



Havering

L O N D O N B O R O U G H

CABINET MEETING
19th JULY 2017

HAVERING LOCAL PLAN
WIND RESOURCE EVIDENCE BASE 2016

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ENERGY AND CLIMATE CHANGE
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WASTE RESOURCE MANAGEMENT



LONDON BOROUGH OF HAVERING

LOCAL PLAN WIND RESOURCE EVIDENCE BASE

SEPTEMBER 2016

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LONDON BOROUGH OF HAVERING**LOCAL PLAN WIND RESOURCE EVIDENCE BASE****SEPTEMBER 2016****PREPARED BY:**

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1 INTRODUCTION

Wardell Armstrong (WA) have been commissioned to prepare a Wind Energy Assessment for the London Borough of Havering. This commission is in response to the Written Ministerial Statement (HCWS42) on the 18th June 2015 and the subsequent amendments to the Planning Practice Guidance which state:

“When determining planning applications for wind energy development involving one or more wind turbines, local planning authorities should only grant planning permission if: – the development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan; and – following consultation, it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and therefore the proposal has their backing.”

This Wind Energy Assessment has identified areas within the London Borough of Havering which are potentially suitable for the development of three different scales of wind turbine based on a Geographical Information system analysis of physical, environmental and planning constraints. These areas will form a key part of the evidence base for the Borough’s emerging Local Plan and will help the Council to designate suitable areas for wind energy development in the Plan. The areas identified will not constitute areas of permitted development and will still require full planning approval subject to suitable environmental assessment, public engagement and support.

2 METHODOLOGY

This assessment seeks to identify areas within the London Borough of Havering which are suitable for the development of wind power. The Borough is diverse in current land use and therefore suitability of various scales of wind turbine needs to be recognised. Constraints for different scales of wind turbine vary greatly and therefore this assessment has sought to identify suitable areas for development of three scales of wind turbine which have been termed Small, Medium and Large.

The wind speeds for the London Borough of Havering are generally quite low at around 6m/s on average at a reference height of 45m above ground level. This will necessitate a

class 2 or 3 turbine which is geared toward lower wind speeds. Generally, this means that turbines will be larger in both rotor diameter and hub height for their respective power output. The three scales of turbine considered are defined below in Table 2.1 in terms of their dimensions and approximate output.

Table 2.1: Definitions for Wind Turbine Scales and Indicative Candidate Wind Turbines					
	Rotor Diameter (m)	Hub Height (m)	Tip Height (m)	Power Output (MW)	Representative Turbine
Small	33	43	59	<0.3	KWT300 IEC 61400 Class IIIA
Medium	54	50	77	<0.9	EWT900 IEC 61400 Class IIIA
Large	80	60	100	<1.8	Leitwind LTW80 Class IIA

Larger turbines necessitate larger separation distances from sensitive receptors (constraint offsets) and therefore it was important to limit the maximum size of the turbine in order to ensure at least some turbines at the large scale could still be accommodated within the Borough. Mapping the constraints allowed the maximum size of large turbines to be determined at about 100m to tip. The Medium and Small cut offs for turbines have been selected based on the availability of turbines. Some of the constraints used to define areas for wind turbine suitability are shown in Table 2.2 below. These constraints have been given offsets or minimum distances where the development of turbines would not usually be proposed. These offsets are applied to the constraints giving a good graphical illustration of where suitable scales of wind turbines may or may not be implemented.

Table 2.2: Wind Turbine Constraints			
Constraint	Small Turbines	Medium Turbines	Large Turbines
	Additional Offsets Applied (m)		
Residential Properties & Schools	300	500	700
Commercial Properties	200	200	200
Farm Properties	200	200	200
Hedges	50	50	50
Woodland & Tree Belts	60	60	60
Railway	76	83.6	110
Roads	76	83.6	110
Electrical Transmission Grid	76	83.6	110
River, streams and other water bodies	25	25	25
Listed Building Grade 1	500	700	900
Listed Building Grade 2*	400	600	800
Listed Building Grade 2	300	500	700

The assessment for each scale of wind turbine was started from a GIS layer comprising the London Borough of Havering boundary. This polygon was then constrained to identify suitable areas in which each scale of wind turbines could be deployed. There are many combinations of turbine hub height and blade diameter which may reduce or increase the offsets distance selected for this study. The areas identified within this evidence base can only be used to help understand where suitable applications for wind turbines might be brought forward. Applications for wind turbines close to the areas identified might also be suitable, especially where they are smaller than the candidate turbines selected for this study.

