



# Uskmouth Conversion Project

## Updated Habitats Air Quality Assessment

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Client: Simec Uskmouth Power Ltd

Project/Proposal No: 3839

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# Document Information

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# 1. Introduction

This report has been produced to support the Schedule 5 responses to Natural Resources Wales in relation to the Permit Variation application for the Uskmouth Conversion project submitted by Simec Uskmouth Power Limited (SUP).

SUP has commissioned further air quality modelling and specialist interpretation of the effects of air emissions, specifically the resulting nitrogen deposition on habitat sites, resulting from the Uskmouth Conversion in response to NRW's requests for further information.

The air quality assessment has been updated to reflect the latest assumptions on emissions of ammonia which are the largest contributing factor to nitrogen deposition. The initial assessment which accompanied the Permit Variation application was based on an emission concentration of 15 mg/Nm<sup>3</sup> at 11%O<sub>2</sub> (or 23 mg/Nm<sup>3</sup> at 6%O<sub>2</sub> dry gas which reflects actual combustion conditions) corresponding to the 2018 Waste Incineration BAT Conclusion (BATC) Associated Emission Levels (AELs) for ammonia emissions from existing plant using dry abatement and SNCR. As NRW now considers the Uskmouth Conversion to represent a "New" waste incineration installation, this "Existing" emission concentration is no longer applicable and the ammonia ELV for new plant has been modelled in this updated assessment, which is 10 mg/Nm<sup>3</sup> at 11%O<sub>2</sub> or 15 mg/Nm<sup>3</sup> at 6%O<sub>2</sub>.

The performance guarantee for ammonia demanded by SUP and offered by the conversion EPC contractor is lower still at 10 mg/Nm<sup>3</sup> at 6%O<sub>2</sub>; this scenario has also been assessed and reported.

A further sensitivity analysis has been performed by modelling a lower NO<sub>x</sub> concentration as well as a lower ammonia concentration, though NO<sub>x</sub> has a proportionally much lower effect than ammonia on nitrogen deposition impacts. Ammonia emissions and their major contribution to nitrogen deposition are hence the focus of this revised assessment.

Figures illustrating both the Process Contribution (PC) from the Uskmouth Conversion and the Predicted Environmental Concentration (PEC) are appended to this report. The PEC includes backgrounds derived from the latest (2020) background concentration mapping by the Air Pollution Information Service (APIS) and calculated in-combination effects from nearby planned installations with relevant emissions profiles.

Batches of Figures have been produced for both ammonia emissions scenarios; Figures 1 to 14 at 10 mg/Nm<sup>3</sup> ammonia at 6% O<sub>2</sub> (performance guarantee level) and Figures 15-28 at 15 mg/Nm<sup>3</sup> (BAT-AEL). Figures have been provided to aid interpretation of the Uskmouth Conversion's contributions in the context of prevailing backgrounds. Figures 1 and 15 show the nitrogen deposition contours from the Uskmouth Conversion on a background map which includes all of the above habitat site boundaries. Figures 2 and 16 shows PECs, including third-party contributions on the same background – note that there are sharp boundaries where the APIS five kilometre grid squares abut.

The remaining Figures present the PC (odd numbered Figures) and PEC (even numbered) at SSSI sites within two kilometres of the main flue stack and other designations within ten kilometres. Figures 15-28 repeat the first batch but use the higher (15 mg/Nm<sup>3</sup>) ammonia concentration.

## 2. Methodology

The original air quality modelling input files from the 2019 Permit Variation Application have been re-used for this assessment with a proportional adjustment to the mass emission rate of ammonia as the only change. This has affected results for ammonia and also nitrogen deposition.

Figures have been developed for each SSSI within a two kilometre radius of the Uskmouth Conversion site and all designated habitat sites within a ten kilometre radius.

The figures show the PC and the total PEC; the PEC mapped includes in-combination effects. Data from the five kilometre square background provided by the Air Pollution Information Service (APIS) have been used





to derive the PEC for nitrogen and acid deposition. APIS has updated these data in 2020 hence backgrounds are different to the original 2019 assessment.

The expected contributions from other installations planned but as yet not operational, and therefore not represented in the APIS background concentrations, have been added to the PC and backgrounds to give the ultimate PEC.

Results from the dispersion model have been plotted at a 100 metre square resolution to allow detailed examination of the expected effects across local habitat sites.

### 3. Approach to “in-combination” effects

Informal advice from NRW was gratefully received on the locations of planned installations with air emissions profiles comparable to the Uskmouth Conversion which should be assessed in combination.

SUP cross-checked planning registers for Newport City and Cardiff Councils for any further installations of relevance. The online planning registers cannot be browsed without some relevant information about a planning application (such as an address or planning reference number) and so searching for an application about which nothing is known is a challenge. Eventually a screening for all applications which were accompanied by an Environmental Impact Assessment was conducted; this was considered the most likely criterion to identify thermal plant and waste incinerators requiring an air quality assessment. These types of plant are reasonably expected to emit oxides of nitrogen and potentially ammonia and hence give potential in-combination effects. No applications beyond the three planned installations already identified were found, namely:

- Mor Hafren Energy from Waste plant
- Parc Calon Biomass plant
- Vogen Energy from Waste plant

In SUP's previous response to NRW's Schedule 5 request, a cumulative assessment was undertaken by examining published air quality assessments from the three planned installations identified above.

The previous approach was for each habitat site examined to add the maximum PC from the Uskmouth Conversion and the maximum PC from the third party installations to the maximum background from APIS at each habitat site, irrespective of whether the three maxima coincided.

Contributions from the three planned installations were in general so low as to barely give a measurable change in the predicted pollution concentrations and deposition rates anywhere on the habitat sites as shown in Appendix 1. These maximum values were retained and overlaid onto the PEC plots to show the total expected concentrations and deposition rates. It is noted that this will represent an overestimate, but will reflect change in the same order of magnitude as the actual contribution. As discussed with NRW, specific contributions from the third-party sources could not be modelled without robust source terms. In the absence of these, model input data would have had to be assumed, making the outcome no more robust or accurate. Estimations of emission limit values could be taken from BREF notes but crucial parameters such as flue gas velocity and temperature would still be missing.

Details of the numerical contributions calculated, and discussion of how the much larger Severn Estuary SAC was treated, are included in Appendix 1.

### 4. Results

Full results for long and short term nitrogen oxides, sulphur dioxide, ammonia, acid deposition and ammonia deposition are included in Annex I.

The highest modelled PC and corresponding PECs have been reported for the following sites:

- Gwent Levels – Nash and Goldcliff SSSI

- Gwent Levels – St Brides SSSI
- Newport Wetlands SSSI
- River Usk SAC and SSSI; and
- Severn Estuary (Wales) SPA, SAC and SSSI

It is assumed that sites designated under multiple regimes have the same geographical coverage.

## 5. Discussion

Results are based on the highest values modelled over five years of meteorological data from 2014 to 2018 and are accordingly conservative. The assessment now reflects the actual (2020 update) APIS background values as opposed to previous response to NRW which considered the maximum PC and highest background at each habitat site, irrespective of the fact the two did not overlap, on the basis of our understanding of NRW's requirements at the time.

Results tables are included in Appendix 2.

### 5.1 Oxides of nitrogen, sulphur dioxide, ammonia and acid deposition

Tables A2-1 to A2-5 show that PCs for these species are generally over the 1% of the Critical Level/Load screening criterion but the PEC is generally well below the Critical Level / Load for each species. At each habitat site modelled the PEC is vastly predominated by the background contribution. The maximum contributions from the Uskmouth Conversion are greater than 1% of the lower critical load at all of the habitats examined within a ten kilometre radius. The PC cannot be screened out as such, hence the detailed modelling exercise which has been reiterated.

### 5.2 Nitrogen deposition

Nitrogen deposition exceeds the lower critical loads advised by NRW at a number of habitat sites. Some sites are not sensitive to nitrogen deposition in any case:

- The River Usk SSSI and SAC are not sensitive to nitrogen deposition based on NRW's advice and are not considered further; and
- The Severn Estuary SPA is a marine designation and not sensitive to nitrogen deposition.

The Severn Estuary SAC/SSSI coastal habitats have a lower critical load limit of 20 kgN/ha/yr which is not exceeded within the assessment area with or without the contribution from the Uskmouth Conversion. No further interpretation of these results is made.

#### 5.2.1 SSSIs where the lower critical level is exceeded

##### 5.2.1.1 Using the New WI Plant ELV for ammonia

Table A2-6 shows that the Uskmouth Conversion project increases nitrogen deposition rates at habitat sites where the lower critical load value is already exceeded due to background contributions. The largest process contributions are to the Nash and Goldcliff SSSI but as at all other sites, the total PEC is hugely predominated by the background contribution.

The three Gwent Levels SSSIs (Nash and Goldcliff, St Brides and the Newport Wetlands) have a background nitrogen deposition rate above the advised lower critical load of 10 kgN/ha/yr with or without the contribution from the Uskmouth Conversion.

Figures 17, 19 and 21 illustrate the spatial extent of the contribution from the Uskmouth Conversion across these three SSSIs with the Waste Incineration BATC-AEL for ammonia (15 mg/Nm<sup>3</sup> at 6%O<sub>2</sub>). The figures

illustrate that the contours corresponding to the highest modelled nitrogen deposition rate cover a small fraction of the SSSIs, hence the importance of viewing the Figures in conjunction with the results table when interpreting the maximum results.

#### **5.2.1.2 Using a lower, achievable emission rate for ammonia**

Table A2-7 shows the effect of operating the Uskmouth Conversion at a lower ammonia emission rate of 10 mg/Nm<sup>3</sup> @6% O<sub>2</sub>, which has been advised as an operational performance guarantee and hence an achievable future Permit condition.

Nitrogen deposition rates are lower under this 10 mg/Nm<sup>3</sup> ammonia scenario, with the maxima modelled in the range of 50-60% of the corresponding values under the 15 mg/Nm<sup>3</sup> scenario.

#### **5.2.1.3 Sensitivity test for lower NOx emissions**

Further results are reported in Table A8 for a lower NOx emission rate corresponding to the 180 mg/Nm<sup>3</sup> at 6% O<sub>2</sub>, the New Plant Waste Incineration BAT Conclusions (BATC) ELV for NOx. As established in the original Air Quality Assessment, NOx emissions had no specific significant effects on human health or habitat sites at the emission rate (225 mg/Nm<sup>3</sup> at 6% O<sub>2</sub>, corresponding to Existing rather than New plant BATC ELVs) and so were not remodelled. The contribution of NOx to nitrogen deposition is far outweighed by that of ammonia – comparing the results of Tables A2-7 and A2-8, the resulting change in nitrogen deposition rates at the lower NOx emission rate is only around 7-8%. Again, this lower emission rate does not change the interpretation of the results inasmuch as PECs still exceed the lower Critical Level – because the background deposition rates are already well above the lower Critical Level.

### **5.2.2 Effects on the Gwent Levels SSSI of the Uskmouth Conversion's Process Contributions**

Under all emissions scenarios modelled, background deposition rates are above the lower Critical levels at the three Gwent Levels SSSIs. While the PC does not screen out (as <1%) under any scenario, it remains the case that the maximum process contributions represents a low percentage of the total PECs.

The effects on the sensitive features of these SSSIs has been assessed in the accompanying report from RPS Ecology and Air Quality Team (ECO01486 Uskmouth AQ Ecology Response V5\_161220). RPS conclude that the overall nitrogen loading of the sensitive features, generally field margins and reens, will be vastly predominated by nitrogen from agricultural runoff - it should be noted that these SSSIs are working agricultural land and used extensively for grazing.

The features for which SSSI designations are made are believed to be relatively tolerant of nitrogen and an increase in deposition rate orders of magnitude greater than the PC from the Uskmouth Conversion project would be required to cause a measurable effect on the SSSI's biodiversity.

## **6. Conclusions**

A detailed dispersion model has been produced and Figures generated which clearly show the extent of the process contribution from the Uskmouth Conversion project to nitrogen deposition levels at nearby habitat sites.

The process contributions at all sites are a small fraction of the predicted environmental concentration, which is the sum of the Uskmouth Conversion project's contribution, other contributions from planned but as yet unbuilt thermal plant and waste incinerators, and the prevailing background.

Nitrogen deposition rates at all habitat sites modelled are predominated by the prevailing background rates, which at three sites close to the Uskmouth Conversion project, are above the Lower Critical Load advised by NRW.

There is concern from NRW on the effects of additional process contributions at sites where background concentrations exceed the Lower Critical Load for nitrogen deposition, namely the three Gwent Levels SSSIs included as receptors – Nash and Goldcliff, St Brides and the Newport Wetlands.



Ammonia has a significant effect on nitrogen deposition, so revised stack concentrations based on the Waste Incineration BATC-AEL for New Plant ammonia (15 mg/Nm<sup>3</sup> at 6% O<sub>2</sub>) and a tighter but achievable performance guarantee level (10 mg/Nm<sup>3</sup> @ 6 %O<sub>2</sub>) have been modelled.

The lower ammonia emission concentrations of 15 mg/Nm<sup>3</sup> at 6% O<sub>2</sub> and 10 mg/Nm<sup>3</sup> @ 6 % O<sub>2</sub> have resulted in considerably lower nitrogen deposition rates than the original assessment for Existing Plant. Process contributions from the Uskmouth Conversion project do not under any scenario past or present cause a site previously under the Lower Critical Load for nitrogen deposition to then exceed this value.

The effects of a small incremental contribution at sites already exceeding the Lower Critical Load for nitrogen deposition owing to prevailing background levels is the subject of specialist interpretation from the RPS Ecology and Air Quality team (ECO01486 Uskmouth AQ Ecology Response V5\_161220) which should be read in conjunction with this report as part of SUP's overall response.

The RPS ecologist's interpretation is that there will be no significant effects from the Uskmouth Conversion's incremental contribution to nitrogen deposition rates at the Gwent Levels SSSIs. Existing atmospheric deposition rates are a small fraction of the mainly agriculturally-derived nitrogen loading received by the features of these habitats for which the designations were made; and these features are relatively tolerant to nitrogen loading.



# Appendix 1 In-combination effects

*Table A1-1 Contributions from Vogen*

| Habitat Site                                    | NO <sub>x</sub><br>(µg/m <sup>3</sup> ) | SO <sub>2</sub><br>(µg/m <sup>3</sup> ) | NH <sub>3</sub><br>(µg/m <sup>3</sup> ) | Acid<br>deposition<br>kgeq/ha/yr | Nitrogen<br>deposition<br>kgeq/ha/yr | Daily<br>NO <sub>x</sub><br>(µg/m <sup>3</sup> ) |
|---|---|---|---|----------------------------------|--------------------------------------|--|
| Gwent Levels – Nash and Goldcliff SSSI          | 0.1                                     | -                                       | -                                       | 0.003                            | 0.01                                 | -  |
| Gwent levels - St Brides SSSI                   | 0.1                                     | -                                       | -                                       | 0.003                            | 0.01                                 | -  |
| Gwlyptiroedd Casnewdd/<br>Newport Wetlands SSSI | 0.1                                     | -                                       | -                                       | 0.003                            | 0.01                                 | -  |
| River Usk SAC / SSSI                            | 0.1                                     | -                                       | -                                       | 0.003                            | 0.01                                 | -  |
| Severn Estuary (England)<br>SAC                 | -                                       | -                                       | -                                       |                                  | -                                    | -  |
| Severn Estuary (Wales)<br>SAC/SSSI/SPA          | 0.1                                     | -                                       | -                                       | 0.002                            | 0.01                                 | -  |

*Table A1-2 Contributions from Mor Hafren EfW*

| Habitat Site                                    | NO <sub>x</sub><br>(µg/m <sup>3</sup> ) | SO <sub>2</sub><br>(µg/m <sup>3</sup> ) | NH <sub>3</sub><br>(µg/m <sup>3</sup> ) | Acid<br>deposition<br>kgeq/ha/yr | Nitrogen<br>deposition<br>kgeq/ha/yr | Daily<br>NO <sub>x</sub><br>(µg/m <sup>3</sup> ) |
|---|---|---|---|----------------------------------|--------------------------------------|--|
| Gwent Levels – Nash and Goldcliff SSSI          | -                                       | -                                       | -                                       | -                                | -                                    | -  |
| Gwent levels - St Brides SSSI                   | 0.03                                    | 0.01                                    | 0.002                                   | 0.001                            | 0.02                                 | 0.30   |
| Gwlyptiroedd Casnewdd/<br>Newport Wetlands SSSI | 0.03                                    | 0.01                                    | 0.002                                   | 0.001                            | 0.02                                 | 0.38   |
| River Usk SAC / SSSI                            | 0.02                                    | 0.01                                    | 0.002                                   | 0.001                            | 0.01                                 | 0.22   |
| Severn Estuary (England)<br>SAC                 | -                                       | -                                       | -                                       | -                                | -                                    | -  |
| Severn Estuary (Wales)<br>SAC/SSSI/SPA          | 0.03                                    | 0.02                                    | 0.002                                   | 0.001                            | 0.02                                 | 0.30   |



**Table A1-3 Contributions from Parc Calon**

| Habitat Site                                    | NO <sub>x</sub><br>(µg/m <sup>3</sup> ) | SO <sub>2</sub><br>(µg/m <sup>3</sup> ) | NH <sub>3</sub><br>(µg/m <sup>3</sup> ) | Acid<br>deposition<br>kgeq/ha/yr | Nitrogen<br>deposition<br>kgeq/ha/yr | Daily<br>NO <sub>x</sub><br>(µg/m <sup>3</sup> ) |
|---|---|---|---|----------------------------------|--------------------------------------|--|
| Gwent Levels – Nash and Goldcliff SSSI          | -                                       | -                                       | -                                       | -                                | -                                    | -  |
| Gwent levels - St Brides SSSI                   | -                                       | -                                       | -                                       | -                                | -                                    | -  |
| Gwlyptiroedd Casnewdd/<br>Newport Wetlands SSSI | -                                       | -                                       | -                                       | -                                | -                                    | -  |
| River Usk SAC / SSSI                            | -                                       | -                                       | -                                       | -                                | -                                    | -  |
| Severn Estuary (England)<br>SAC                 | -                                       | -                                       | -                                       | -                                | -                                    | -  |
| Severn Estuary (Wales)<br>SAC/SSSI/SPA          | 0.1                                     | -                                       | -                                       | -                                | 0.01                                 | 0.60   |

## Notes on the Severn Estuary

The Severn Estuary SPA/SAC must be treated differently to the Gwent Levels SSSIs which are reasonably discrete; the Severn Estuary SPA/SAC receives a relatively large contribution from Parc Calon at the western end of the habitat designation, which is several kilometres removed from the location in the SPA where the maximum PC from the Uskmouth Conversion is expected. The Parc Calon site boundary abuts the SPA/SAC, so a large contribution is understandable, but it is not realistic to apply this worst case third party contribution to the entire designated area for this habitat and further analysis is required. It was necessary to interrogate the available data in the public domain of the three planned installations to infer their contributions to the location on the Severn Estuary SPA/SAC where Uskmouth Conversion maximum PC was modelled.

