not to scale

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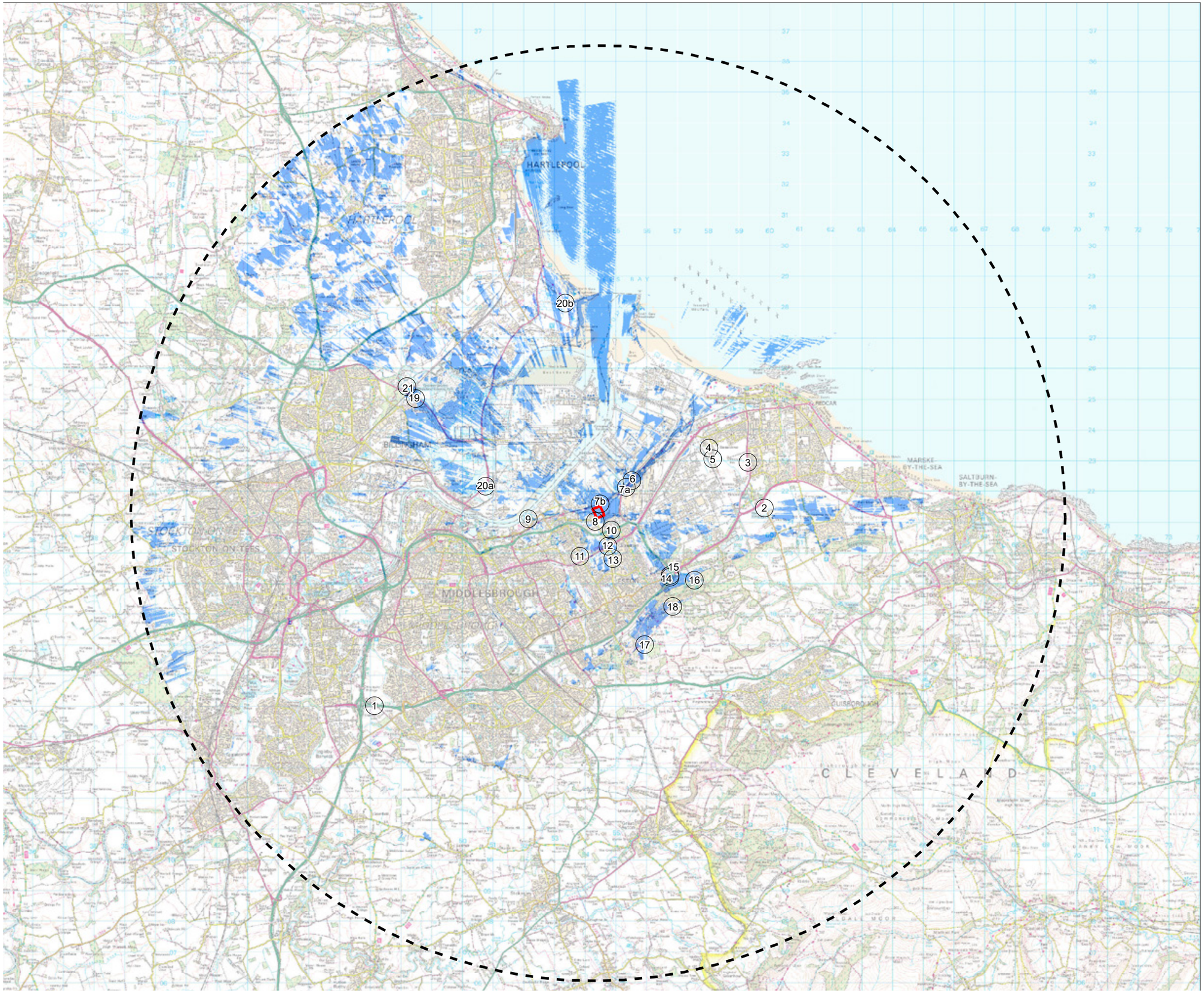