Residential Properties & Schools

Residential properties and Schools are noise sensitive receptors and therefore offsets were created around non-commercial addresses as identified in the Ordnance Survey's AddressBase layer to exclude areas that would otherwise generate noise in excess of background levels at residential receptors. The offset distances have been selected based on WA's experience of modelling noise levels for these scales of turbine and comparison with likely background noise levels in the Borough. The offsets selected are expected to be a good approximation, however the actual offset required for a planning application will need to be confirmed and will depend on the results of specific background noise monitoring and turbine modelling.

Commercial Properties and Farms

Noise from wind turbines also has the potential to impact people while at work however background noise levels are generally much higher in these locations and the noise from turbines is masked. Farms which host residential properties could have financial involvement in wind turbine developments and as such tolerate higher noise levels. To show consideration to occupants of commercial properties and farms, without overly restricting potential development areas, an offset of 200m has been selected for all scales of turbine development. Actual offsets required will depend on specific noise assessments and financial involvement.

Hedges, Tree Belts & Woodland

Natural England has issued guidance for wind turbines regarding their proximity to hedges / tree belts and woodlands. Bat activity (including commuting and foraging) has been seen to decline significantly at distance of 50m or less. Natural England's advice is to ensure that

wind turbines blade tips cannot intrude within a 50m offset from hedges / tree belts and woodlands. The corresponding ground level offset is a function of the turbine tower height and rotor diameter. Based on the selected candidate turbines for each scale of development, the offsets at ground level to the turbine centres from these features would need to be 53m (Small turbines), 59m (Medium turbines) and 69m (Large turbines), assuming a hedge height of 2.5m. For trees these buffers would need to be 58m, 65m and 75m respectively, assuming a tree height of 10m. These distances would vary depending on the combinations of turbine geometry and tree / hedgerow height. Because of this and for simplicity a relatively small offset of 50m for hedges and 60m for trees has been selected as an approximation of what will be required by Natural England.

Roads, Railway and Electrical Transmission Grid

The safety record for wind turbines is excellent however the highways agency, local authority highways departments, Network rail, National Grid and regional Electricity Distribution Network Operators would as a minimum require topple offsets from existing and planned infrastructure of turbine tip height + 10%.

River, Streams and Other Water Bodies

There is currently no guidance on minimum distances between wind turbines and water bodies. However, it is not practical to construct wind turbines immediately adjacent to them. For this reason, an offset of 25m (typically the size of a large turbine foundation) has been selected to prevent excessive run off from the construction area, subsidence and potential contamination of the water body. Much larger offsets may be required if specific ecological concerns are relevant and raised as part of the planning application process.

Listed Buildings

Listed buildings can be vulnerable to impacts from turbines with regard to their setting within their local context. There are three grades of nationally listed buildings which reflect the value of the building and inferred setting. The highest ranking buildings are known as Grade 1 follow by Grade 2* and lastly Grade 2. Locally Listed Buildings are classified as of less importance and have not been considered in this assessment, but will need to be considered at the planning application stage. There is no specific guidance on minimum separation distances between wind turbines and listed buildings. Impacts would normally be assessed as part of landscape and visual impact, heritage and noise assessments for a specific planning application. This is beyond the scope of this study and a simpler approach

of assigning constraint offsets to them has been taken. The higher the listing the greater the offset required. It also follows that due to dominance in the landscape, the larger the turbine the greater the offset required. This is reflected in the offsets selected as shown in the constraint table (Table 2.2), which are based on Wardell Armstrong's experience in previous wind resource assessments.

Environmental Constraints

Wind turbines can have an impact on birds and bats either through direct strike or displacement. To limit the potential for this, environmental designations and certain habitat type such as woodlands / orchards have been removed from the potential wind turbine areas layer, see Table 2.3 below.