Vogen's contributions to any relevant habitat sites have been used "as is"; Vogen and Uskmouth Conversion are in close proximity so it is reasonable that their respective highest PCs could conceivably coincide at the same location on the Severn Estuary SPA/SAC.

The NO<sub>x</sub> contours from the Mor Hafren report do not extend beyond Cardiff but given the shape of the visible sections 0.1 µg/m<sup>3</sup> NO<sub>2</sub> contour from that report's cumulative assessment, the point at which the highest PC from the Uskmouth Conversion occurs at the Severn Estuary SPA/SAC (shown on Figures 1 and 13 as being on the west bank of the mouth of the River Usk) will receive a NO<sub>x</sub> contribution from Mor Hafren of far less than 0.1 µg/m<sup>3</sup>. A contribution of 0.1 µg/m<sup>3</sup> NO<sub>x</sub> has hence been assumed on a precautionary basis.

The maximum PC from the Uskmouth Conversion to the Severn Estuary SPA/SAC and the Gwent Levels (St Brides) SSSI are within close proximity (>200 metres). For the purposes of the cumulative assessment, the stated maximum contribution to nitrogen deposition at the St Brides SSSI from Mor Hafren has been used as a proxy for the contribution to nitrogen deposition at the Severn Estuary SPA/SAC near the Uskmouth Conversion. This is considered conservative, as the St Brides SSSI is closer to Mor Hafren than the point of maximum PC from the Uskmouth Conversion, but not unrealistic. The value of 0.02 kgN/ha/yr was used.

The report for Parc Calon is more difficult to extrapolate as it contains no contours. The maximum PC to annual mean NO<sub>x</sub> at the Severn Estuary SPA/SAC is 7.4 µg/m<sup>3</sup> which is believed to fall at a point immediately



adjacent to the Parc Calon site boundary which is contiguous with the SPA/SAC. Maximum PCs at residential receptors elsewhere in Cardiff are in the order of  $0.2\text{--}0.3\text{ }\mu\text{g}/\text{m}^3$  so it seems reasonable to assume that the NO<sub>x</sub> contribution at the point on the SPA/SAC which receives the Uskmouth Conversion maximum PC (several kilometres east) will be no more than  $0.1\text{ }\mu\text{g}/\text{m}^3$  and in likelihood a lot less. This value has been used on a conservative basis and equates to a corresponding nitrogen deposition contribution of  $0.01\text{ kgN}/\text{ha}/\text{yr}$ .

As discussed, the revised contributions from the three planned installations were added to the APIS backgrounds to derive PECs.

## References for third-party reports

Vogen Energy / Hyder Consulting, Newport Docks Bulk Drying, Pelletising and CHP Facility, 2011 via Newport Planning Portal search ref 10/1238

Mor Hafren:

<https://static1.squarespace.com/static/5d1b5a312329df0001bff73b/t/5eeb65299d1a0b2d79b63b19/1592485241847/Technical+Assessment+6+Air+Quality+Assessment.pdf>

Parc Calon:

[https://planning.cardiff.gov.uk/online-applications/files/E9A25AC5D74FA9C6C30C73CD7DD3DBD7/pdf/17\\_02130\\_MJR-APPENDIX\\_9.6\\_-\\_AIR\\_QUALITY\\_ASSESSMENT-1984445.pdf](https://planning.cardiff.gov.uk/online-applications/files/E9A25AC5D74FA9C6C30C73CD7DD3DBD7/pdf/17_02130_MJR-APPENDIX_9.6_-_AIR_QUALITY_ASSESSMENT-1984445.pdf)



## Appendix 2 Revised AQ assessment results

*Table A2-1 Long term NOx results based on 225 mg/Nm<sup>3</sup> NOx @ 6%O<sub>2</sub>*

| Habitat Site                                 | Critical Level | PC   | PC/CL | Background + in combination | PEC   | PEC/CL |
|--|----------------|------|-------|-----------------------------|-------|--------|
| Gwent Levels – Nash and Goldcliff SSSI       | 30             | 2.39 | 7.97% | 14.43 + 0.1                 | 16.92 | 56.4%  |
| Gwent levels - St Brides SSSI                | 30             | 0.94 | 3.13% | 16.32 + 0.13                | 17.39 | 58.0%  |
| Gwlyptiroedd Casnewdd/ Newport Wetlands SSSI | 30             | 1.56 | 5.20% | 15.04 + 0.13                | 16.73 | 55.8%  |
| River Usk SAC / SSSI                         | 30             | 0.7  | 2.33% | 15.04 + 0.12                | 15.86 | 52.9%  |
| Severn Estuary (England) SAC                 | 30             | 0.31 | 1.03% | -                           | -     | -      |
| Severn Estuary (Wales) SAC/SSSI/SPA          | 30             | 1.02 | 3.40% | 15.04 + 0.23                | 16.29 | 54.3%  |

Results are annual mean concentrations of NOx in micrograms per cubic metre (µg/m<sup>3</sup>)



*Table A2-2 Short term NO<sub>x</sub> results based on 225 mg/Nm<sup>3</sup> NO<sub>x</sub> @ 6%O<sub>2</sub>*

| Habitat Site                                 | Critical Level | PC    | PC/CL | Background + in combination | PEC   | PEC/CL |
|--|----------------|-------|-------|-----------------------------|-------|--------|
| Gwent Levels – Nash and Goldcliff SSSI       | 75             | 19.07 | 25.4% | 30.56                       | 49.63 | 66.2%  |
| Gwent levels - St Brides SSSI                | 75             | 15.29 | 20.4% | 31.26 + 0.3                 | 46.85 | 62.5%  |
| Gwlyptiroedd Casnewdd/ Newport Wetlands SSSI | 75             | 14.44 | 19.3% | 27.44 + 0.28                | 42.16 | 56.2%  |
| River Usk SAC / SSSI                         | 75             | 14.32 | 19.1% | 38.44 + 0.22                | 52.98 | 70.6%  |
| Severn Estuary (England) SAC                 | 75             | 2.37  | 3.16% | -                           | -     | -      |
| Severn Estuary (Wales) SAC/SSSI/SPA          | 75             | 17.74 | 23.7% | 25.66 + 0.9                 | 44.3  | 59.1%  |

Results are maximum daily mean concentrations of NO<sub>x</sub> in micrograms per cubic metre (µg/m<sup>3</sup>)

*Table A2-3 Long term SO<sub>2</sub> results based on 60 mg/Nm<sup>3</sup> NO<sub>x</sub> @ 6%O<sub>2</sub>*

| Habitat Site                                 | Critical Level | PC   | PC/CL | Background + in combination | PEC  | PEC/CL |
|--|----------------|------|-------|-----------------------------|------|--------|
| Gwent Levels – Nash and Goldcliff SSSI       | 20             | 0.64 | 3.20% | 1.65                        | 2.29 | 11.5%  |
| Gwent levels - St Brides SSSI                | 20             | 0.25 | 1.25% | 1.65 + 0.01                 | 1.91 | 9.55%  |
| Gwlyptiroedd Casnewdd/ Newport Wetlands SSSI | 20             | 0.42 | 2.10% | 1.65 + 0.01                 | 2.08 | 10.4%  |
| River Usk SAC / SSSI                         | 20             | 0.19 | 0.95% | 1.65 + 0.01                 | 1.85 | 9.25%  |
| Severn Estuary (England) SAC                 | 20             | 0.08 | 0.40% | -                           | -    | -      |
| Severn Estuary (Wales) SAC/SSSI/SPA          | 20             | 0.27 | 1.35% | 1.65 + 0.02                 | 1.94 | 9.7%   |

Results are annual mean concentrations of SO<sub>2</sub> in micrograms per cubic metre (µg/m<sup>3</sup>)



*Table A2-4 Long term NH<sub>3</sub> results based on 15 mg/Nm<sup>3</sup> NH<sub>3</sub> @ 6%O<sub>2</sub>*

| Habitat Site                                 | Critical Level | PC   | PC/CL | Background | PEC  | PEC/CL |
|--|----------------|------|-------|------------|------|--------|
| Gwent Levels – Nash and Goldcliff SSSI       | 3              | 0.24 | 8.00% | 1.05       | 1.29 | 43.0%  |
| Gwent levels - St Brides SSSI                | 3              | 0.10 | 3.33% | 1.05       | 1.15 | 38.3%  |
| Gwlyptiroedd Casnewdd/ Newport Wetlands SSSI | 3              | 0.16 | 5.33% | 1.05       | 1.21 | 40.3%  |
| River Usk SAC / SSSI                         | 3              | 0.07 | 2.33% | 1.05       | 1.12 | 37.3%  |
| Severn Estuary (England) SAC                 | 3              | 0.03 | 1.00% | 1.05       | 1.08 |        |
| Severn Estuary (Wales) SAC/SSSI/SPA          | 3              | 0.10 | 3.33% | 1.05       | 1.15 | 38.3%  |

Results are annual mean concentrations of ammonia in micrograms per cubic metre (µg/m<sup>3</sup>)





*Table A2-5 Acid deposition results based on 225 mg/Nm<sup>3</sup> NO<sub>x</sub>, 15 mg/Nm<sup>3</sup> NH<sub>3</sub> @ 6%O<sub>2</sub>*

| Habitat Site                                 | Critical Load |       | PC   |       |       | Total PC / CL Max N % | Background + in combination |     | PEC  |      |       | Total PEC / CL Max N % |
|--|---------------|-------|------|-------|-------|-----------------------|-----------------------------|-----|------|------|-------|------------------------|
|  | Min N         | Max N | N    | S     | Total |                       | N                           | S   | N    | S    | Total |                        |
| Gwent Levels – Nash and Goldcliff SSSI       | 0.438         | 4.528 | 0.11 | 0.076 | 0.19  | 4.17%                 | 0.8                         | 0.2 | 0.91 | 0.28 | 1.19  | 26.2%                  |
| Gwent levels - St Brides SSSI                | 0.438         | 4.528 | 0.05 | 0.030 | 0.08  | 1.68%                 | 0.9                         | 0.2 | 0.95 | 0.23 | 1.18  | 26.1%                  |
| Gwlyptiroedd Casnewdd/ Newport Wetlands SSSI | 0.438         | 4.528 | 0.08 | 0.050 | 0.12  | 2.76%                 | 0.9                         | 0.2 | 0.98 | 0.25 | 1.22  | 26.9%                  |
| River Usk SAC / SSSI                         | 0.223         | 0.730 | 0.03 | 0.022 | 0.06  | 7.61%                 | 1.5                         | 0.3 | 1.53 | 0.32 | 1.86  | 254%                   |
| Severn Estuary (England) SAC                 | --            | -     | 0.01 | 0.009 | 0.02  | -                     | 0.8                         | 0.3 | 0.81 | 0.31 | 1.12  | -                      |
| Severn Estuary (Wales) SAC/SSSI/SPA          | 0.438         | 4.568 | 0.05 | 0.032 | 0.08  | 1.75%                 | 1.1                         | 0.3 | 1.15 | 0.33 | 1.48  | 32.4%                  |

Results are in kilograms equivalent per hectare per year (kgeq/ha/yr).

No data published on specific sulphur critical loads.

The River Usk habitats are not sensitive to acid deposition.



*Table A2-6 Nitrogen deposition results based on 225 mg/Nm<sup>3</sup> NO<sub>x</sub>, 15 mg/Nm<sup>3</sup> NH<sub>3</sub> @ 6%O<sub>2</sub>*

| Habitat Site                                 | Critical Load |        | PC   | PC / CL % |        | Background<br>+<br>in<br>combination | PEC   | PEC / CL % |        |
|--|---------------|--------|------|-----------|--------|--------------------------------------|-------|------------|--------|
|  | Lower         | Higher |      | Lower     | Higher |                                      |       | Lower      | Higher |
| Gwent Levels – Nash and Goldcliff SSSI       | 10            | 15     | 1.59 | 15.9%     | 10.6%  | 10.8 + 0.01                          | 12.40 | 124%       | 82.7%  |
| Gwent levels - St Brides SSSI                | 10            | 15     | 0.65 | 6.55%     | 4.37%  | 12.8 + 0.03                          | 13.48 | 135%       | 89.9%  |
| Gwlyptiroedd Casnewdd/ Newport Wetlands SSSI | 10            | 15     | 1.06 | 10.6%     | 7.04%  | 11.9 + 0.03                          | 12.99 | 130%       | 86.6%  |
| River Usk SAC / SSSI                         | 10            | 20     | 0.46 | 4.64%     | 2.32%  | 21.5 + 0.02                          | 21.98 | 220%       | 110%   |
| Severn Estuary (England) SAC                 | 20            | -      | 0.20 | 1.00%     | -      | 18.6                                 | 19.27 | 96.3%      | -      |
| Severn Estuary (Wales) SAC/SSSI/SPA          | 20            | 30     | 0.67 | 3.33%     | 2.22%  | 18.6 + 0.04                          | 19.31 | 96.5%      | 64.4%  |

Results are in kilograms of nitrogen per hectare per year (kgN/ha/yr)

NRW advises that the River Usk habitats are not sensitive to nitrogen deposition within the assessment radius.



**Table A2-7 Nitrogen deposition results based on 225 mg/Nm<sup>3</sup> NO<sub>x</sub>, 10 mg/Nm<sup>3</sup> NH<sub>3</sub> @ 6%O<sub>2</sub>**

| Habitat Site                                 | Critical Load |        | PC   | PC / CL % |        | Background<br>+<br>in<br>combination | PEC   | PEC / CL % |        |
|--|---------------|--------|------|-----------|--------|--------------------------------------|-------|------------|--------|
|  | Lower         | Higher |      | Lower     | Higher |                                      |       | Lower      | Higher |
| Gwent Levels – Nash and Goldcliff SSSI       | 10            | 15     | 0.89 | 8.95%     | 5.96%  | 10.8 + 0.01                          | 11.70 | 117%       | 78.0%  |
| Gwent levels - St Brides SSSI                | 10            | 15     | 0.35 | 3.51%     | 2.34%  | 12.8 + 0.03                          | 13.18 | 132%       | 87.9%  |
| Gwlyptiroedd Casnewdd/ Newport Wetlands SSSI | 10            | 15     | 0.58 | 5.84%     | 3.89%  | 11.9 + 0.03                          | 12.51 | 125%       | 83.4%  |
| River Usk SAC / SSSI                         | 10            | 20     | 0.26 | 2.62%     | 1.31%  | 21.5 + 0.02                          | 21.77 | 218%       | 109%   |
| Severn Estuary (England) SAC                 | 20            | -      | 0.12 | 0.59%     |        | 18.6                                 | 18.72 | 93.6%      | -      |
| Severn Estuary (Wales) SAC/SSSI/SPA          | 20            | 30     | 0.38 | 1.91%     | 1.27%  | 18.6 + 0.04                          | 19.02 | 95.1%      | 63.4%  |

Results are in kilograms of nitrogen per hectare per year (kgN/ha/yr)

NRW advises that the River Usk habitats are not sensitive to nitrogen deposition within the assessment radius.



*Table A2-8 Nitrogen deposition results based on 180 mg/Nm<sup>3</sup> NO<sub>x</sub>, 10 mg/Nm<sup>3</sup> NH<sub>3</sub> and @ 6%O<sub>2</sub>*

| Habitat Site                                 | Critical Load |        | PC   | PC / CL % |        | Background<br>+<br>in<br>combination | PEC   | PEC / CL % |        |
|--|---------------|--------|------|-----------|--------|--------------------------------------|-------|------------|--------|
|  | Lower         | Higher |      | Lower     | Higher |                                      |       | Lower      | Higher |
| Gwent Levels – Nash and Goldcliff SSSI       | 10            | 15     | 0.83 | 8.26%     | 5.50%  | 10.8 + 0.01                          | 11.64 | 116%       | 77.6%  |
| Gwent levels - St Brides SSSI                | 10            | 15     | 0.32 | 3.24%     | 2.16%  | 12.8 + 0.03                          | 13.15 | 132%       | 87.7%  |
| Gwlyptiroedd Casnewdd/ Newport Wetlands SSSI | 10            | 15     | 0.54 | 5.39%     | 3.59%  | 11.9 + 0.03                          | 12.47 | 125%       | 83.1%  |
| River Usk SAC / SSSI                         | 10            | 20     | 0.24 | 2.42%     | 1.21%  | 21.5 + 0.02                          | 21.75 | 218%       | 109%   |
| Severn Estuary (England) SAC                 | 20            | -      | 0.11 | 0.54%     | -      | 18.6                                 | 18.71 | 93.5%      | -      |
| Severn Estuary (Wales) SAC/SSSI/SPA          | 20            | 30     | 0.35 | 1.77%     | 1.17%  | 18.6 + 0.04                          | 18.99 | 95.0%      | 63.3%  |

Results are in kilograms of nitrogen per hectare per year (kgN/ha/yr)

NRW advises that the River Usk habitats are not sensitive to nitrogen deposition within the assessment radius.