1 Viewpoint locations

Reserved matters application boundary

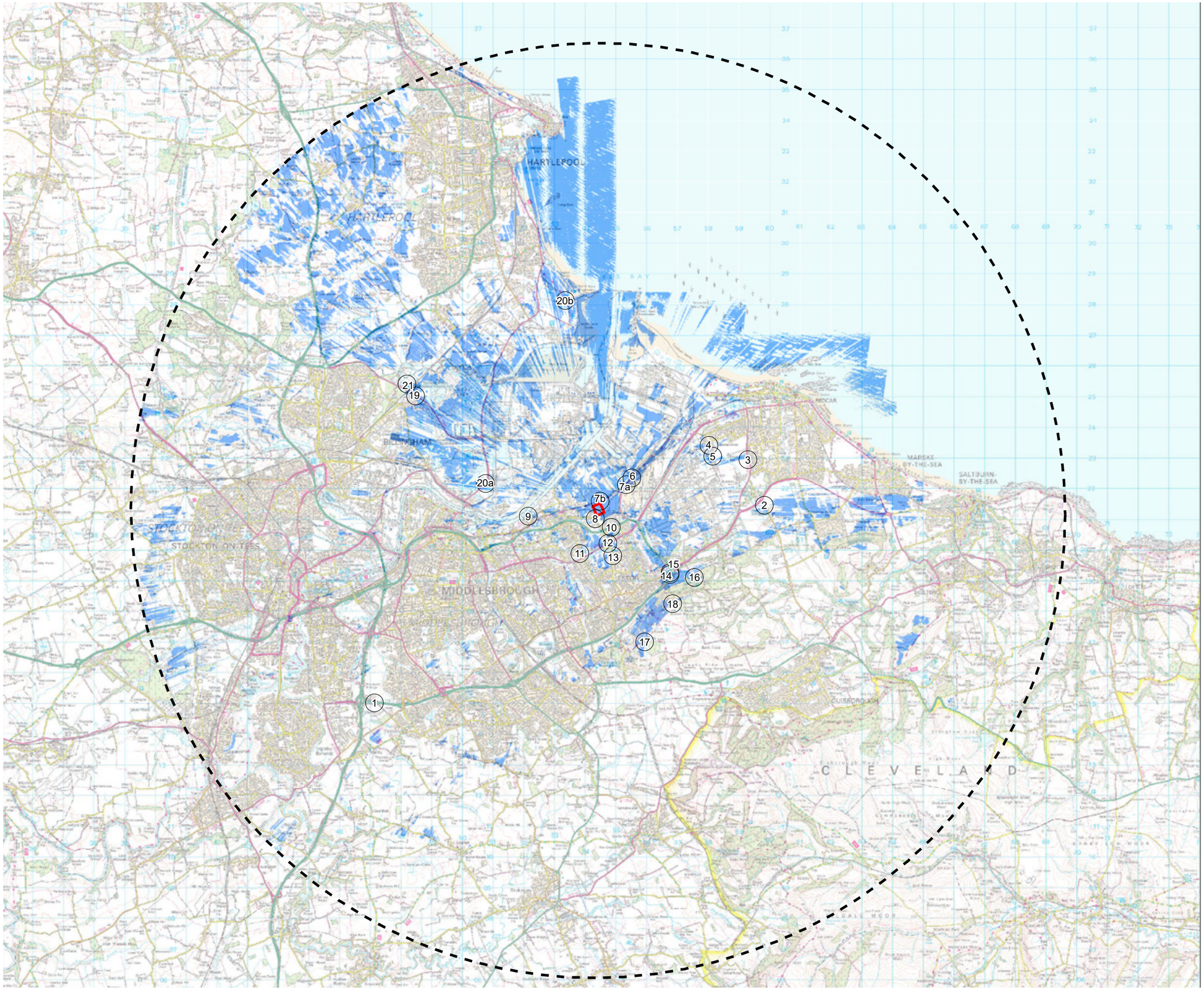
15km study area

Energy recovery facility visible

Viewpoint List:

VP1: Footpath to Stainsby Hall Farm, Stainsby.
VP2: Permissive Bridleway off Fishponds Road, B1269.
VP3: Kirkleatham Lane, A1042
VP4: Amenity Green Space, Howcroft Avenue, Dormanstown
VP5: Bridleway off Hobson Avenue
VP6: Tees Dock Road
VP7a: Access point to Teesdale Way (also known as the Black Path) Footpath
VP7b: Teesdale Way Footpath
VP8: Eston Road, Grangetown
VP9: River Tees Viewpoint
VP10: Footway adjacent to A66 Bolckow Road/ Whitworth
Road, Grangetown
VP11: Junction of Normanby Road/Poplar Grove
VP12: A1085 Trunk Road from the bridge over Church Lane
VP13: Local footpath through Eston Recreation Area, off Church Lane.
VP14: B1380, High Street, Lackenby.
VP15: NCN Route 1, Lackenby
VP16: Bridleway within Eston Hills, off Lazenby Bank Road.
VP17: Tees Link National Trail footpath 122/21/3 Eston Hills.
VP18: OS Triangulation point, Eston Nab.
VP19: A1185, Seal Sands Road, Stockton-on-Tees.
VP20a: Section of the England Coast Path (ECP) National Trail, Stockton-on-Tees.
VP20b: Section of the England Coast Path.
VP21: Viewpoint within Cowpen Bewley Woodland Park, Stockton-on-Tees.

0 3,600 m



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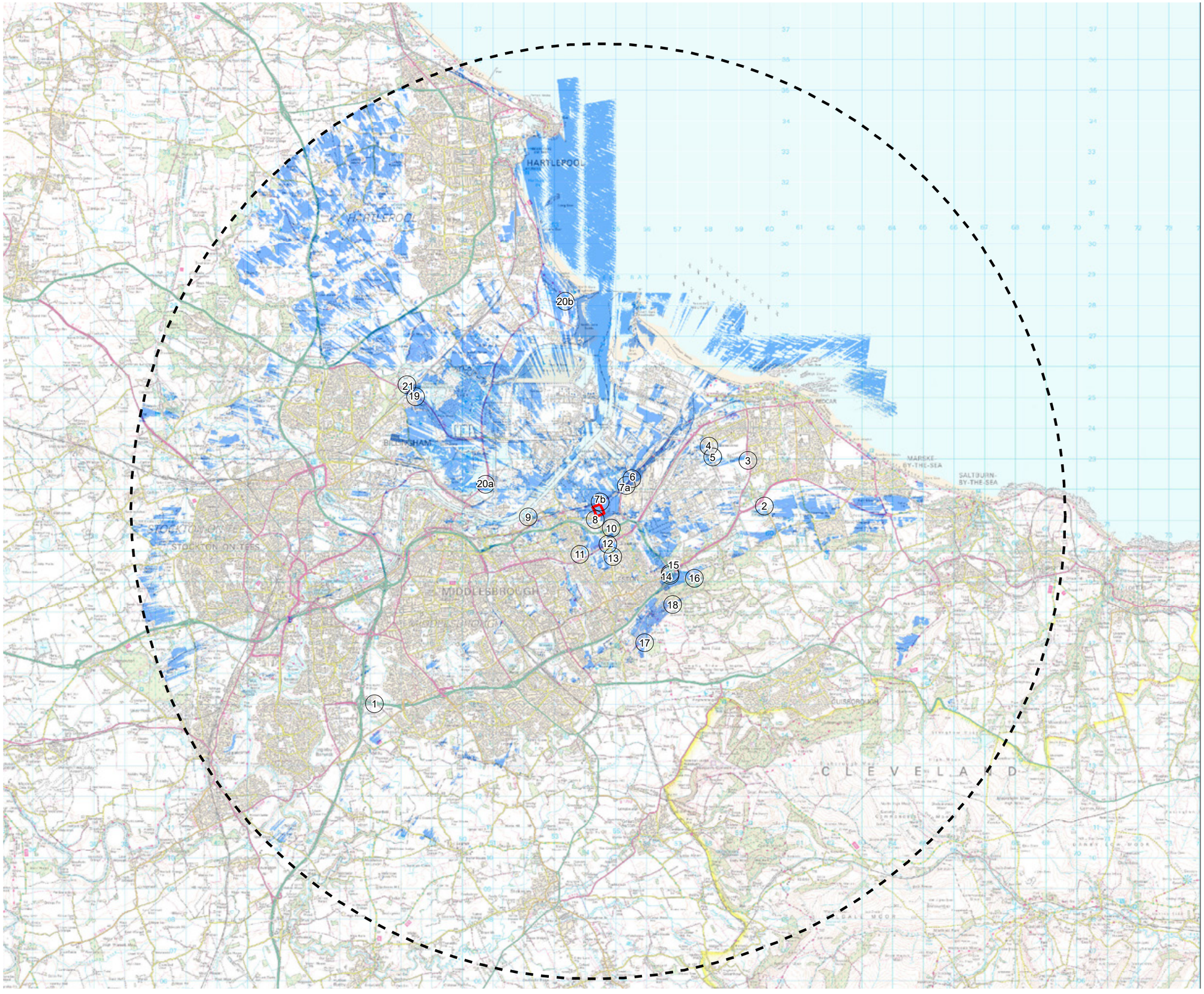

