturbance type		none	none				
disturbance codes		none	none				
MAP no.		1	2				
Flight line reference		4	4				
number of birds		1	2				
time		08:49:00	10:03:00				
disturbance type		none	none				
disturbance codes		none	none				
MAP no.		1	2				
Flight line reference		5	5				
number of birds		8	3				
time		08:53:00	10:28:00				
disturbance type		none	none				
disturbance codes		none	none				
MAP no.		1	2				
Flight line reference		6	6				
number of birds		2	3				
time		08:54:00	10:33:00				
disturbance type		none	none				
disturbance codes		none	none				
MAP no.		1	2				
Flight line reference		7	7				
number of birds		1	11				
time		08:57:00	10:35:00				
disturbance type		none	none				
disturbance codes		none	none				
MAP no.		1	2				
Flight line reference		8					
number of birds		10					
time		09:13:00					
disturbance type		none					
disturbance codes		none					
MAP no.		1					
Flight line reference		9					
number of birds		4					
time		09:16:00					
disturbance type		none					
disturbance codes		none					
MAP no.		1					
Flight line reference		10					
number of birds		2					
time		09:31:00					
disturbance type		none					
disturbance codes		none					
MAP no.		1					

Aviation fuel pipeline
Brent Goose flight lines and disturbances field sheet

SITE: Tolka Estuary				VP Grid Ref'		DATE: 22/12/13	
VISIBILITY:		PREC':		WIND:		SUNRISE/S	
START TIME:	hour 0-1	hour 1-2	hour 2-3	hour 3-4	hour 4-5	hour 5-6	hour 6-7
Flight line reference					1		
number of birds					16		
time					12:48:00		
disturbance type					none		
disturbance codes					none		
MAP no.					10		
Flight line reference					2		
number of birds					2		
time					12:49:00		
disturbance type					none		
disturbance codes					none		
MAP no.					10		
Flight line reference					3		
number of birds					4		
time					12:54:00		
disturbance type					none		
disturbance codes					none		
MAP no.					10		
Flight line reference					4		
number of birds					5		
time					13:04:00		
disturbance type					none		
disturbance codes					none		
MAP no.					10		
Flight line reference					5		
number of birds					42		
time					13:04:00		
disturbance type					none		
disturbance codes					none		
MAP no.					10		
Flight line reference							
number of birds							
time							
disturbance type							
disturbance codes							
MAP no.							

Aviation fuel pipeline
Brent Goose flight lines and disturbances field sheet

SITE: Tolka Estuay				VP Grid Ref'		Date:28/02/14	
VISIBILITY:		PREC':		WIND:		SUNRISE/S	
START TIME:	hour 0-1	hour 1-2	hour 2-3	hour 3-4	hour 4-5	hour 5-6	Hour 6-7
Flight line reference	1		1		1	1	1
number of birds	10		3		c100	c100	70
time	10:53:00		13:08:00		15:10:00	15:35:00	16:37:00
disturbance type	none		none		none	none	none
disturbance codes	none		none		none	none	none
MAP no.	18		20		22	23	24
Flight line reference	2		2				
number of birds	9		2				
time	10:59:00		13:14:00				
disturbance type	none		none				
disturbance codes	none		none				
MAP no.	18		20				
Flight line reference	3						
number of birds	3						
time	11:12:00						
disturbance type	none						
disturbance codes	none						
MAP no.	18						
Flight line reference	4						
number of birds	35						
time	11:13:00						
disturbance type	none						
disturbance codes	none						
MAP no.	18						
Flight line reference	5						
number of birds	500						
time	11:28:00						
disturbance type	none						
disturbance codes	none						
MAP no.	18						
Flight line reference	6						
number of birds	100						
time	11:33:00						
disturbance type	none						
disturbance codes	none						
MAP no.	18						