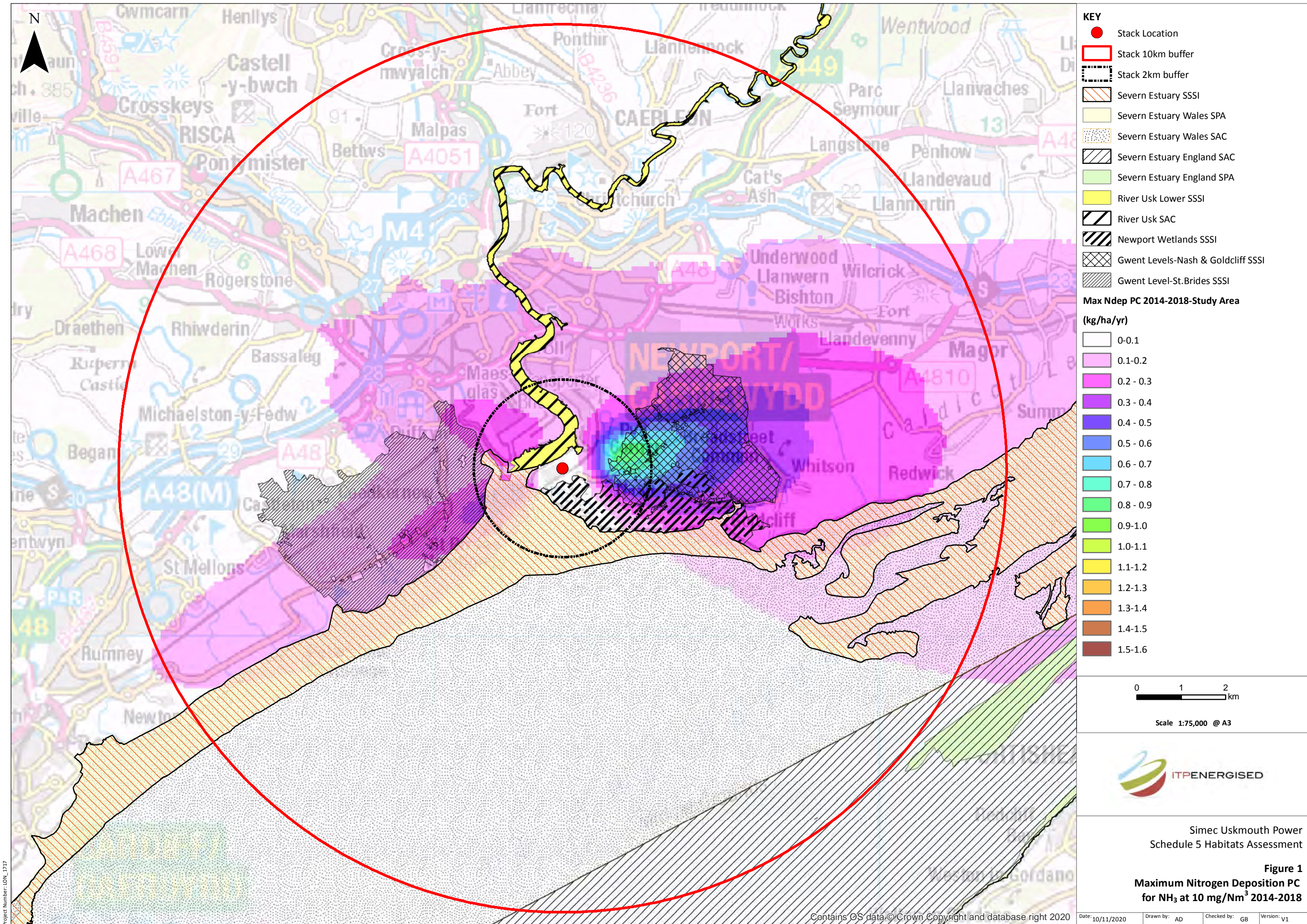




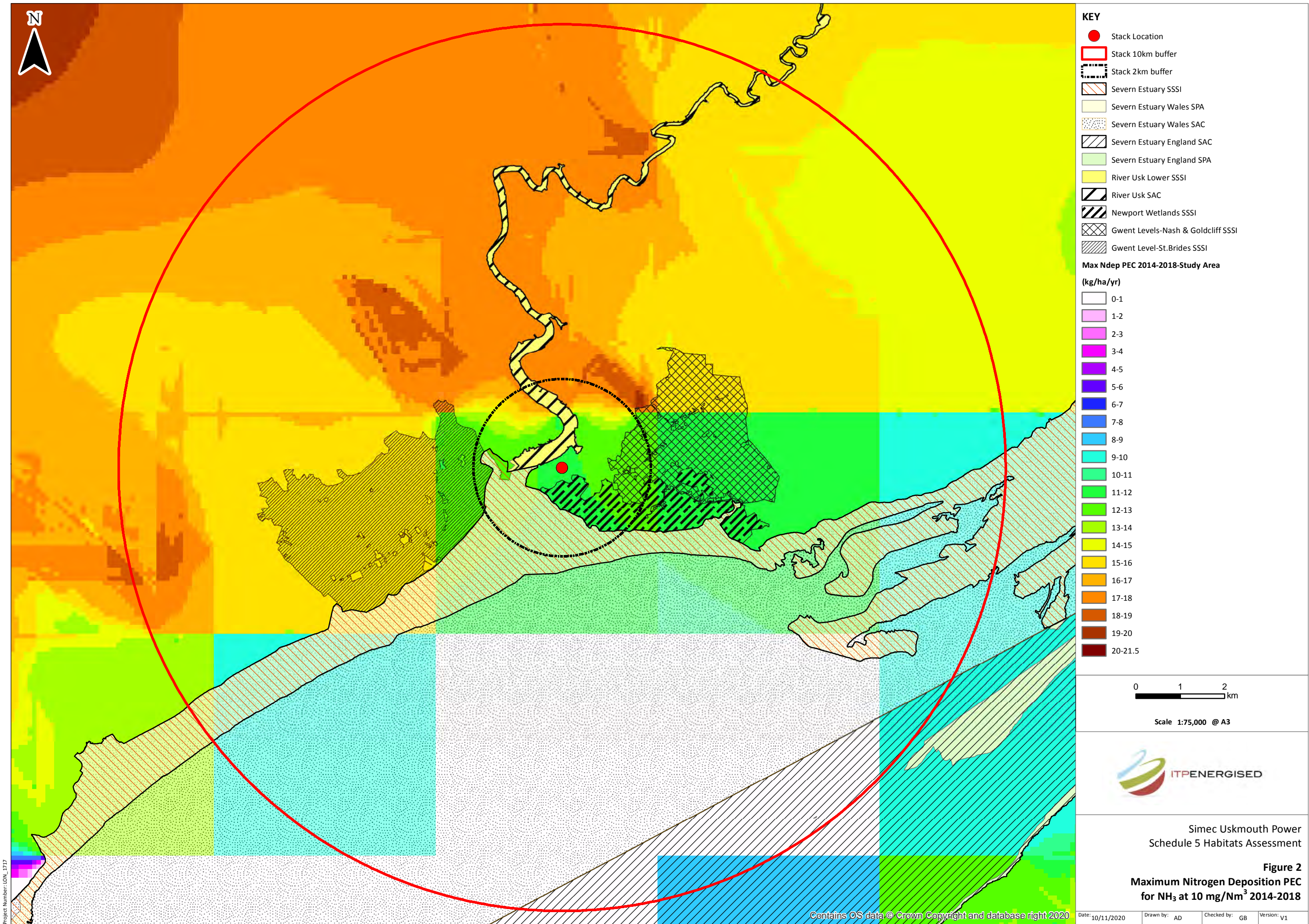


# Figures

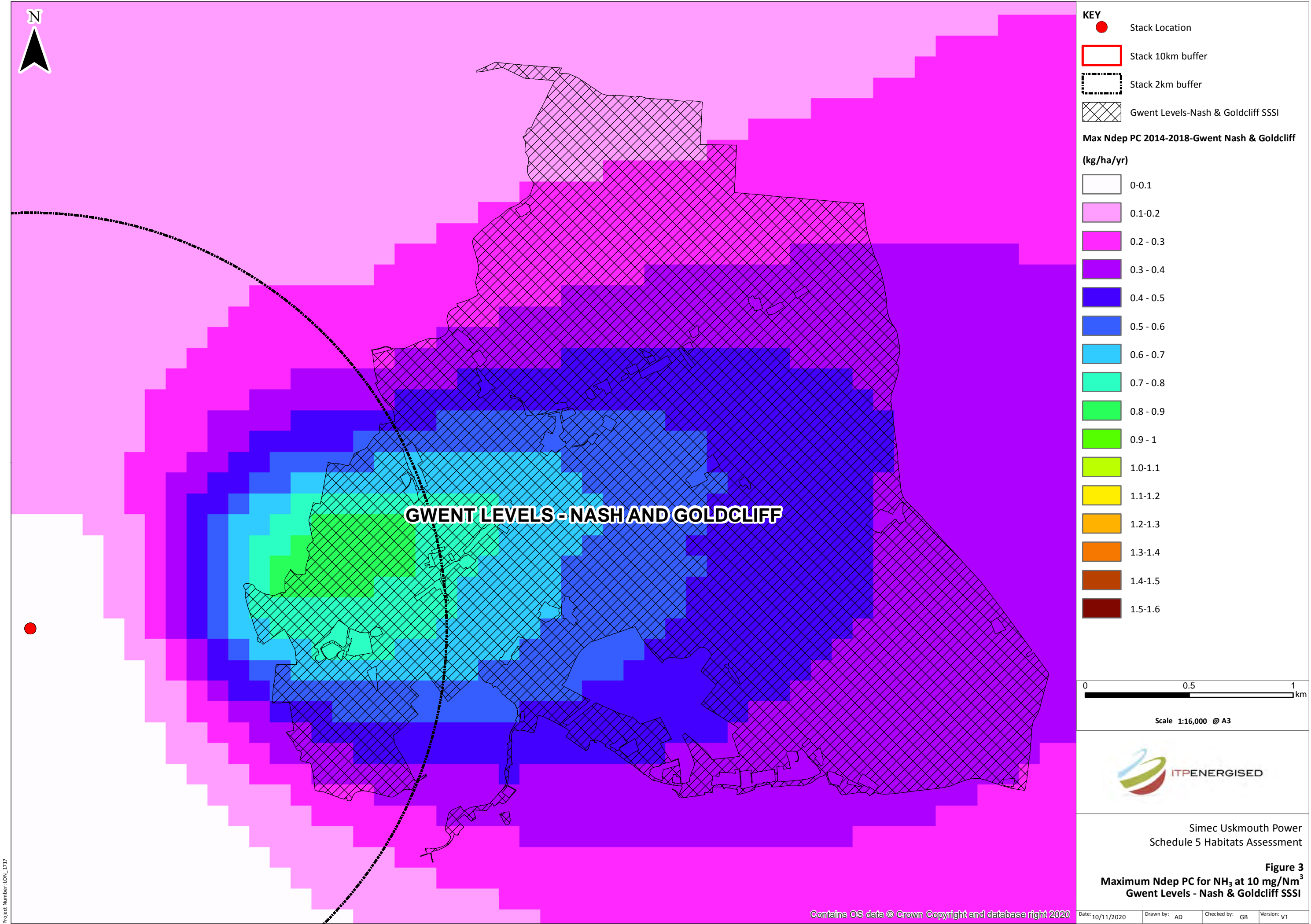




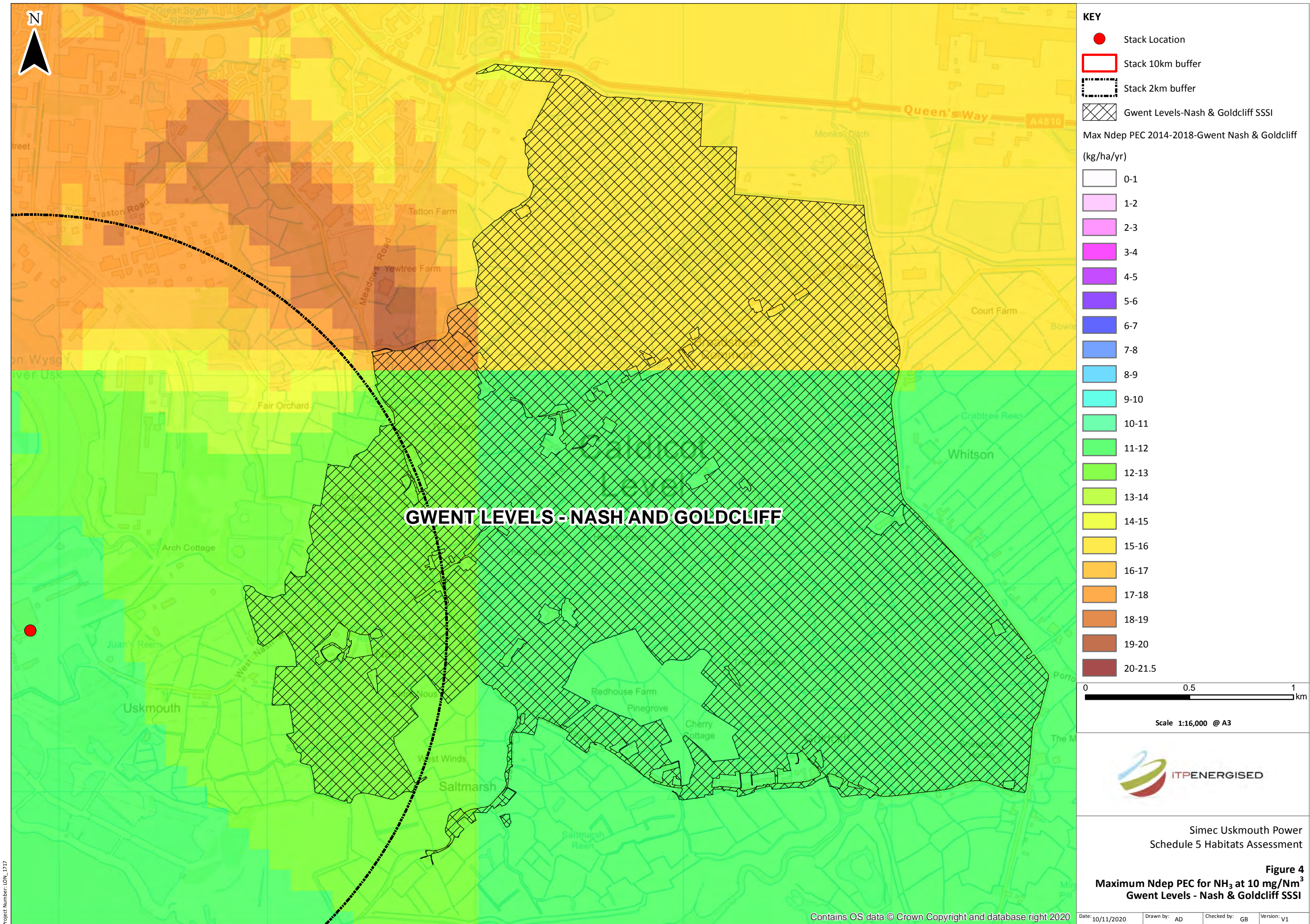




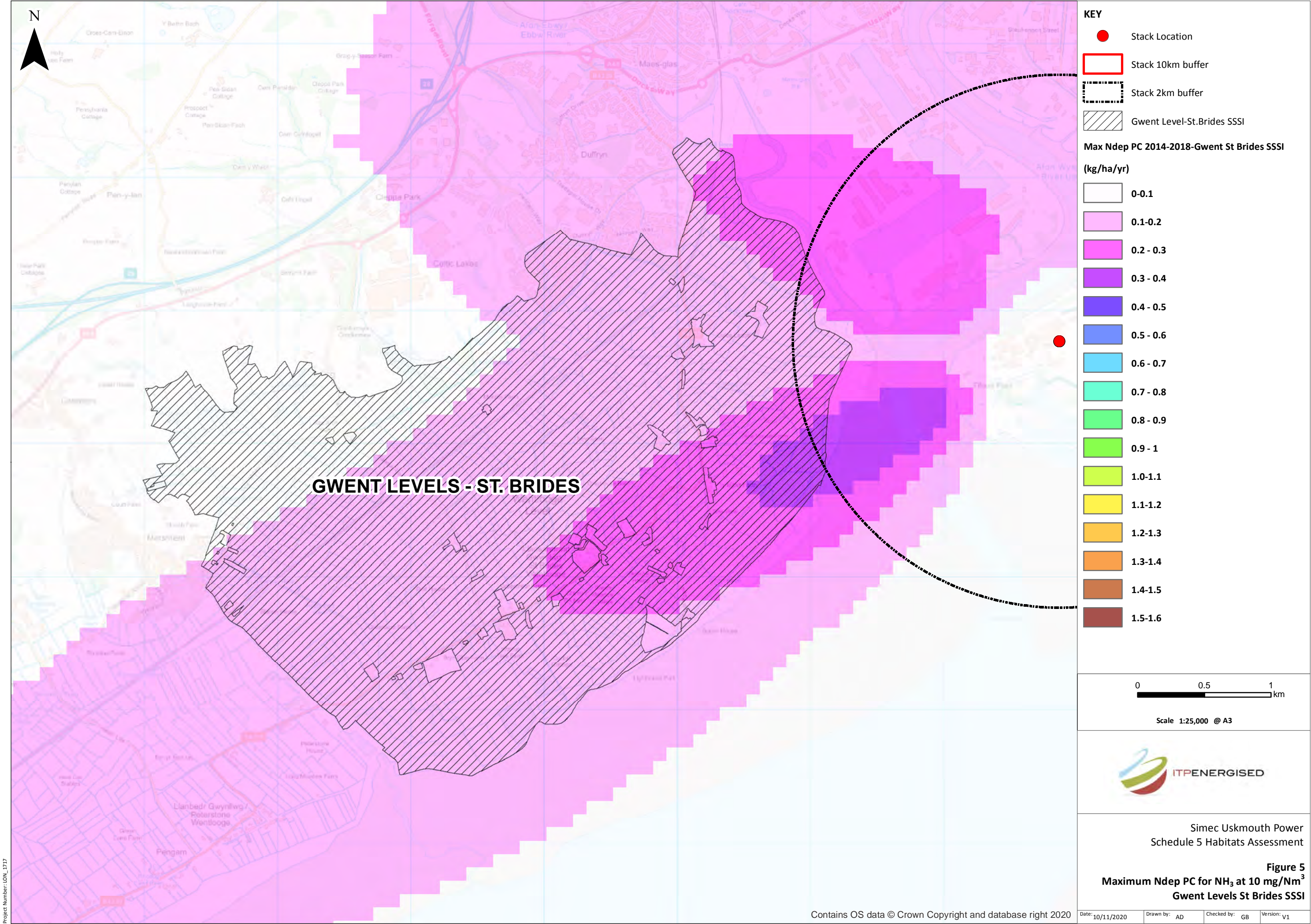




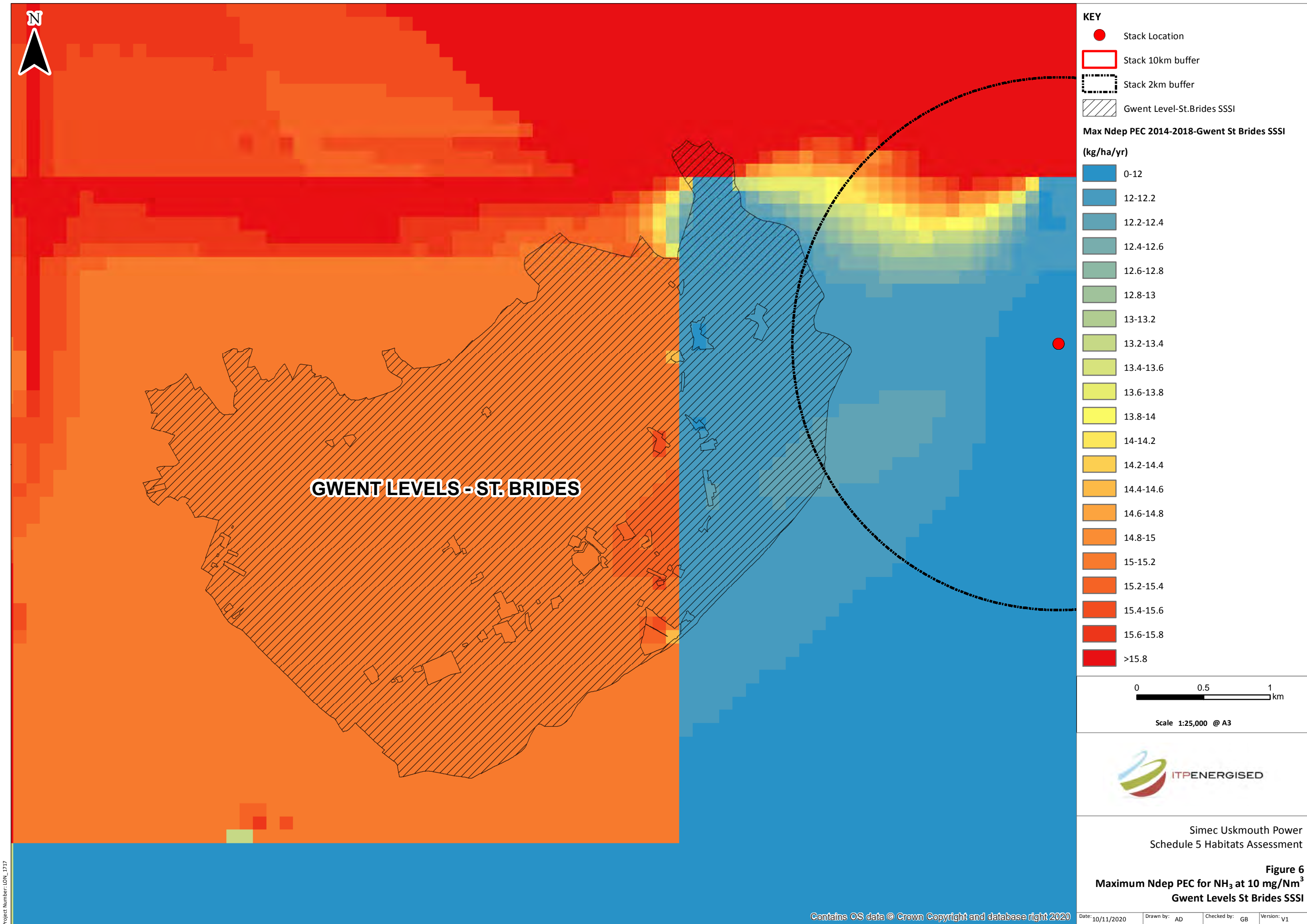




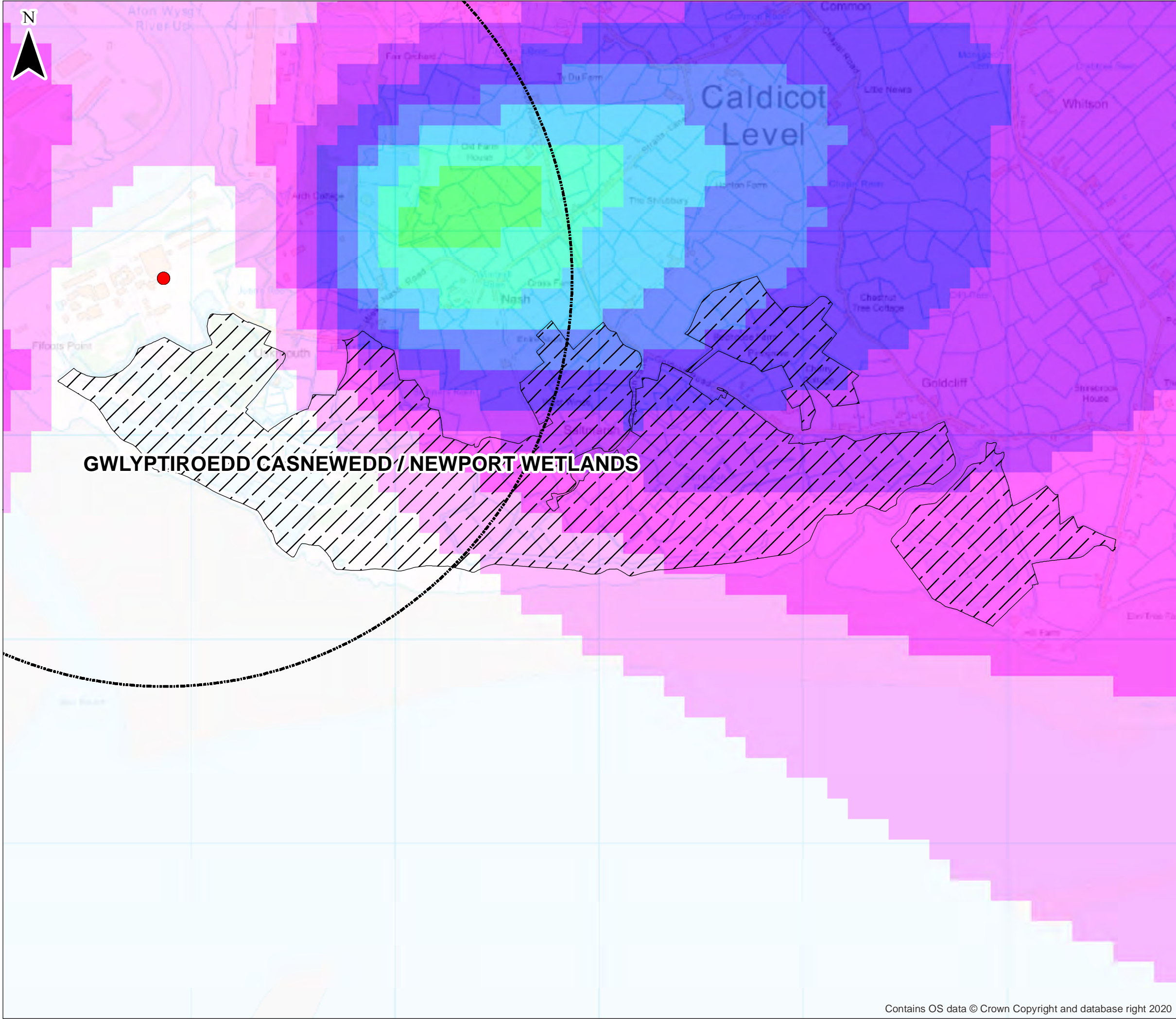












**KEY**

Stack Location

Stack 10km buffer

Stack 2km buffer

Newport Wetlands SSSI

**Max Ndep PC 2014-2018-Newport Wetlands SSSI**  
**(kg/ha/yr)**

0-0.1

0.1-0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

0.5 - 0.6

0.6 - 0.7

0.7 - 0.8

0.8 - 0.9

0.9-1.0