Table 2.3: Environmental Constraints	
RSPB Reserves	Marine Conservation Areas
RSPB Important Bird Areas	Doorstep Greens
World Heritage Sites	Country Parks
Battlefields	Local Nature Reserves
Parks and Gardens	National Nature Reserves
Traditional Orchards	Special Protected Areas
Areas of Outstanding Natural Beauty	Special Areas of Conservation
Open Country	Ramsar Sites
Nature Improvement Areas	Special Sites of Scientific Interest
Millennium Greens	Heritage Coast
National Parks	

Other Constraints Considered but not Included in the Assessment

Radar

Wind turbine developments are often prone to objections arising from concerns regarding radar interference. Such objections from the Civil Aviation Authority or Ministry of Defence can be difficult, costly or impossible to resolve. These economic risk considerations should be explored by the developer prior to an application for planning being made. In order to understand where radar interference may occur, Wardell Armstrong has created "viewsheds" or zones of theoretical visibility for primary surveillance radar (PSR) within consultation distance of the London Borough of Havering. These viewsheds shows where the consultation zone is and also how much clearance there is between the ground and radar visibility. The consultation zone depends on whether the radar is used for civil or military operations. Civil radars are perceived to have coverage of 35km in any given

direction whilst military radars cover approximately 65km. If a desired site is within or close to the consultation zone for a radar it will be necessary to consult the operator of the radar. Consultation should always be sought with the relevant airport/radar operator when developing a wind project. This GIS layer has not therefore been applied as an additional constraint to wind resource. Instead it has been supplied to provide information on where difficulties due to radar interference may arise.

The viewsheds show that only the Stansted and Southend indicative radar consultation areas extend into the Borough. The clearance with the Southend radar is in excess of 300m and is therefore unlikely to restrict development of wind turbines. The clearance with the Stansted radar varies between 100m and 35m. Detailed consultation with Stansted will therefore be required by any developer.

Green Belt

The Green Belt covers 53% of the London Borough of Havering however adding the Green Belt to the constraint list would leave no suitable areas for wind development with the exception of the existing site at Dagenham. The National Planning Policy Framework (NPPF) states that;

“When located in the Green Belt, elements of many renewable energy projects will comprise inappropriate development. In such cases developers will need to demonstrate very special circumstances if projects are to proceed. Such very special circumstances may include the wider environmental benefits associated with increased production of energy from renewable sources.”

Developers wishing to develop wind projects within the Borough will therefore need to demonstrate these special circumstances to allow permission to be granted for wind developments.

3 RESULTS

The areas potentially suitable for Small, Medium and Large turbines development (based on the methodology described above) are highlighted on Figure 2 without the constraints used to identify them. The layers of constraints are somewhat complicated and are shown on Figures 3, 4 and 5 respectively. The key to the constraint layers is shown on Figure 6.

No cut off for lower wind speeds has been derived. The developer of any wind project will first consider the prevailing wind regime combined with the energy yield profile of a turbine best suited to the wind regime. The financial viability of the development may also be dependent on the electricity price. In the future this may or may not include a top up subsidy or an onsite end user power purchase agreement. For reference purposes a wind speed up log law calculation was applied to the UK Wind Speed database to estimate the wind speed at the candidate turbine hub heights for the Small, Medium and Large turbines. These are shown on the respective maps (Figures 3-5).

The areas assessed as suitable for large wind turbines would also be suitable for Medium and Small turbines and areas assessed as suitable for Medium sized turbines would also be suitable for Small turbines. Consideration within the Local Plan should be given as to whether to allow smaller turbines to sterilise areas which would otherwise be suitable for larger wind turbines as this could reduce the potential for wind energy production within the London Borough of Havering.

To estimate the number of turbines and resulting installed capacity that could be developed in these areas, it has been assumed that areas suitable for larger scale turbines will be populated by large turbines and that these areas are mutually exclusive with Medium and small scale turbines. The estimates for each area were based on the land area occupied by a single turbine and the land take required for each scale of turbine ellipses set at 5 rotor diameters downwind and 3 rotor diameters across the wind aligned along a south west axis to match the prevailing wind direction for London¹. These buffers are to ensure optimum wind resource extraction based on wind flow between adjacent turbines and are the minimum spacing expected to be acceptable by the turbine manufacturers. The results are summarised in Table 3.1 below.