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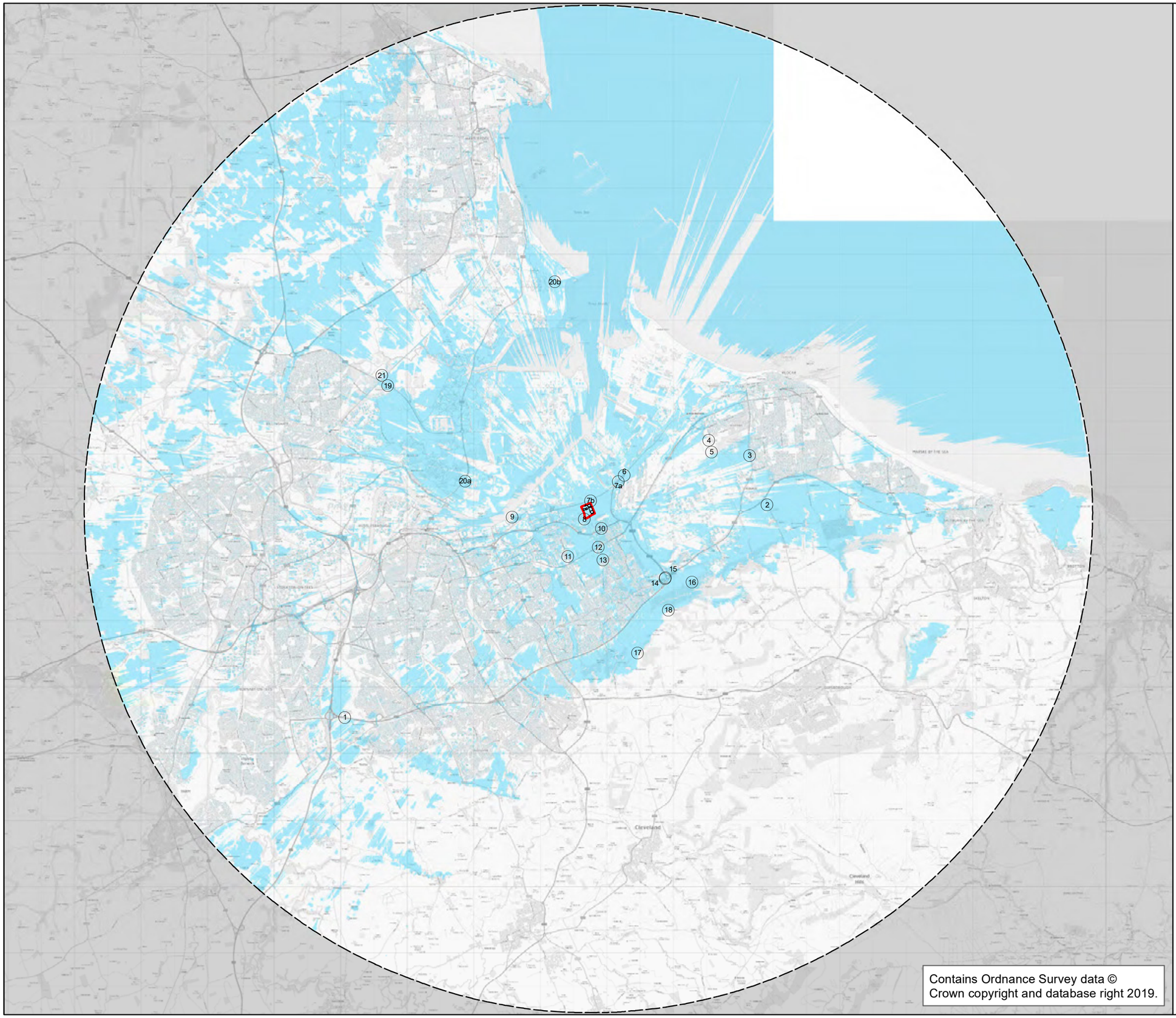