Aviation fuel pipeline
Brent Goose flight lines and disturbances field sheet

SITE: Tolka Inner Estuary				VP Grid Ref'		DATE: 21/03/14	
VISIBILITY:		PREC':		WIND:		SUNRISE/S	
START TIME:	hour 0-1	hour 1-2	hour 2-3	hour 3-4	hour 4-5	hour 5-6	hour 6-7
Flight line reference			1	1	1	1	
number of birds			4	15	197	119	
time			10:36:00	10:47:00	12:00:00	12:50:00	
disturbance type			none	none	8	10	
disturbance codes			none	none	M,A	H,A	
MAP no.			26	27	28	29	
Flight line reference				2	2	2	
number of birds				36	98	119	
time				10:50:00	12:10:00	13:00:00	
disturbance type				none	none	none	
disturbance codes				none	none	none	
MAP no.				27	28	29	
Flight line reference				3	3		
number of birds				7	11		
time				10:55:00	12:21:00		
disturbance type				none	none		
disturbance codes				none	none		
MAP no.				27	28		
Flight line reference				4	4		
number of birds				7	15		
time				11:05:00	12:24:00		
disturbance type				none	none		
disturbance codes				none	none		
MAP no.				27	28		
Flight line reference					5		
number of birds					21		
time					12:30:00		
disturbance type					none		
disturbance codes					none		
MAP no.					28		
Flight line reference							
number of birds							
time							
disturbance type							
disturbance codes							
MAP no.							

Aviation fuel pipeline
Brent Goose flight lines and disturbances field sheet

SITE: Tolka Estuary				VP Grid Ref'		DATE: 28/01/14	
VISIBILITY:		PREC':		WIND:		SUNRISE/S	
START TIME:	hour 0-1	hour 1-2	hour 2-3	hour 3-4	hour 4-5	hour 5-6	Hour 6-7
Flight line reference	1	1	1	1	1	1	
number of birds	1	26	14	2	2	2	
time	09:49:00	10:12:00	11:24:00	12:14:00	13:50:00	14:54:00	
disturbance type	none	none	none	none	none	none	
disturbance codes	none	none	none	none	none	none	
MAP no.	12	13	14	15	16	17	
Flight line reference		2	2	2	2		
number of birds		26	2	12	98		
time		10:20:00	11:32:00	12:24:00	14:05:00		
disturbance type		none	none	none	none		
disturbance codes		none	none	none	none		
MAP no.		13	14	15	16		
Flight line reference		3	3	3			
number of birds		2	7	7			
time		10:25:00	11:39:00	12:25:00			
disturbance type		none	none	none			
disturbance codes		none	none	none			
MAP no.		13	14	15			
Flight line reference		4	4	4			
number of birds		5	3	9			
time		10:39:00	11:47:00	12:29:00			
disturbance type		none	none	none			
disturbance codes		none	none	none			
MAP no.		13	14	15			
Flight line reference		5	5	5			
number of birds		7	26	9			
time		11:04:00	11:57:00	12:45:00			
disturbance type		none	none	none			
disturbance codes		none	none	none			
MAP no.		13	14	15			
Flight line reference			6	6			
number of birds			1	23			
time			12:01:00	12:52:00			
disturbance type			none	none			
disturbance codes			none	none			
MAP no.			14	15			
Flight line reference			7				
number of birds			4				
time			12:02:00				
disturbance type			none				
disturbance codes			none				
MAP no.			14				

Disturbance types are as follows:

(1) human, on-foot – shoreline/intertidal
(2) human, on foot - Park
(3) bait-diggers
(4) non-powered watercraft
(5) powered watercraft,
(6) water-based recreation (e.g. jet-skis, wind-surfers)
(7) cyclists
(8) dogs
(9) aircraft
(10) joggers
(11) [redacted] MOWER
(12) OTHER

W - weak response, waterbirds move slightly away from the source of the disturbance.

M - moderate response, waterbirds move away from the source of the disturbance to another part
of your count unit; they may return to their original position once disturbance ceases.

H - High response, waterbirds fly away to areas outside of your count unit and do not return
during the current count session.

This should be followed by the codes A, B or C to indicate how long the disturbance lasts:
A – short/discrete event.
B – disturbance occurs for up to 50% of the count period.
C – disturbance length estimated at >50% but < 100% of the count period.
D – disturbance continues after the count period has ended.