1.0-1.1

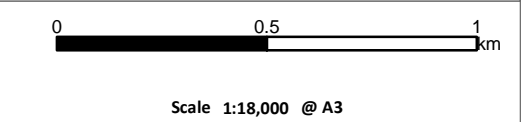
1.1-1.2

1.2-1.3

1.3-1.4

1.4-1.5

1.5-1.6

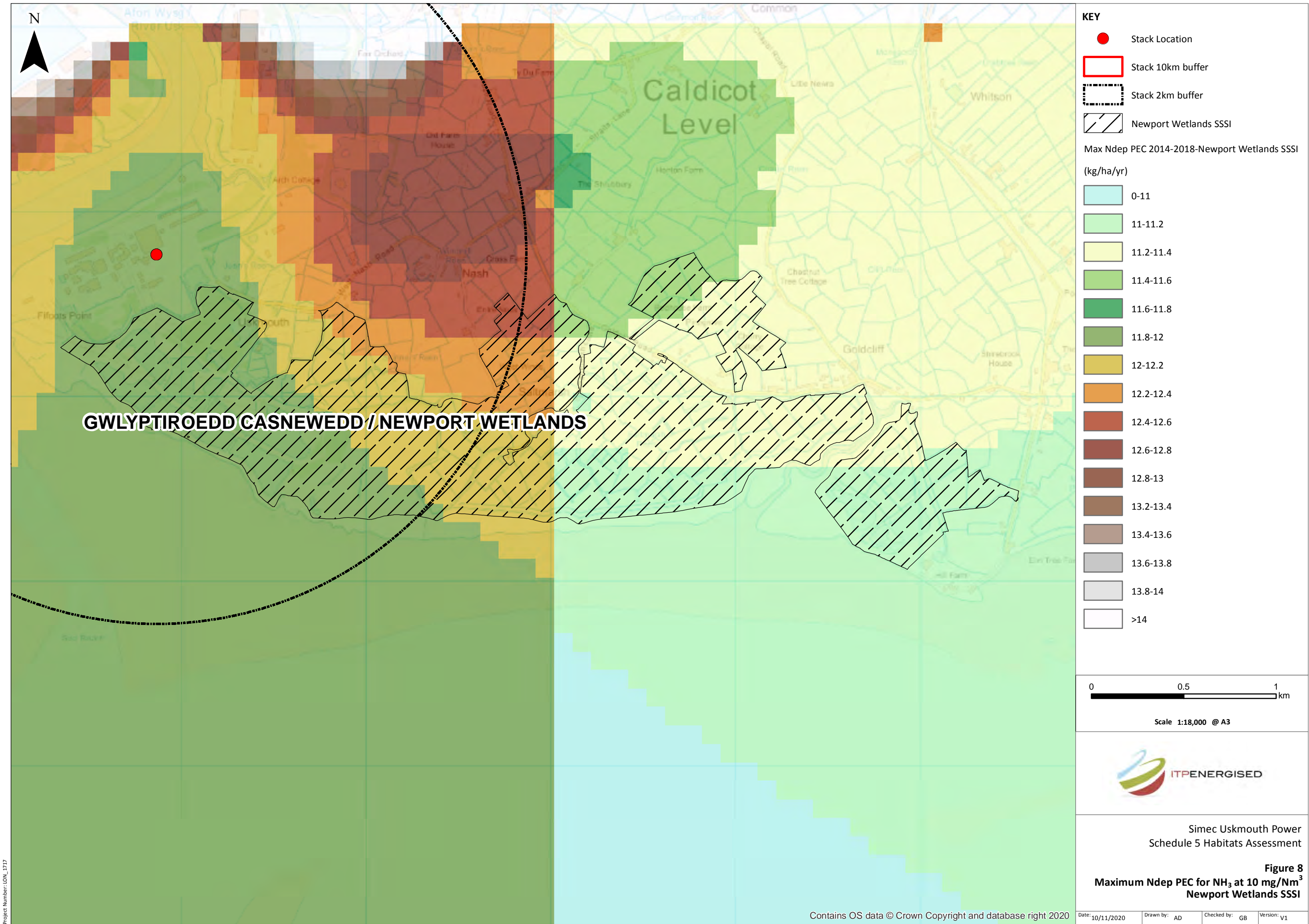


Simec Uskmouth Power  
Schedule 5 Habitats Assessment

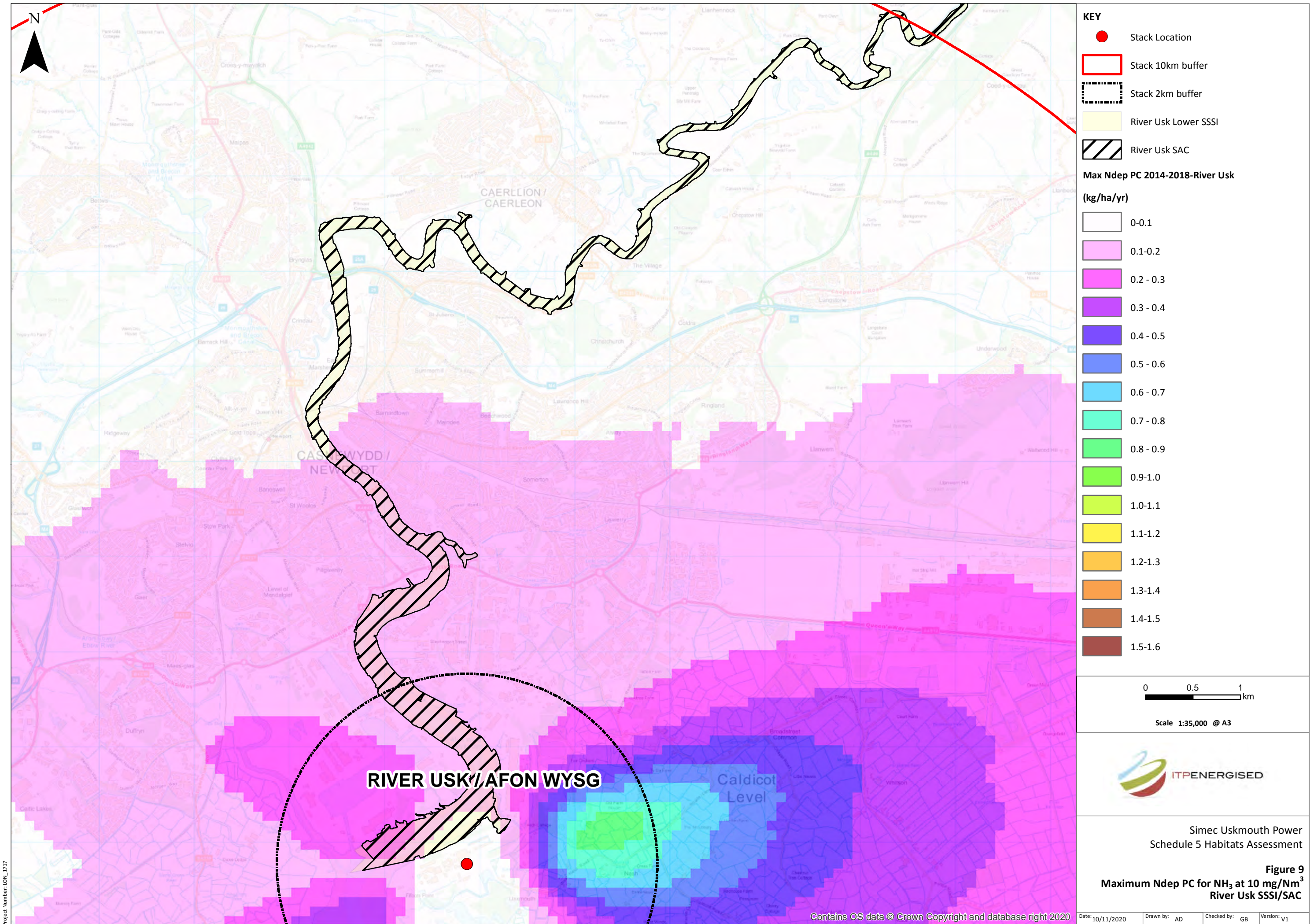
**Figure 7**  
**Maximum Ndep PC for NH<sub>3</sub> at 10 mg/Nm<sup>3</sup>**  
**Newport Wetlands SSSI**

|                  |              |                |             |
|------------------|--------------|----------------|-------------|
| Date: 10/11/2020 | Drawn by: AD | Checked by: GB | Version: v1 |
|------------------|--------------|----------------|-------------|