Notes:

1. Predicted visibility is for observer eye level 1.65m above ground level.
2. The ZTV has been created primarily with LIDAR Composite DSM (Digital Surface Model), a raster elevation model covering ~75% of England at 2m spatial resolution, produced by the Environment Agency. The DSM is produced from the last return LIDAR signal and includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface.
Where there are gaps within the DSM, these have been aggregated with Ordnance Survey Digital Terrain Data on 50m grid with additional screening elements derived from OS vectormap layers. Buildings have been mapped in at an assumed 8m height (average two storey property) and woodland at an assumed height of 12m (for typical woodland). These have been 'stamped' onto the bare earth terrain model. This gives a more realistic impression of theoretical visibility for the proposed development, however it does not take account for hedgerows and isolated mature trees.

Legend

- Building Footprint
- Site Boundary
- 15km Buffer from Extent of Development
- (1) Viewpoint Location
- Energy Recovery Facility Visible

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0 2.5 5
Kilometres

Figure 6.4
Zone of Theoretical Visibilility: Screened using DSM data with 15km Buffer from the Facility (Stack and Buildings)

2019s0951
Redcar - Energy Recovery Facility

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BD18 3LF

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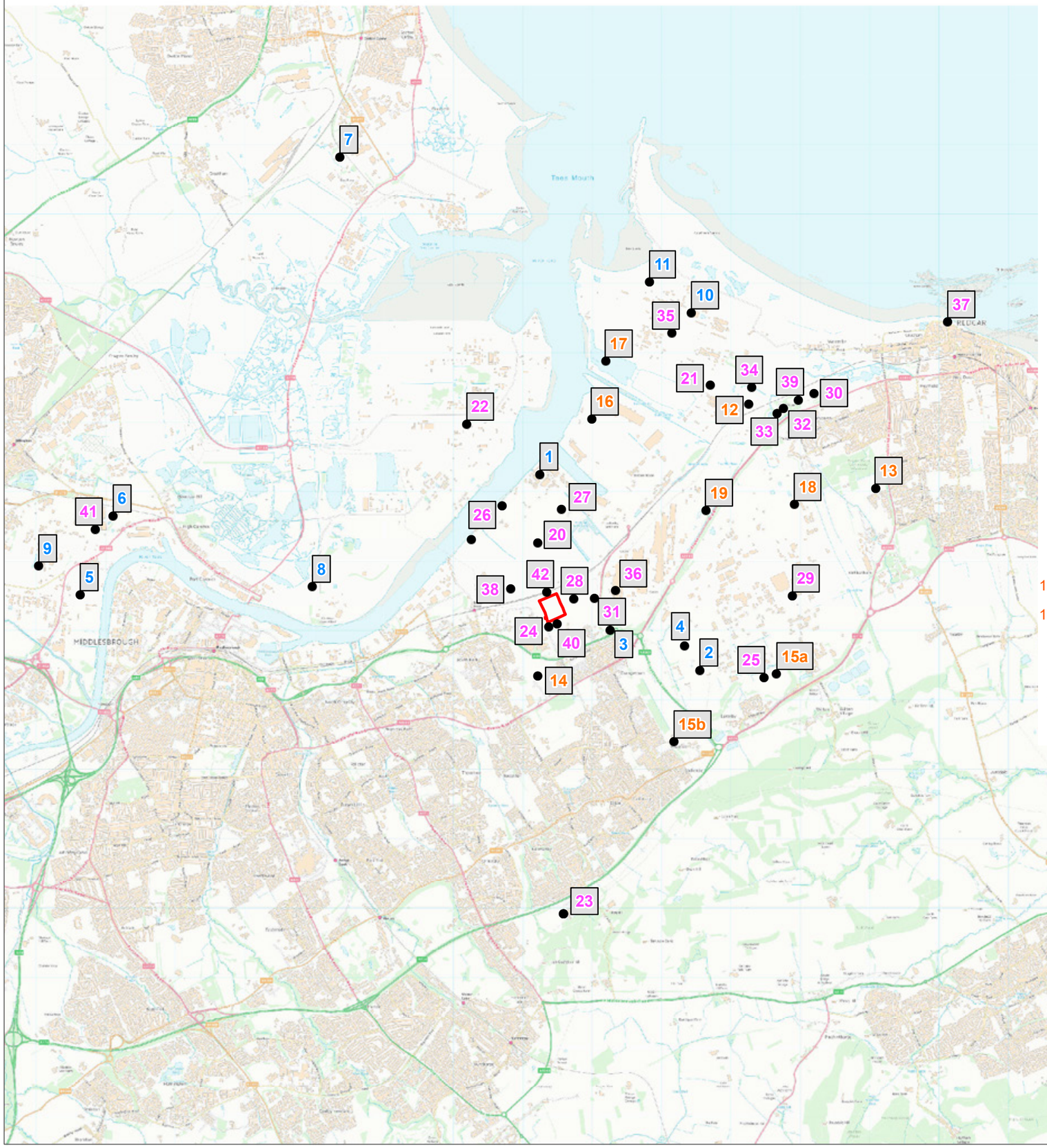
Fax: (01274) 714272
www.jbaconsulting.com



- Cumulative sites

Point source emitters identified by Fichtner

1. R/2008/0671/EA
2. R/2017/0119/DCO
3. R/2018/0098/FF
4. R/2017/0876/FFM
5. 162165/VARY *
6. 14/1454/EIS *
7. H/2019/0275 *
8. 14/1106/EIS *
9. 16/0195/VARY *
10. R/2019/0124/DCO *
11. R/2020/0411/FFM

Projects considered in outline application / ES / HRA screening (some included in section above)

12. R/2019/0427/FFM
13. R/2016/0663/OOM
14. R/2014/0372/OOM
15a. R/2018/0364/NID
15b. DCO Reference - 5192
16. R/2006/0433/OO
17. R/2015/0218/DCO
18. R/2014/0626/FFM
19. R/2019/0245/SC *

New projects for consideration

20. R/2020/0357/OOM
21. R/2017/0906/OOM
22. 19/2161/FUL
23. R/2016/0326/OOM and R/2019/0443/RMM
24. R/2020/0270/FFM
25. R/2020/0355/FFM
26. R/2020/0684/ESM * and R/2020/0685/ESM *
27. R/2020/0465/FFM
28. R/2020/0318/FFM
29. R/2019/0031/FFM *
30. R/2022/0816/FFM
31. R/2020/0819/ESM
32. R/2022/0050/FFM
33. R/2020/0823/ESM
34. R/2020/0822/ESM
35. R/2020/0821/ESM
36. R/2020/0820/ESM
37. R/2020/0075/F3M
38. R/2022/0355/FFM
39. R/2022/0494/FFM
40. R/2021/0879/FF
41. 20/00090/EIS
42. ERF grid connection