Table 3.1: Potential Number of Wind Turbines and Indicative Installed Capacity				
Turbine Scale	Total Area (ha)	Indicative Turbines/ha (5Dx3D spacing)	No of mutually exclusive turbines	Indicative capacity (MW)
Small	268.3	0.81	217	65
Medium	102	0.36	37	18
Large	24.5	0.16	4	8

¹ https://www.meteoblue.com/en/weather/forecast/modelclimate/london_united-kingdom_2643743.

The number of turbines estimated from the areas available is conservative in that if the areas are fragmented, which they generally are (see Figure 2), it would be possible to apply higher density turbine packing. Nevertheless, the areas identified are likely not to be suitable for wind development for a number of reasons, which may include:

- Existing land use
- Landowner willingness
- Justification of special circumstances in the Green belt
- Turbine uneconomic without a suitable end user for the electricity generated
- Grid connection limitations
- Landscape and heritage concerns
- Ecology and archaeology outside of areas currently designated
- Radar and aviation issues
- Public amenity

It would therefore be sensible to assume less than 10% of the sites could be developed.

4 CONCLUSION

The study has identified a number of potentially unconstrained locations for the development of Small, Medium and Large wind turbines in the Borough. The majority of these can accommodate small scale turbines. There is some scope for medium scale turbines and very few opportunities to implement large scale turbines.

5 RECOMMENDATION

We would recommend that the Local Plan highlights the locations identified within this study and invites developers to bring forward well planned projects which have carefully considered the scale and appropriate constraints, and can be justified in terms of Green belt policies.

FIGURES

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)178 227 6700

BIRMINGHAM
Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
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Tel: +44 (0)121 580 0909

CARDIFF
22 Windsor Place
Cardiff
CF10 3BY
Tel: +44 (0)292 072 9191

CROYDON
Melrose House
42 Dingwall Road
Croydon
Surrey
CR0 2NE
Tel: +44 (0)20 8680 7600

CUMBRIA
Cocklakes Yard
Carlisle
Cumbria
CA4 0BQ
Tel: +44 (0)122 856 4820

EDINBURGH
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NEWCASTLE UPON TYNE
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Newcastle upon Tyne
NE1 4DP
Tel: +44 (0) 191 232 0943