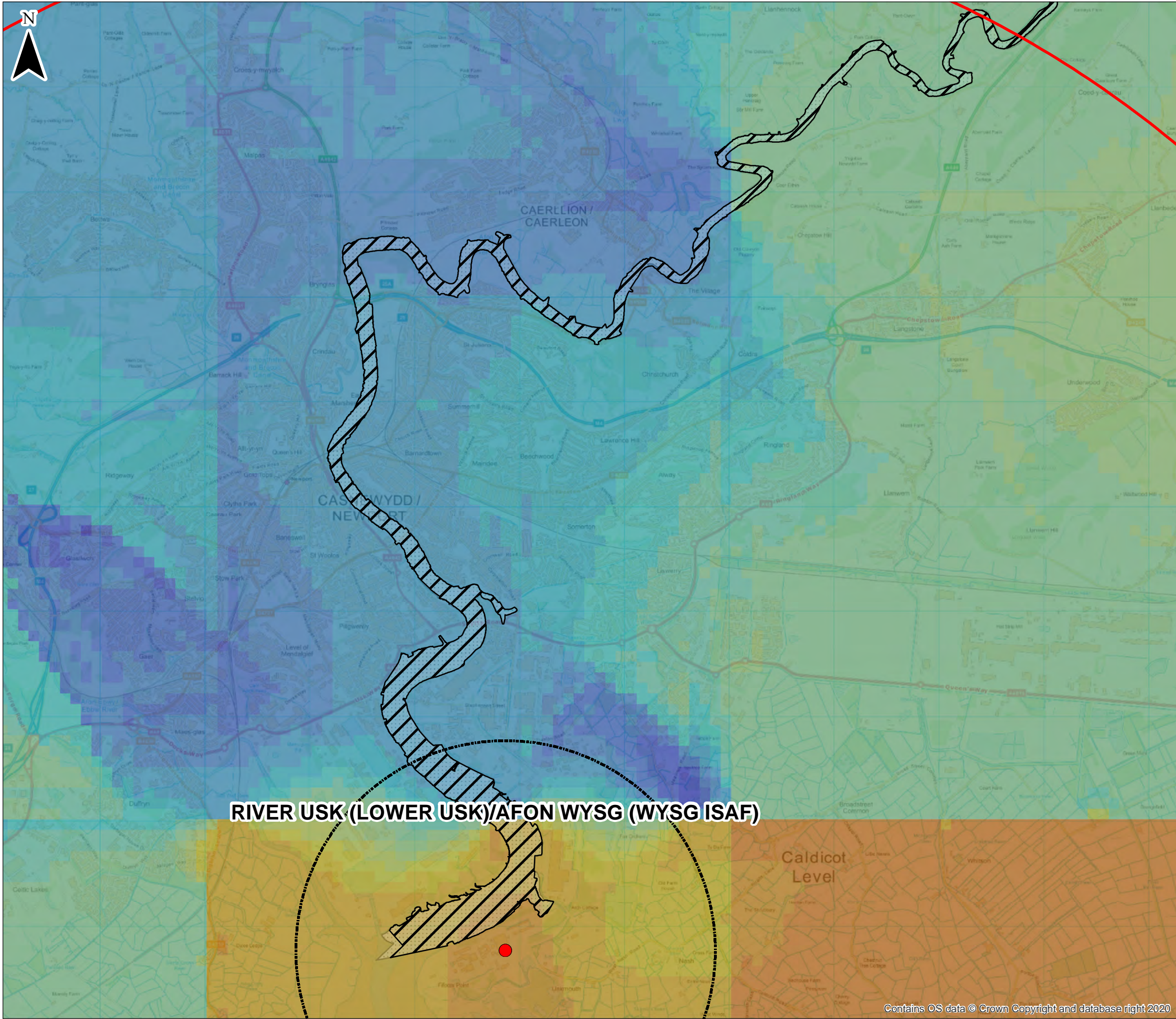












KEY

- Stack Location
- Stack 10km buffer
- Stack 2km buffer
- River Usk Lower SSSI
- River Usk SAC

Max Ndep PEC 2014-2018-River Usk

(kg/ha/yr)

- 0-10
- 10-10.5
- 10.5-11
- 11-11.5
- 11.5-12
- 12-12.5
- 12.5-13
- 13-13.5
- 13.5-14
- 14-14.5
- 14.5-15
- 15-15.5
- 15.5-16
- 16-16.5
- 16.5-17
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- 18.5-19
- 19-19.5
- 19.5-20

0 0.5 1 km

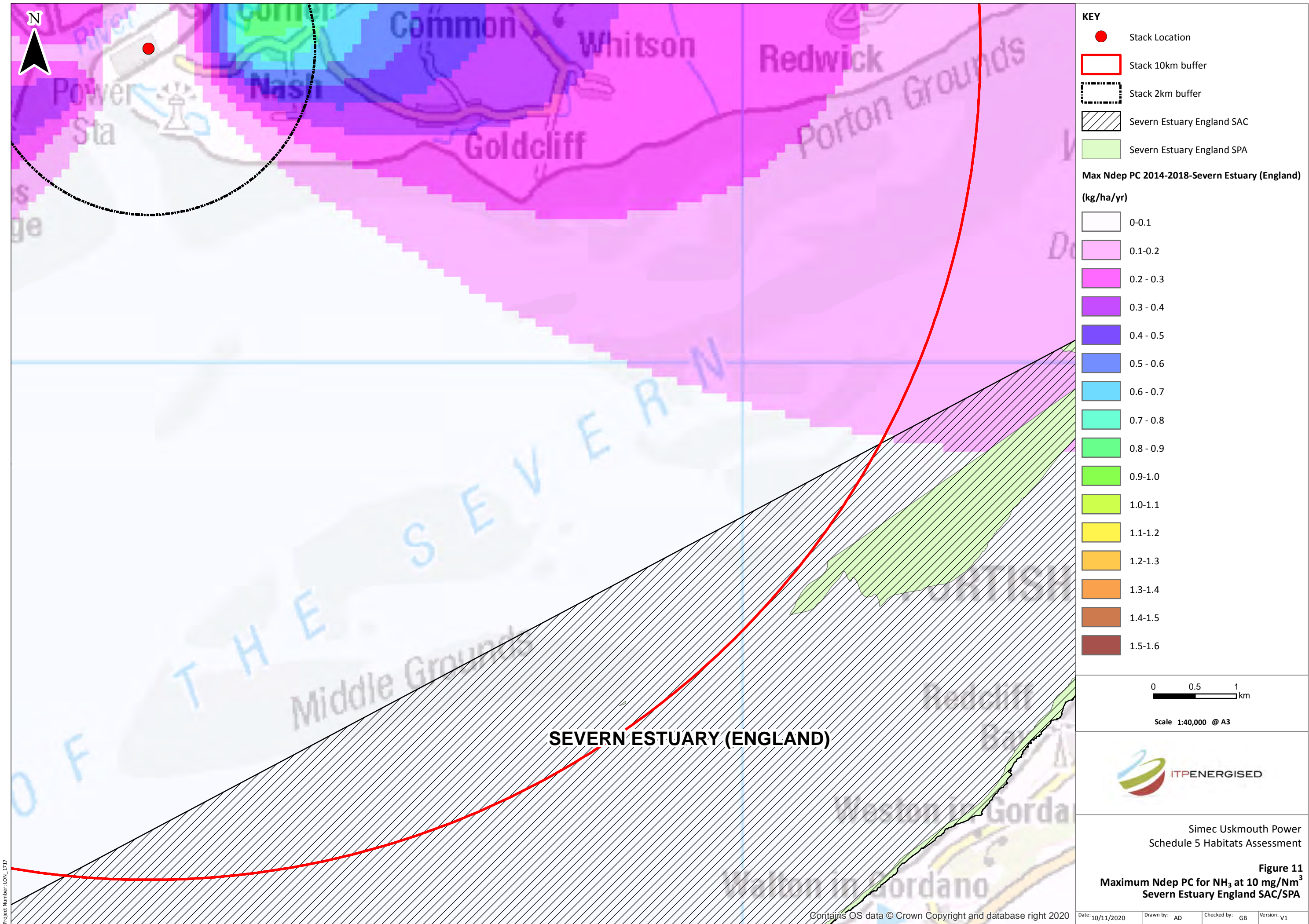
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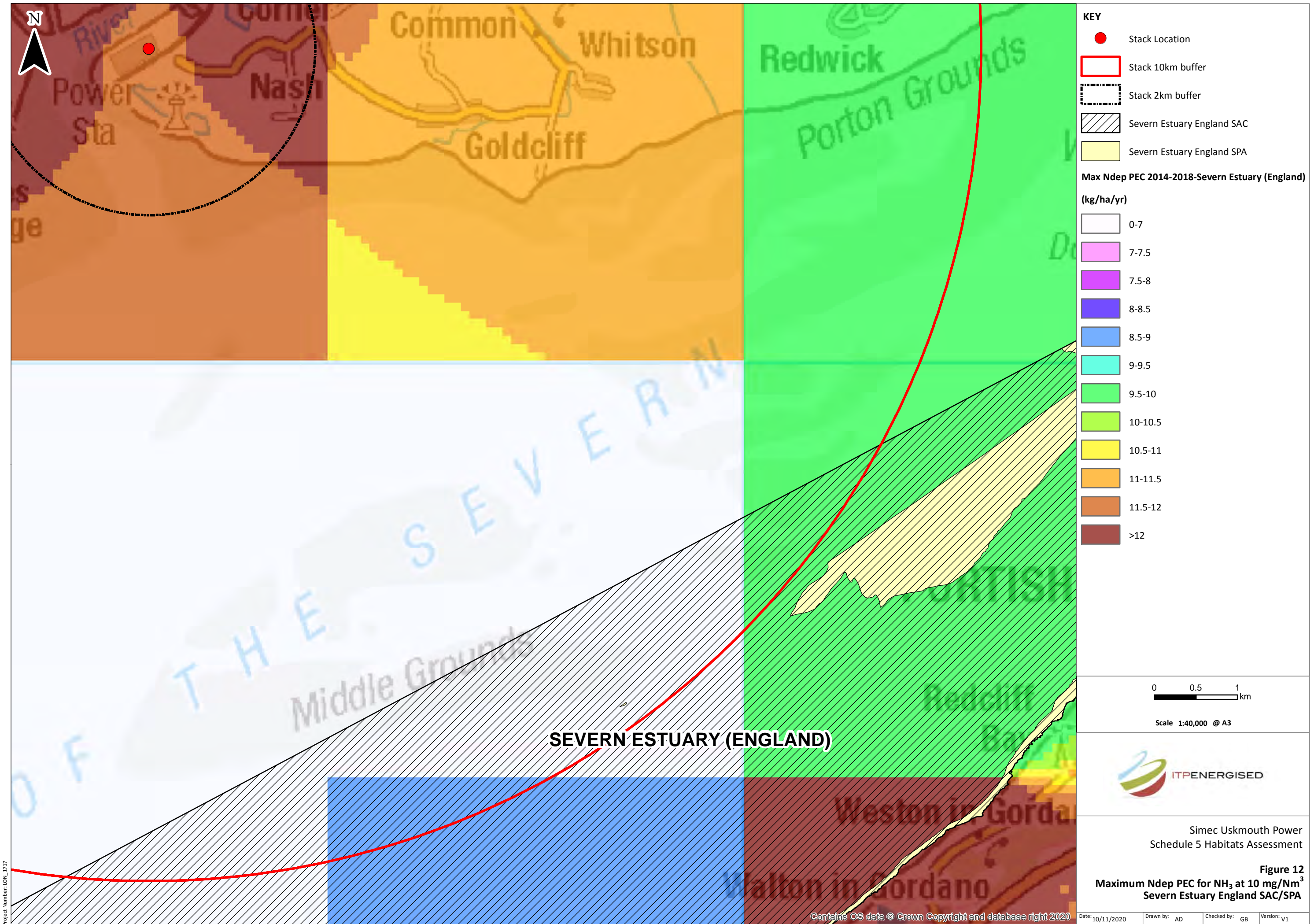


Simec Uskmouth Power  
Schedule 5 Habitats Assessment

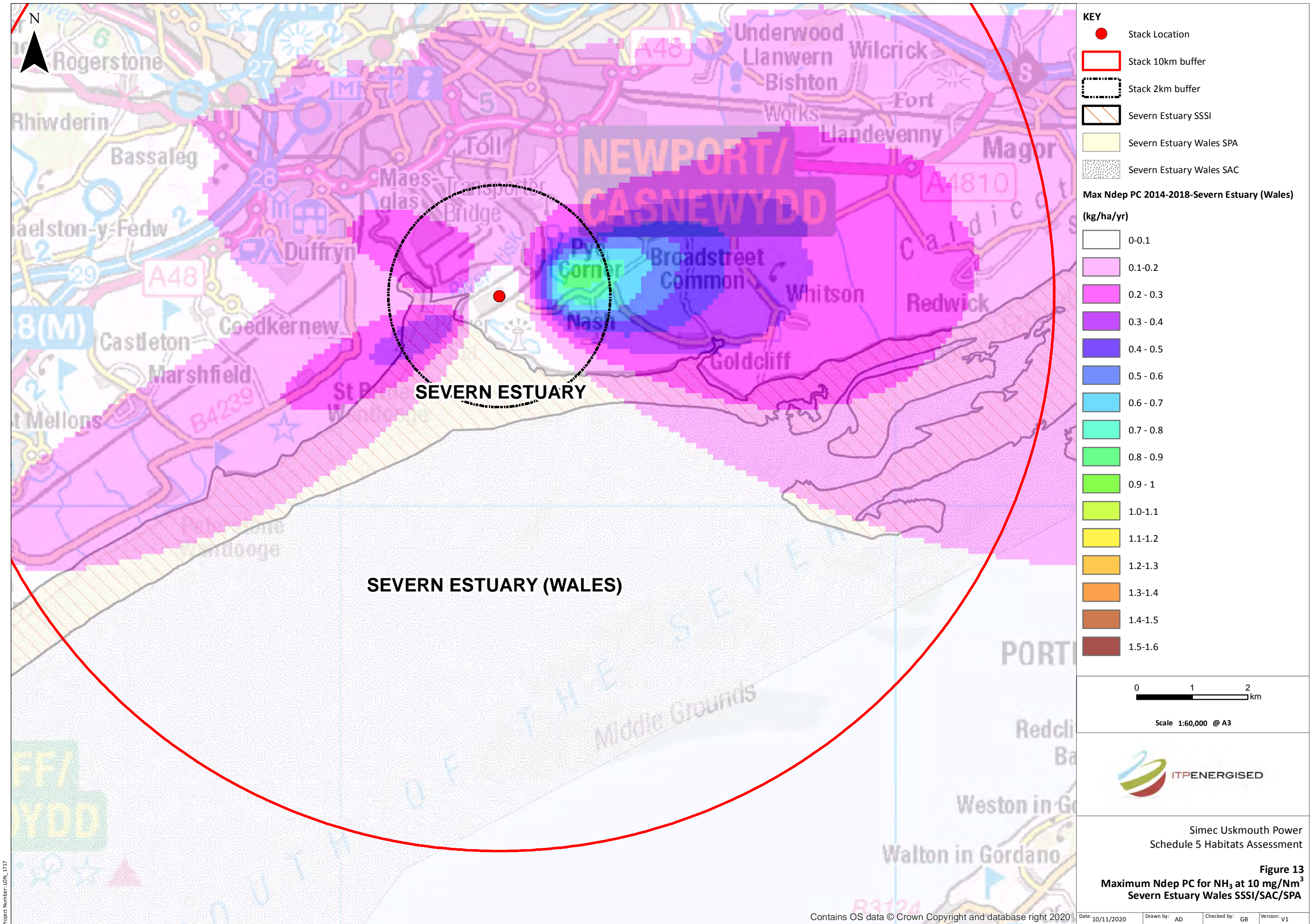
Figure 10  
Maximum Ndep PEC for NH<sub>3</sub> at 10 mg/Nm<sup>3</sup>  
River Usk SSSI/SAC