Reserved matters application boundary

*** Projects excluded from the cumulative assessment following consultation with RCBC. Further details are set out in Table 13.1**

0 2,500 m

N

Appendix 1

Effects of nitrogen deposition on the Teesmouth and Cleveland Coast SSSI

Teesmouth and Cleveland Coast SSSI covers 2,964.37ha. The site is of special interest for the following nationally important features that occur within and are supported by the wider mosaic of coastal and freshwater habitats:

- Jurassic and Quaternary geology
- Sand dunes
- Saltmarshes
- Breeding harbour seals
- Breeding avocet, little tern and common tern
- A diverse assemblage of breeding birds of sand dune, saltmarsh and lowland open waters and their margins
- Non-breeding shelduck, shoveler, gadwall, ringed plover, knot, ruff, sanderling, purple sandpiper, redshank and sandwich tern.
- An assemblage of more than 20,000 waterbirds during the non-breeding season
- A diverse assemblage of invertebrates associated with sand dunes.

There are two main dune systems within the SSSI: Seaton Dunes to the north of the Tees, and Coatham Dunes to the south. The structure and geomorphology of both systems has been heavily influenced by a long history of human intervention, including sand extraction. Most significant has been the construction of two large breakwaters (North Gare and South Gare), which guard the entrance to the estuary. They have a strong influence on sediment dynamics and result in both dune systems showing a combination of the features of bay and spit dune systems.

Small pockets of strandline vegetation occur throughout the site and occasionally include sea sandwort and sea rocket. Foredunes of sand couch are much more extensive and grade into mobile dunes with stands dominated by both marram and lyme-grass. As conditions ameliorate in the semi-fixed dunes the dominance of marram and lyme-grass wanes and other plants such as red fescue, ragwort and common cat's-ear become prominent.

The band of mobile and semi-fixed dunes around the Tees Estuary is quite narrow in comparison with some dune systems due to the relative stability of the coast. The bulk of the dunes are covered with extensive stands of fixed dune grassland and in some places this has developed on base-rich slag. The dune grassland includes some diverse swards with herbs such as common bird's-foot trefoil, lady's bedstraw, fairy flax and common restharrow forming a prominent component. They also support a number of scarce and threatened species, including purple milk-vetch, lesser meadow-rue, field mouse-ear and carline thistle. In contrast there are also large areas with a coarse sward dominated by false oat-grass.

There are a number of damp depressions ('slacks') in both dune systems, which support a range of wetter vegetation types, usually with a sward dominated by mixtures of red fescue, Yorkshire fog and creeping bent. Creeping willow is extremely scarce in the Tees Estuary and so does not form a regular component of the dune slacks in contrast to many dunes systems. A particularly prominent feature of some of the slacks are large and colourful stands of marsh orchids and their hybrids. Some of the slacks show affinities with saltmarsh vegetation, with a selection of salt tolerant species such as saltmarsh rush, sea plantain and sea-milkwort and are likely to have been derived from the isolation of saltmarsh vegetation by developing dunes.

More consistently wet slacks support swamp communities. Fertile feather moss and flat-sedge occur in some of the slacks.

APIS gives a range of values for coastal dune grasslands depending on whether they are stable or shifting systems. The critical load for stable acid dune grasslands is 8-15kg/N/ha/yr. Stable calcareous dune grasslands have a critical load range of 10-15kg/N/ha/yr. The range for shifting coastal dunes is 10-20 kg/N/ha/yr.

A study of the Coatham Dunes by Royal Haskoning DHV in 2018 found that the dune system has been influenced by the historic deposition of slag from local ironworks. The dune system is a mix of slag deposits, marine deposited and wind-blown sands. There is a historic landfill located in the dunes in the Majuba area. Accretion is evident along the whole of Coatham Sands but particularly at South Gare.