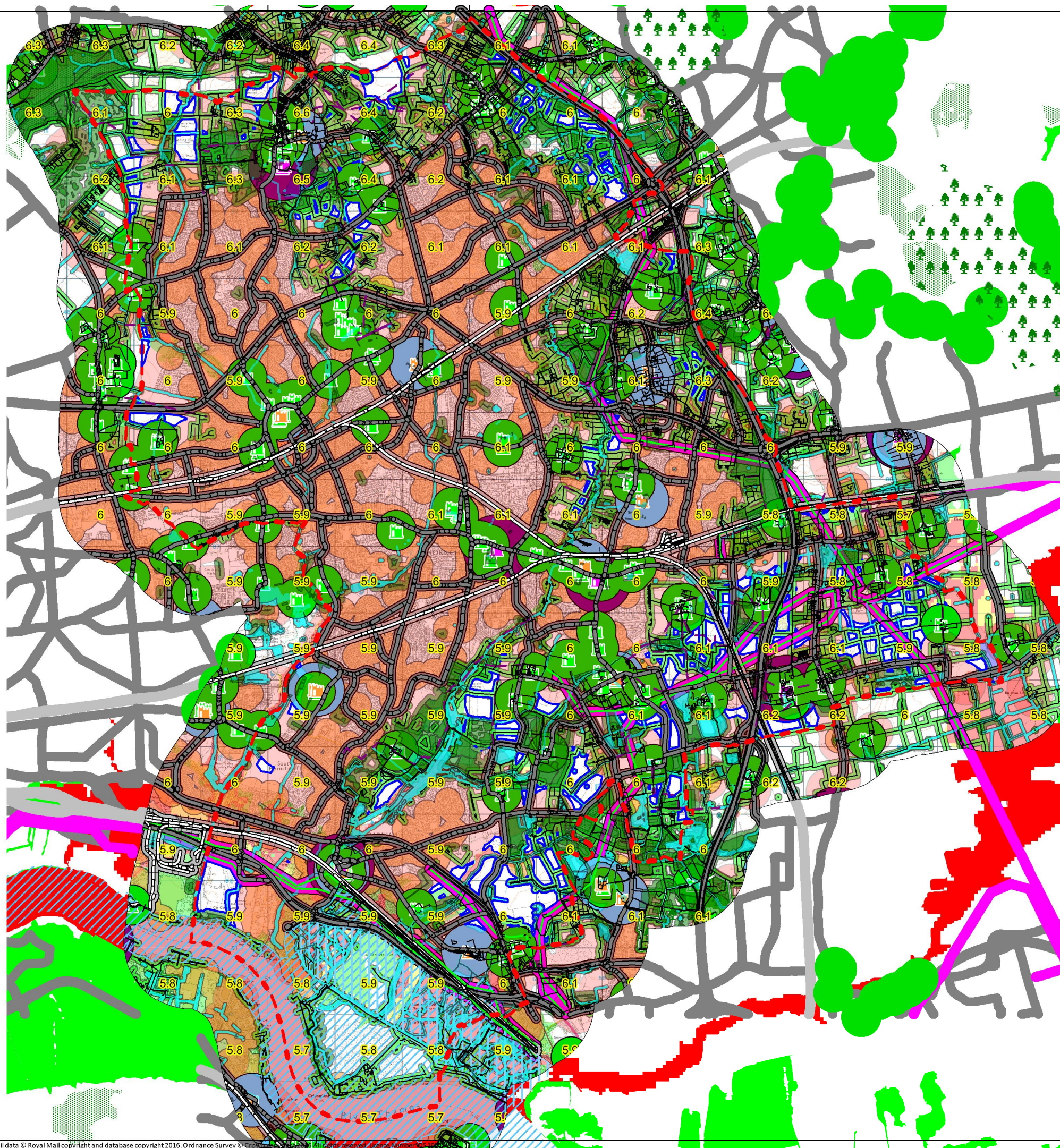
SHEFFIELD
Unit 5 Newton
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Tel: +7(727) 334 1310

MOSCOW
21/5 Kuznetskiy Most St.
Moscow
Russia
Tel: +7(495) 626 07 67



- Havering Borough Boundary
- LargeWind
- MediumWind
- SmallWind



0 4 kilometres 1 : 60 000 @ A3

BNG Ref: 555032 : 186650 OS 100km Grid: TQ Landranger Ref: 177

Long : Lat DD 0.2366° : 51.5569° Long : Lat DMS 0° 14' 11.8" : 51° 33' 24.9"



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Drawn By: SC Date: 15/07/16
Checked By: SA Date: 15/07/16

Constraints to medium scale wind turbine development
Local Plan Evidence Base for Wind Farm Development
Havering London Borough