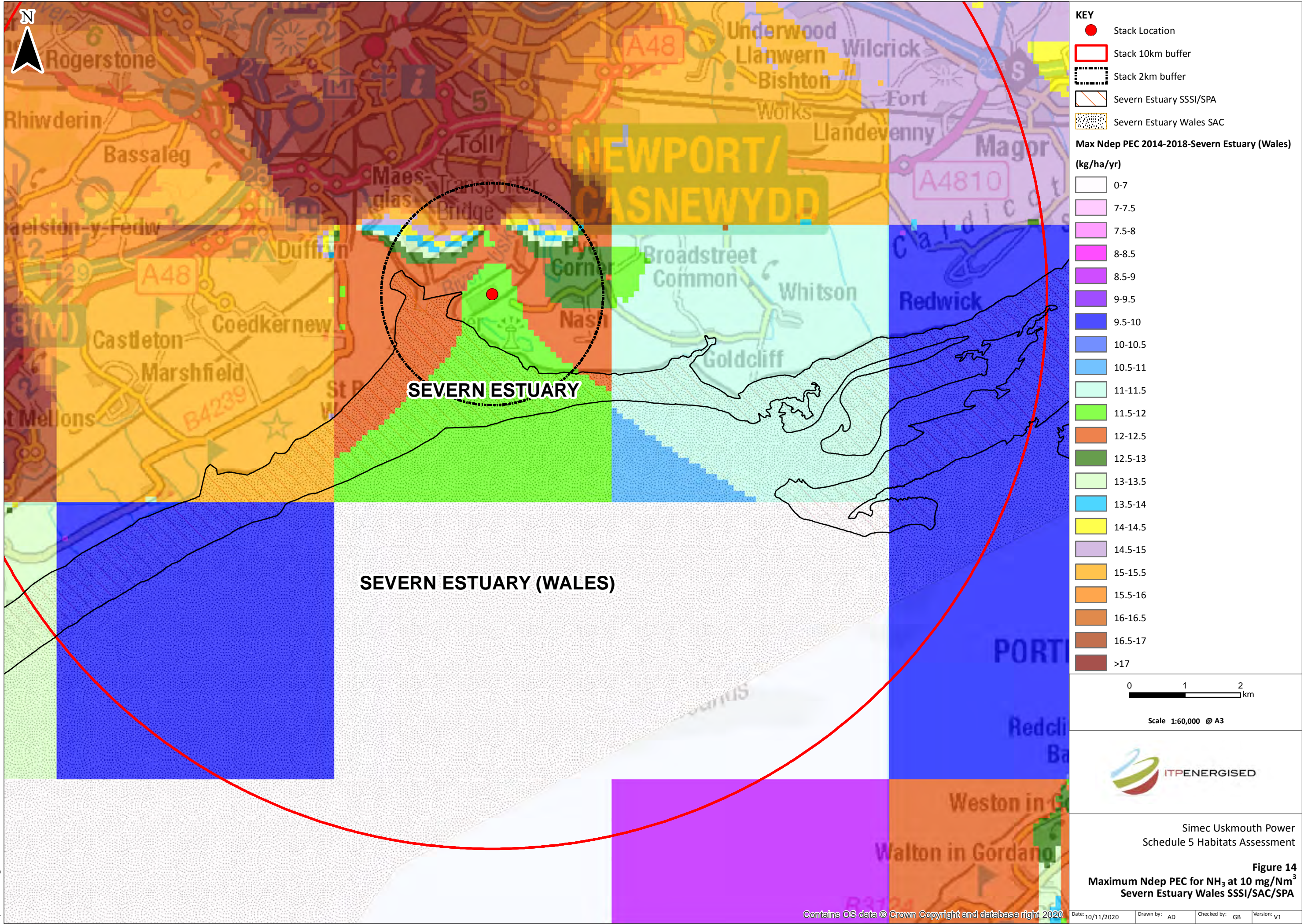




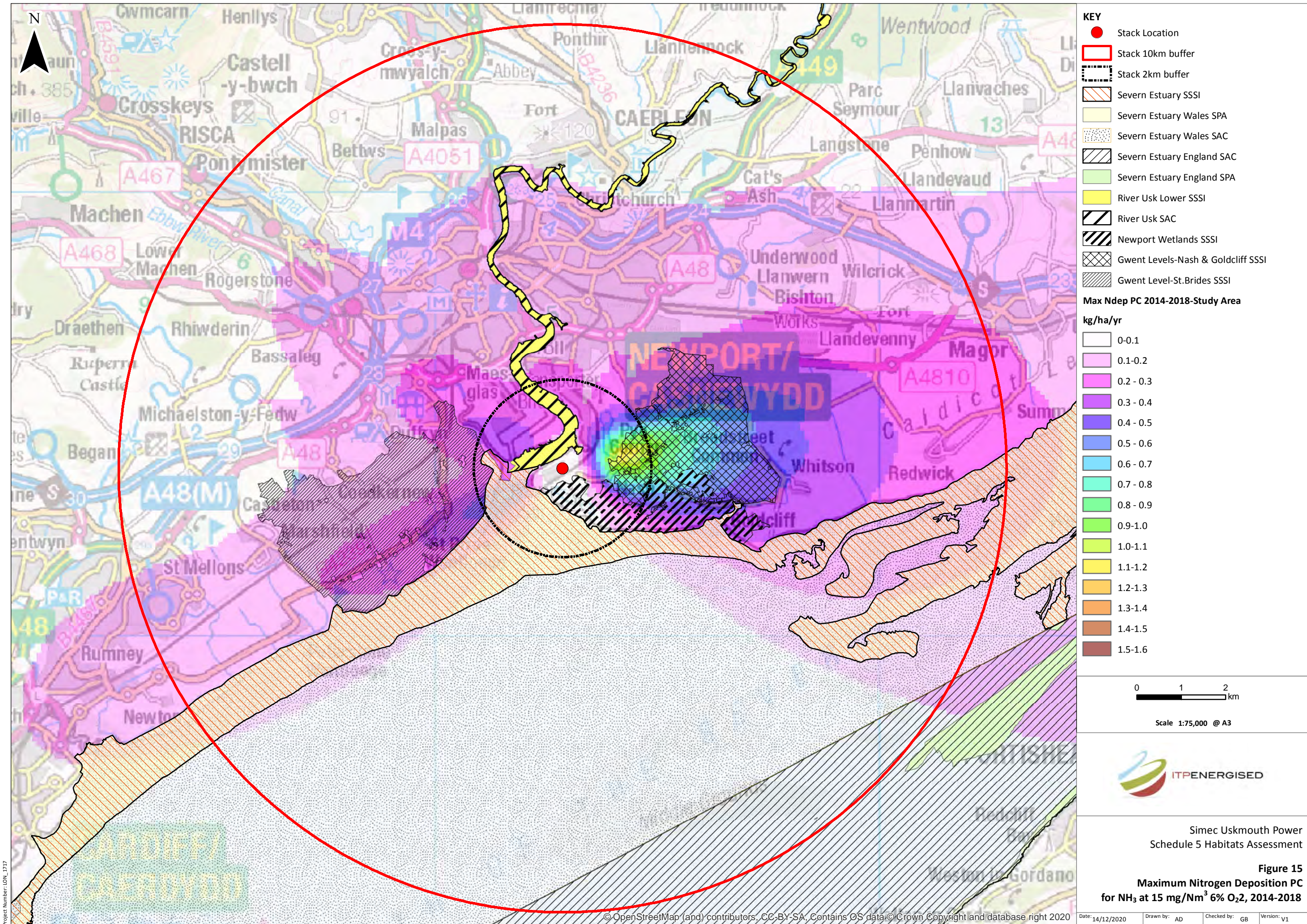




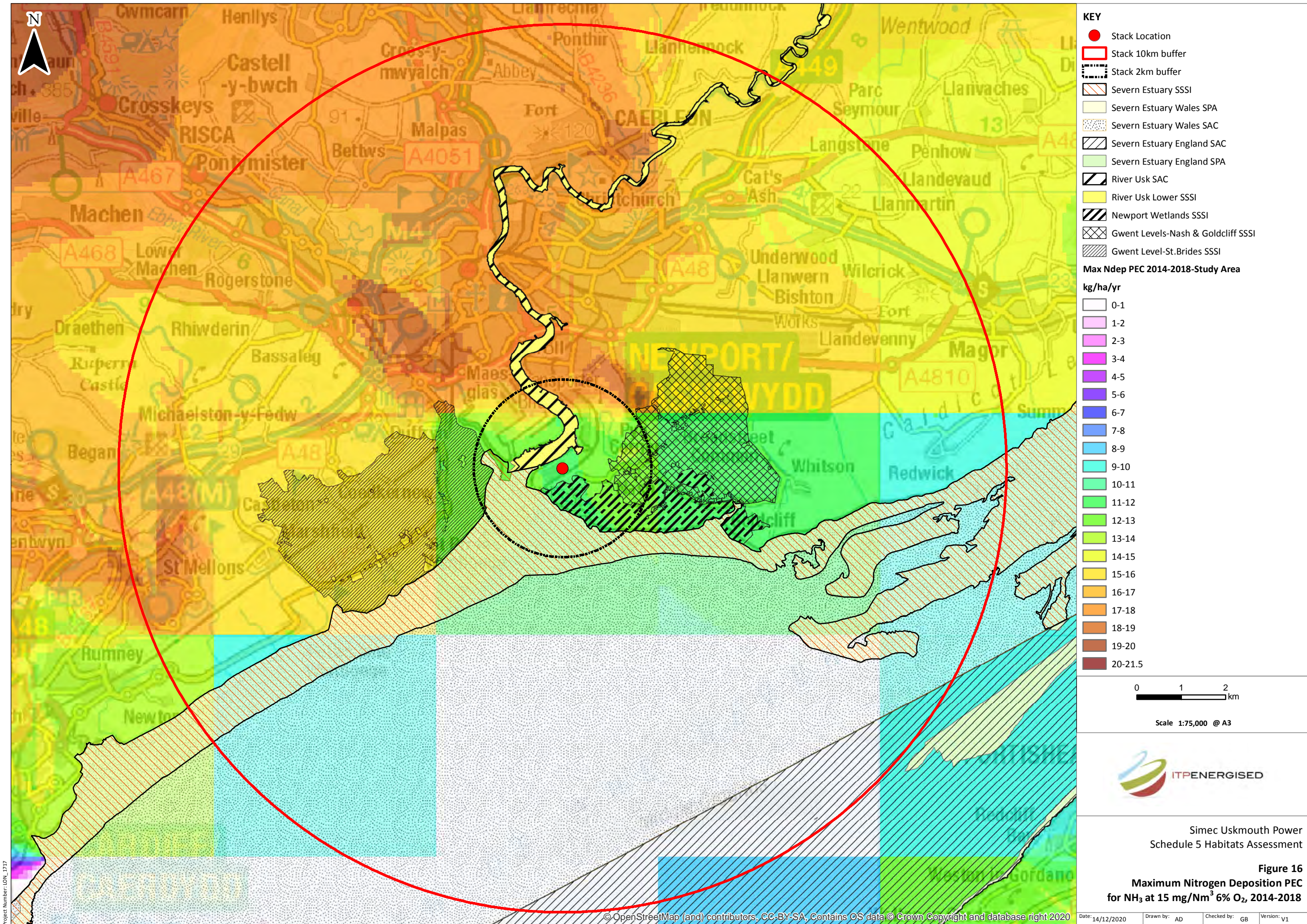




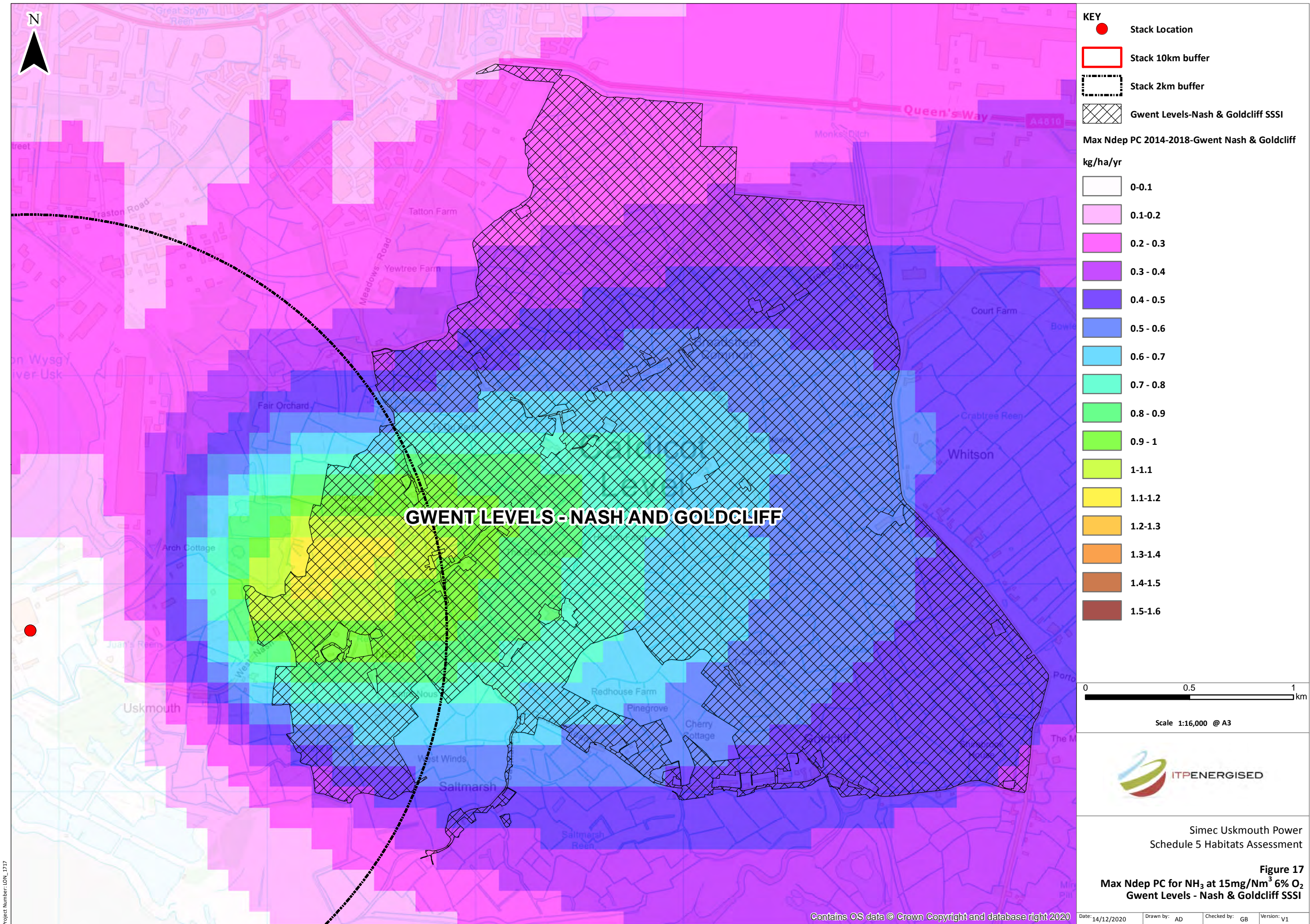




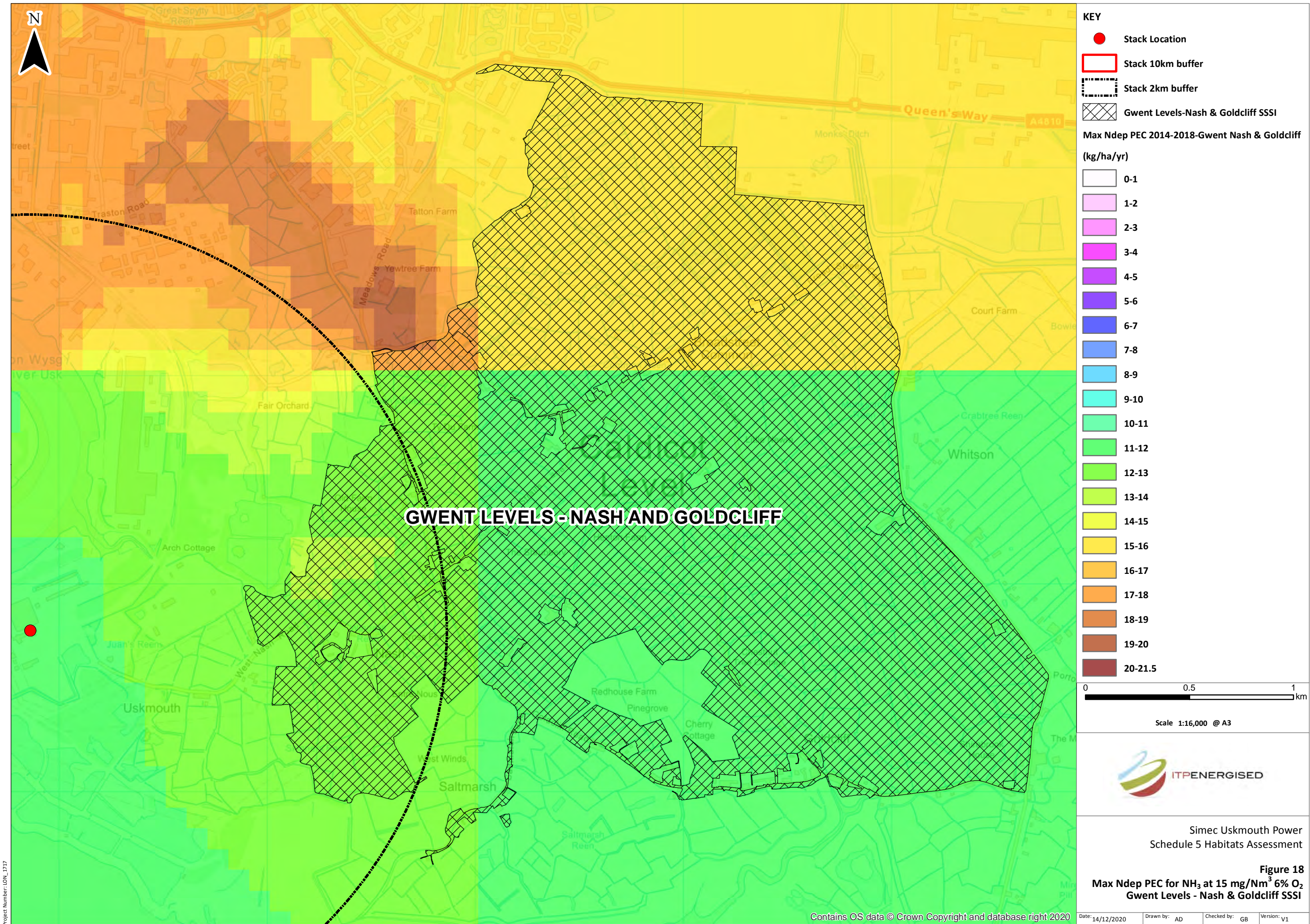




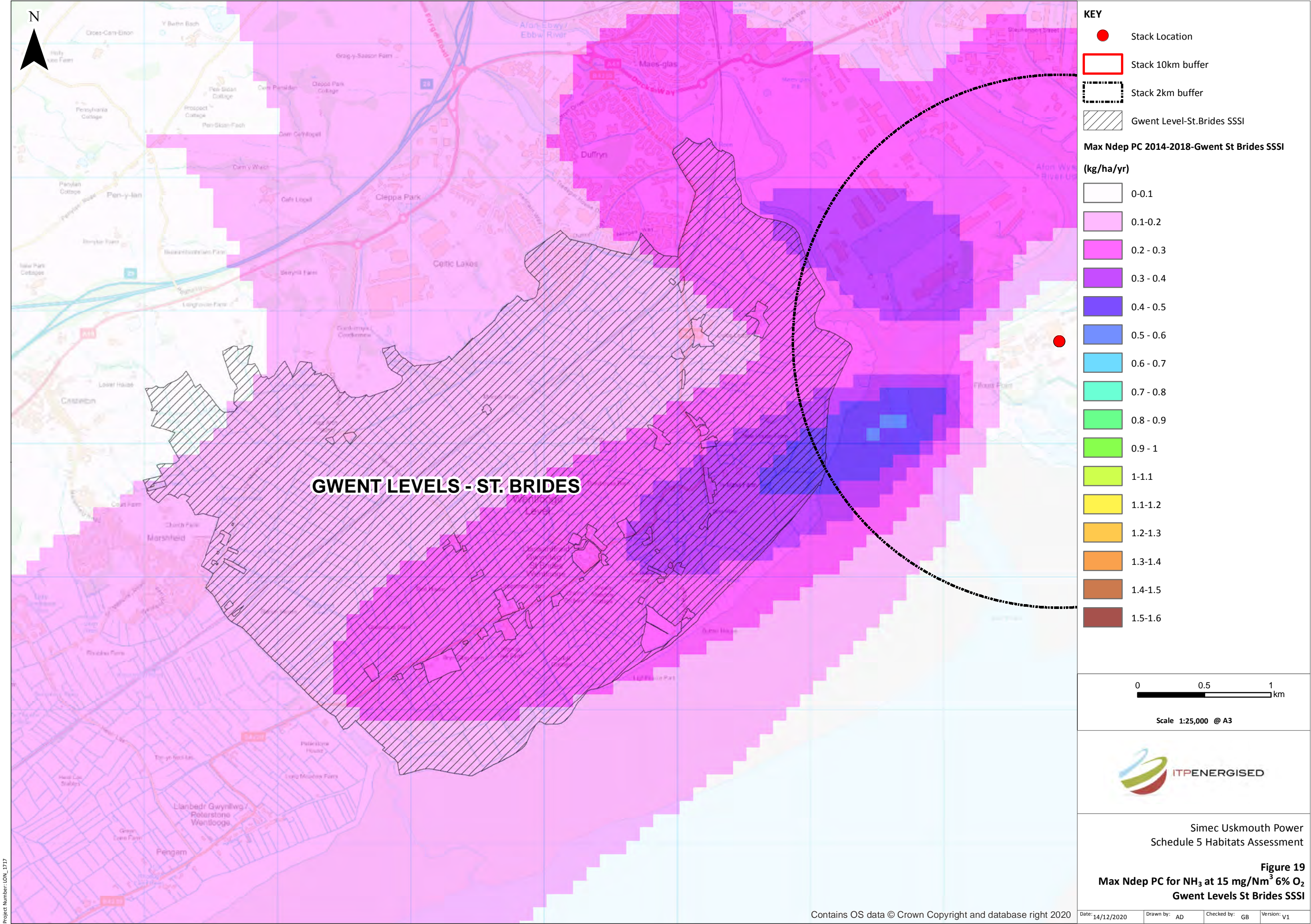




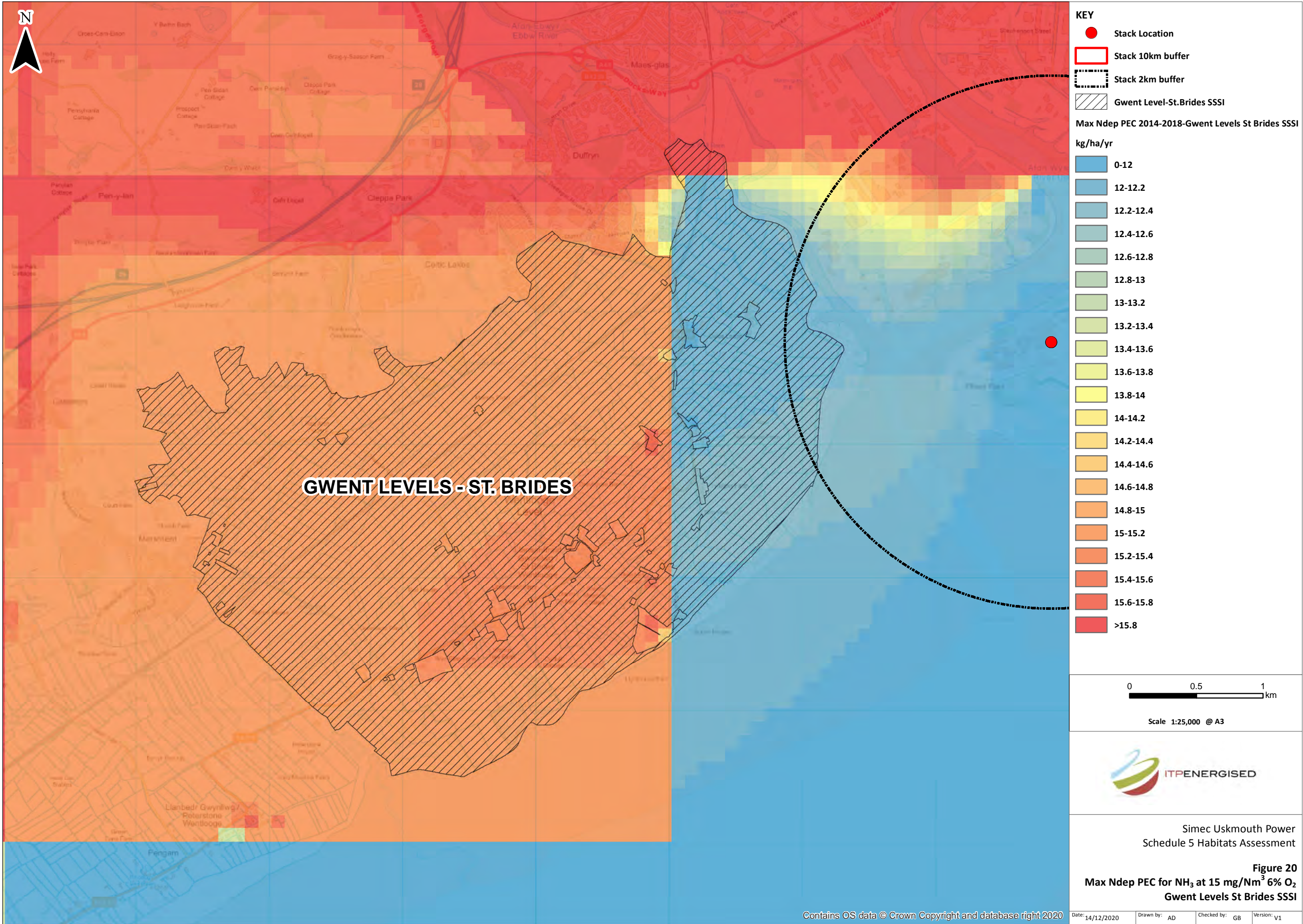




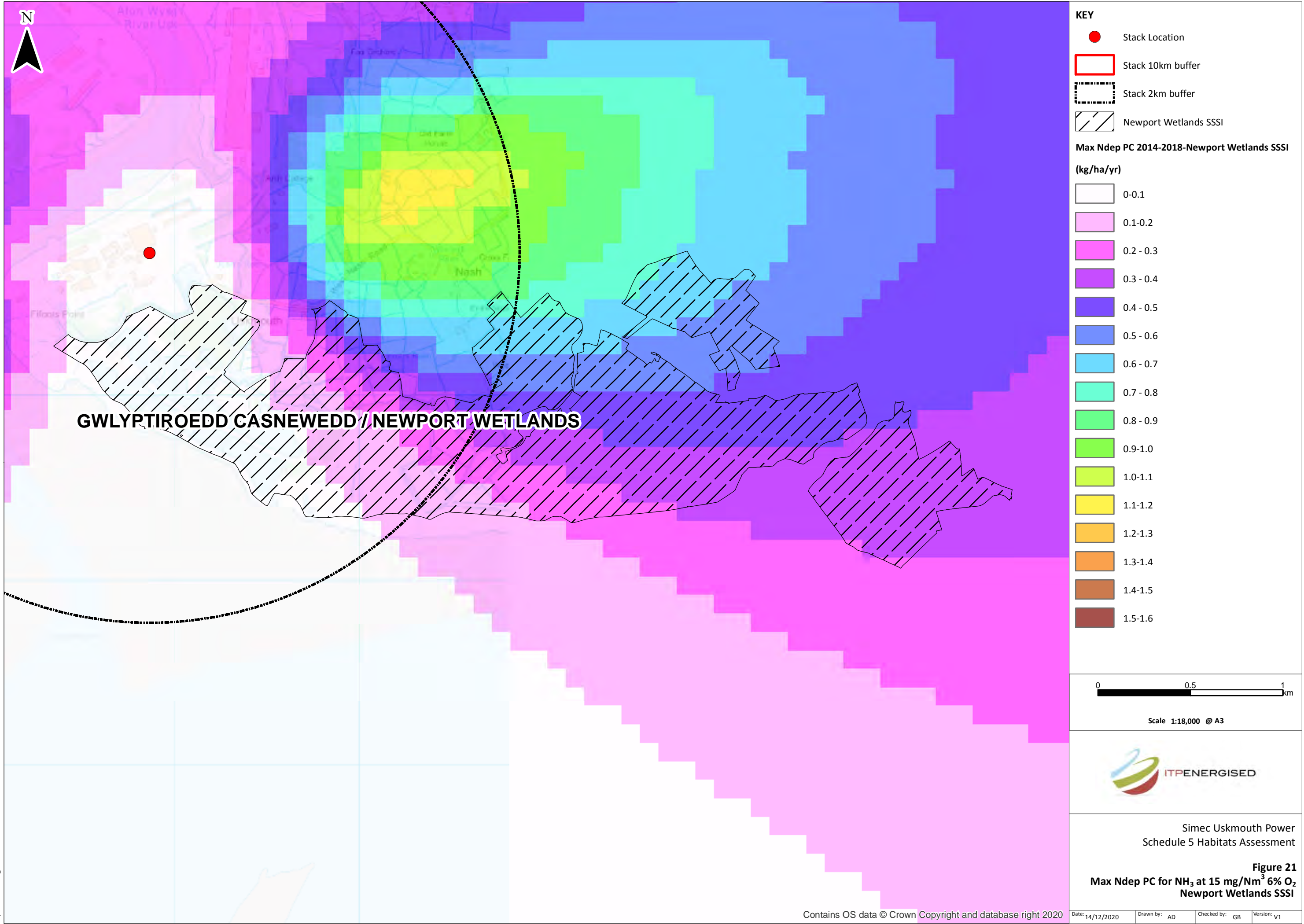


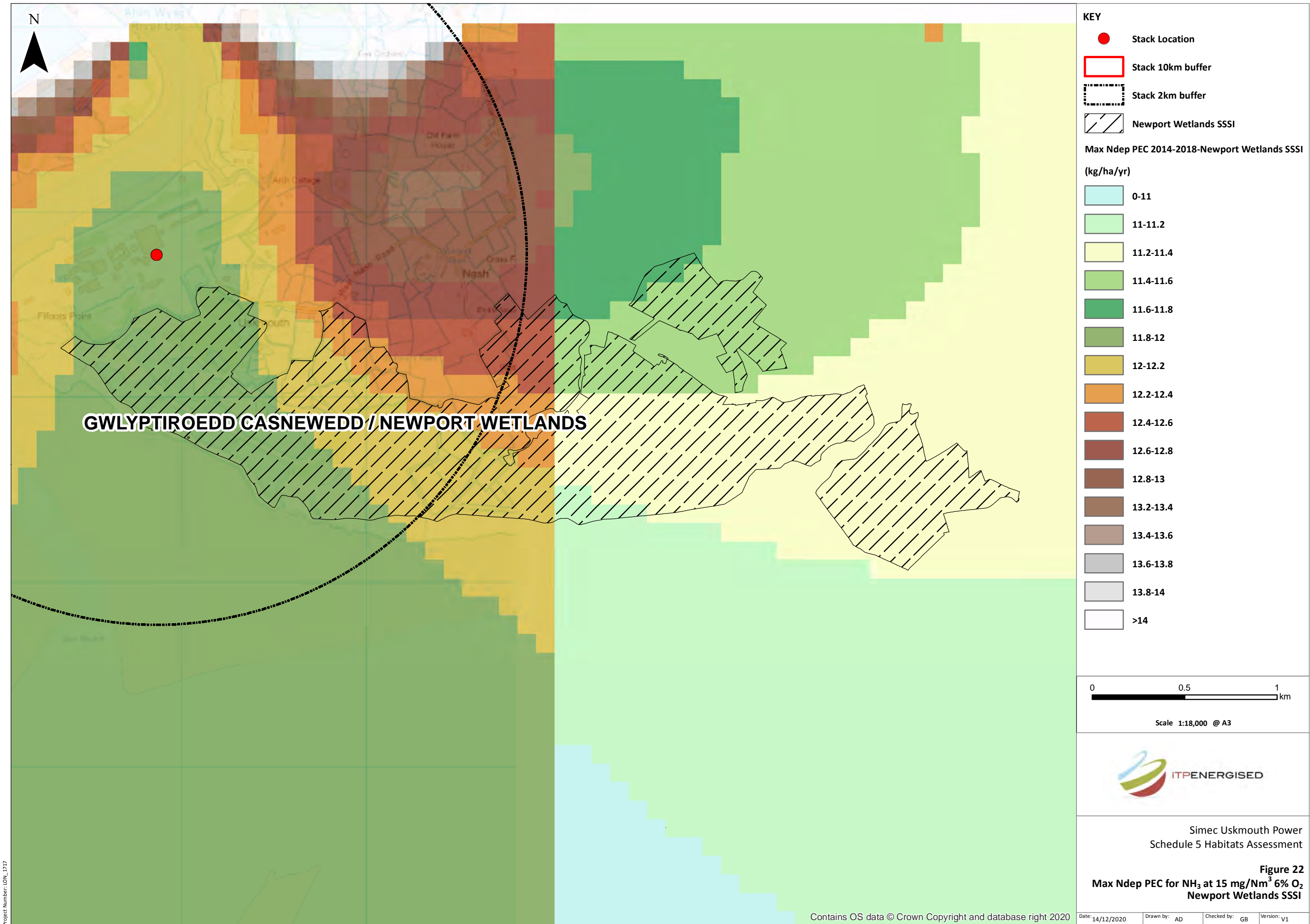