Away from South Gare the dune system remained largely unchanged between 1999 and 2017 except for areas of dune blowout or localised increases in areas of bare dunes. The dune system here has been assessed as a stable system for assessment purposes.

An Environmental Statement prepared by Envest Limited and Gair Consulting Limited for the Breagh Pipeline Project in February 2010 includes the results of a NVC survey undertaken on the Coatham Dunes by RSK. The ES chapter reports that the whole dune system is "*distinctly calciolous in its plant species and vegetation types, so that strongly calcifugous species are altogether lacking. Even species characteristic of marginally calcifugious grasslands are scarce*".

The deposition modelling undertaken by Fichtner for this reserved matters application shows a maximum rate of nitrogen deposition (PC) in the Coatham Sands area (and associated dunes) of 0.11kgN/ha/yr. within the SSSI (see figure 4). This represents 1.21% of the lower end of the critical load given for stable calcareous dune grassland on APIS. The background level of nitrogen deposition in this area is above the upper end of the critical load range (10-15kg/N/ha/yr.) at 16kg/N/ha/yr. For sand dune habitats increased nitrogen deposition can lead to increases in graminoid cover that could alter the species composition of certain sand dune communities.

The maximum in-combination rate of nitrogen deposition within the Teesmouth and Cleveland Coast SSSI is 15.93% of the critical load for coastal sand dune habitats. The contribution from the ERF at this in-combination point of maximum impact is a small proportion of the total, at only 1.02% of the lower end of the critical load range (10kg/N/ha/yr.) and the maximum contribution from the ERF at any part of the coastal sand dune habitat is 1.21% of the lower end of the critical load range. The majority of the in-combination impact is due to emissions from the consented REC which is located within a few hundred metres of the sand dune habitats.

The background rate of N deposition within this part of the SSSI with the projects included in the in-combination assessment operating would be c17.49kg/N/ha/yr. With the ERF also operational, the in-combination deposition rate would be c17.59kg/N/ha/yr.

Work published by Caporn *et al*, 2016 highlights that for a range of vegetation communities the incremental effect of long-term nitrogen deposition on species richness reduces as deposition levels increase above the upper end of the critical load. When considering species-richness in sand dune habitats the Caporn *et al*, 2016 study found that where background levels of nitrogen deposition are 15kg/N/ha/yr. an increase in nitrogen deposition of 0.9kg/N/ha/yr. is required to reduce measured species richness by one species. This amount of nitrogen needed increases to 1.3kg/N/ha/yr. where background nitrogen deposition is 20kg/N/ha/yr.. The pattern of increasing large amounts of additional nitrogen deposition required to reduced species richness by one species as background levels of nitrogen deposition increase is also common to upland heath, lowland heath and acid grassland habitats.

The air quality modelling shows that increase in nitrogen deposition in this part of the SSSI is largely driven by large-point source emitters that are already consented. Using the figures set out in Caporn et al, it is likely that the change in levels of nitrogen deposition on the sand dune systems from already consented projects could be large enough to result in the loss of one to two species within the sand dune communities.

The ES chapter provided for the REC identifies the potential loss of the two species from the sand dune communities as a potential impact of the emissions from the REC alone. The ES chapter concluded that although this was an adverse impact it was unlikely to lead to changes in habitat type (i.e. a shift in successional stages) and therefore unlikely to be significant. No mitigation was proposed.

As projects such as the REC have been consented it is concluded that the potential impacts of increased levels of nitrogen deposition on the SSSI were deemed to be acceptable.

The contribution of nutrient nitrogen from the ERF itself is relatively small and is not of a magnitude that current evidence would suggest would lead to a discernible change in species composition within the SSSI. The change in nitrogen deposition from this project is not considered likely to have any adverse impacts on the floral interest of the dune system within the SSSI.

Reference

Caporn, S., Field, C., Payne, R., Dise, N., Britton, A., Emmett, B., Jones, L., Phoenix, G., S Power, S., Sheppard, L. & Stevens, C. 2016. Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance. Natural England Commissioned Reports, Number 210.