SMALL_WIND_PE10658 Figure



- Havering Borough Boundary
- LargeWind
- MediumWind
- SmallWind



0 1 2 3 4 kilometres 1 : 60 000 @ A3

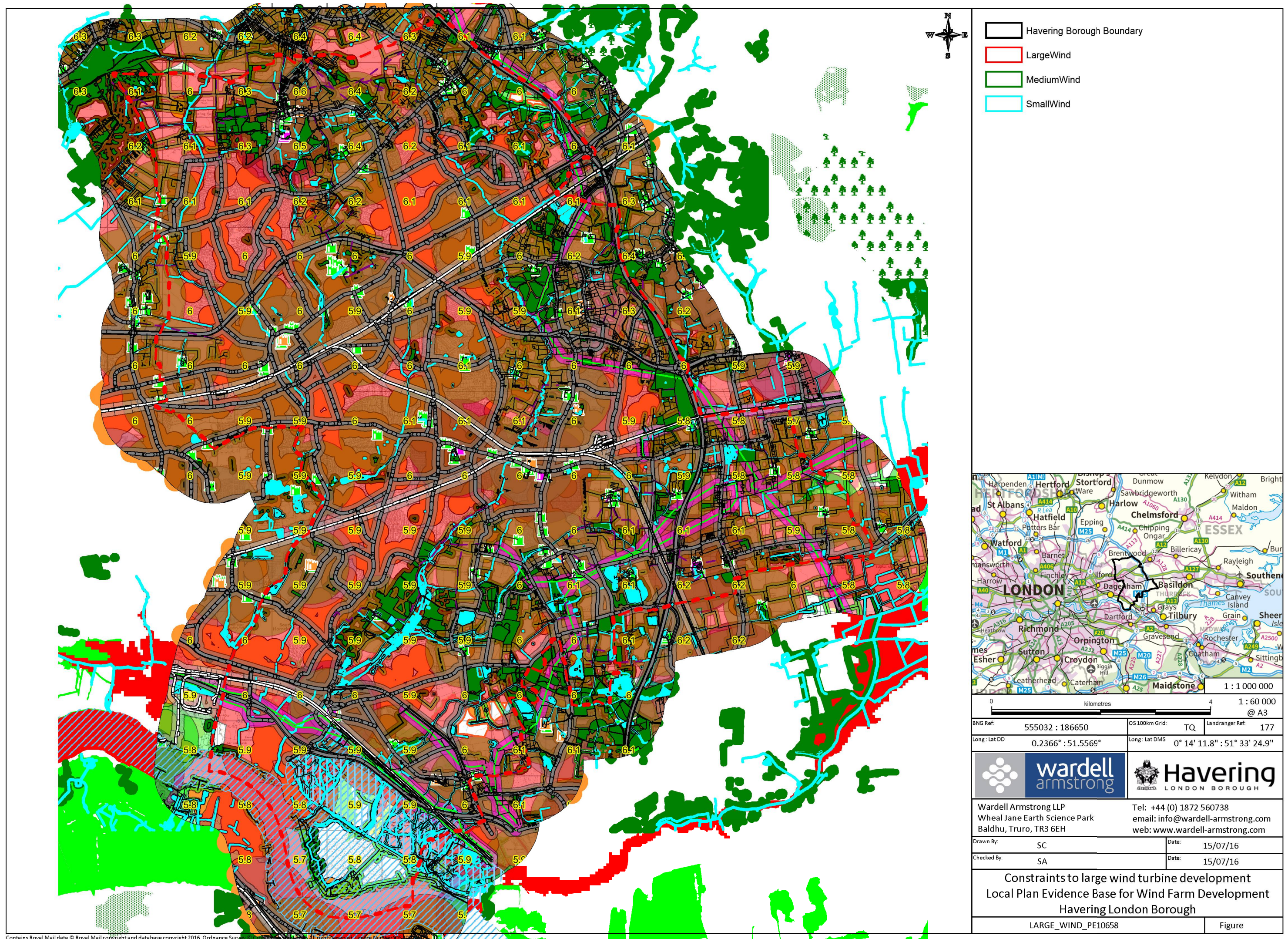
BNG Ref:	555032 : 186650	OS 100km Grid:	TQ	Landranger Ref:	177
Long : Lat DD	0.2366° : 51.5569°	Long : Lat DMS	0° 14' 11.8" : 51° 33' 24.9"		











































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Constraints to medium scale wind turbine development
Local Plan Evidence Base for Wind Farm Development
Havering London Borough

MED_WIND_PE10658	Figure
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	SmallWind
	Havering_Borough_Boundary
	Havering_Borough_Buff1kmV2
	Hedges
	all_railway
	footpath
	all_roads
	electric_transmission_grid
	water
	water
	all_wood
	RSPBreserves_UK
	iba
	_13May2016_ListedBuildingGI
	_13May2016_ListedBuildingGIsta
	_13May2016_ListedBuildingGII
	_13May2016_CertificateOfImmunit
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	_13May2016_ProtectedWreck
	_13May2016_ParkAndGarden
	_13May2016_Battlefield
	Ancient_Woodland_Inventory_v3_
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	ListedBuildingGII_BUF300m
	ListedBuildingGIIstar_BUF400m
	ListedBuildingGI_BUF500m
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	electric_transmission_grid_76m
	all_roads_76mBUF
	water_25mBUF
	Hedges_50mBUF
	all_wood_60mBUF
	AddressBase_Farms_200mBUF
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	Flood_Zones_EA_ENG
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	WS_Havering