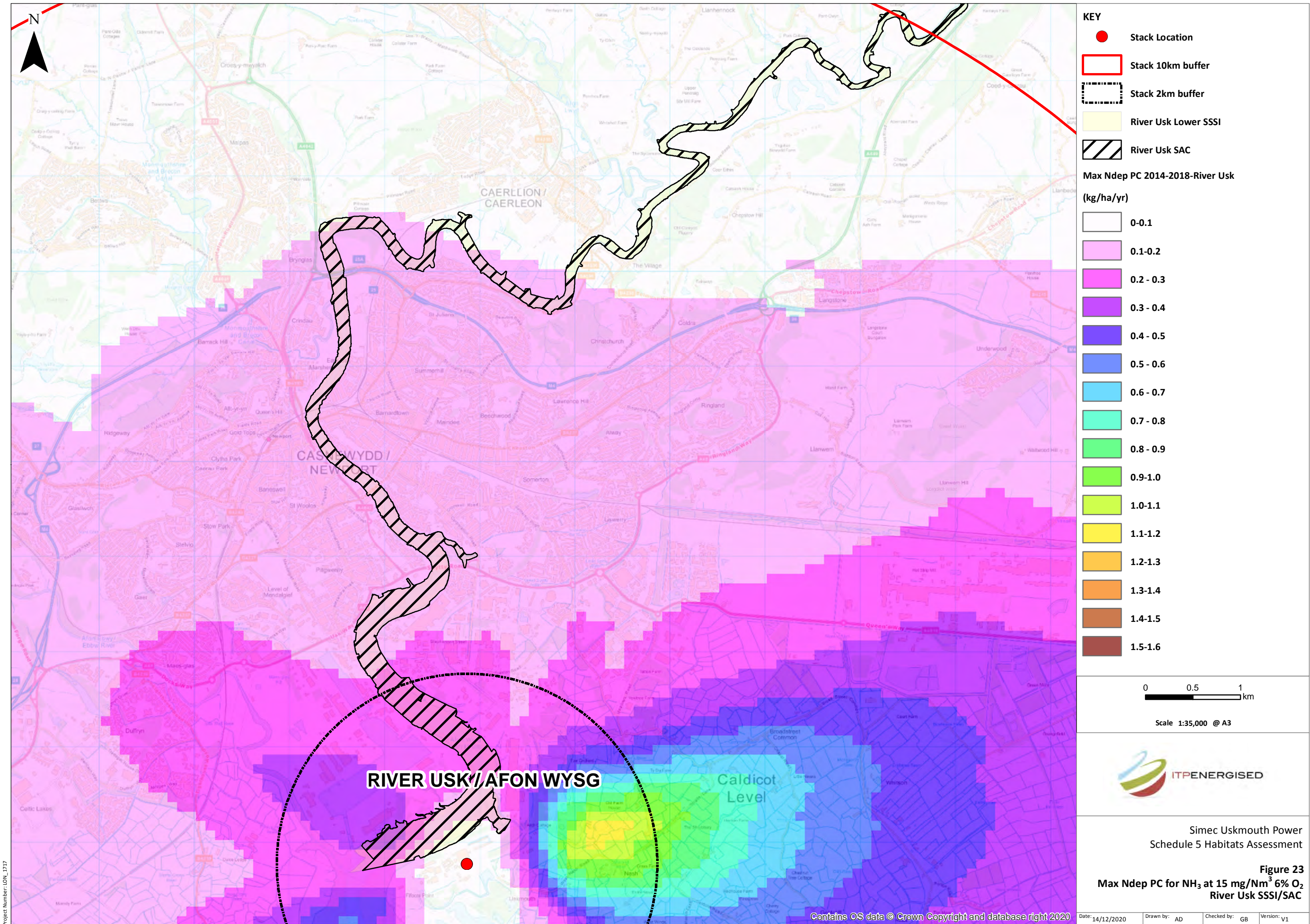




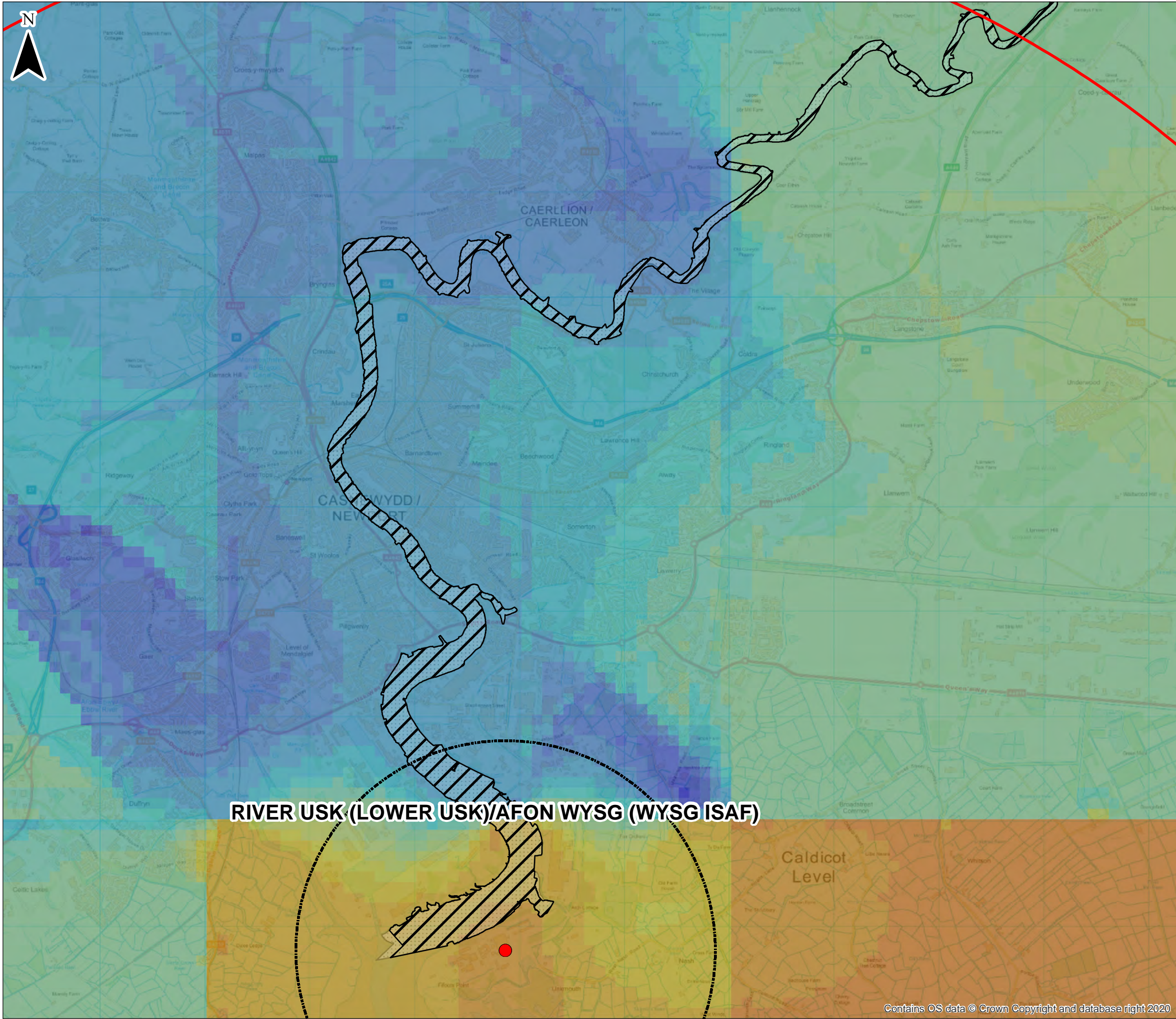












KEY

- Stack Location
- Stack 10km buffer
- Stack 2km buffer
- River Usk Lower SSSI
- River Usk SAC

Max Ndep PEC 2014-2018-River Usk

(kg/ha/yr)

- 0-10
- 10-10.5
- 10.5-11
- 11-11.5
- 11.5-12
- 12-12.5
- 12.5-13
- 13-13.5
- 13.5-14
- 14-14.5
- 14.5-15
- 15-15.5
- 15.5-16
- 16-16.5
- 16.5-17
- 17-17.5
- 17.5-18
- 18-18.5
- 18.5-19
- 19-19.5
- 19.5-20

0 0.5 1 km

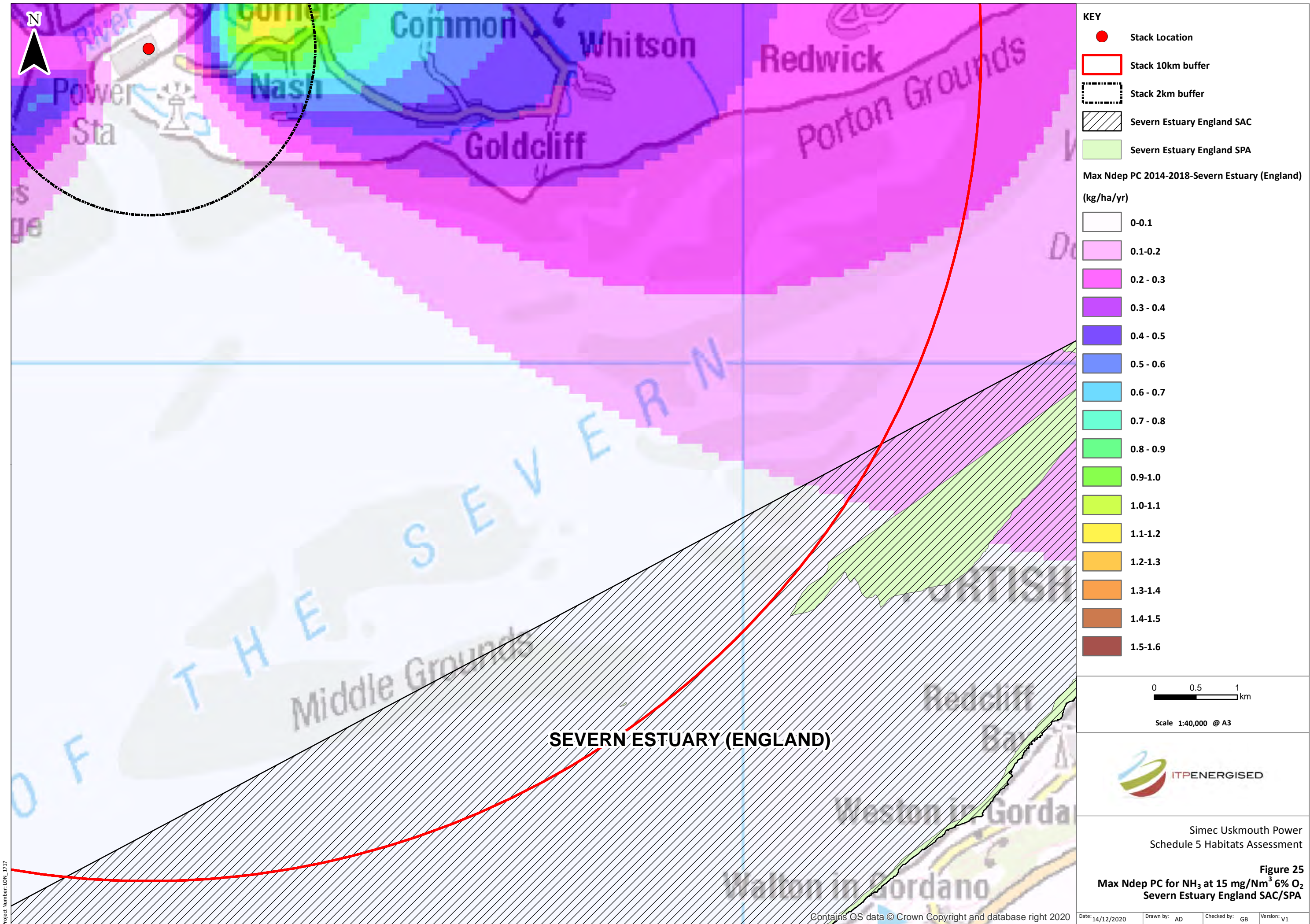
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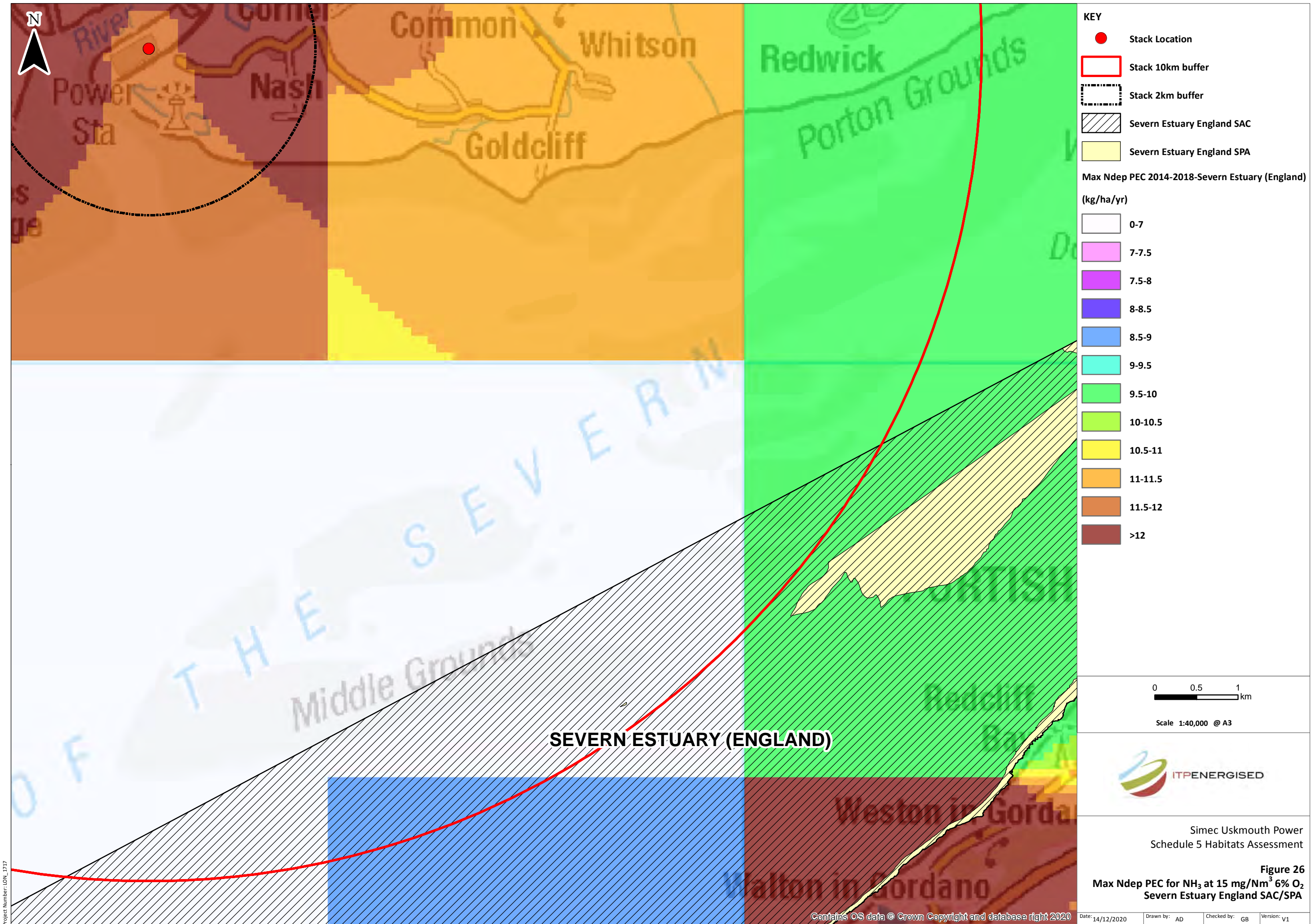


Simec Uskmouth Power  
Schedule 5 Habitats Assessment

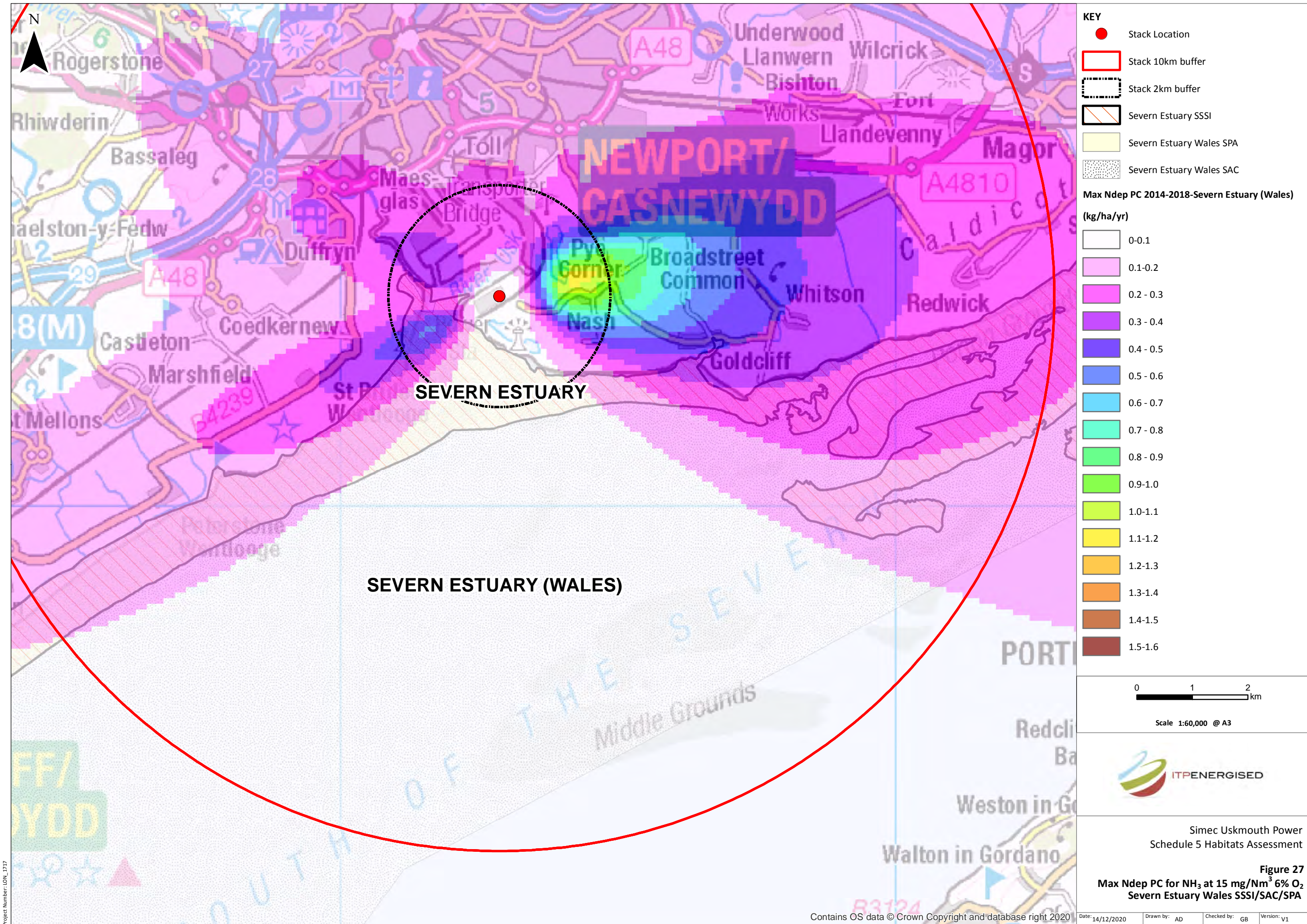
**Figure 24**  
**Max Ndep PEC for NH<sub>3</sub> at 15 mg/Nm<sup>3</sup> 6% O<sub>2</sub>**  
**River Usk SSSI/SAC**



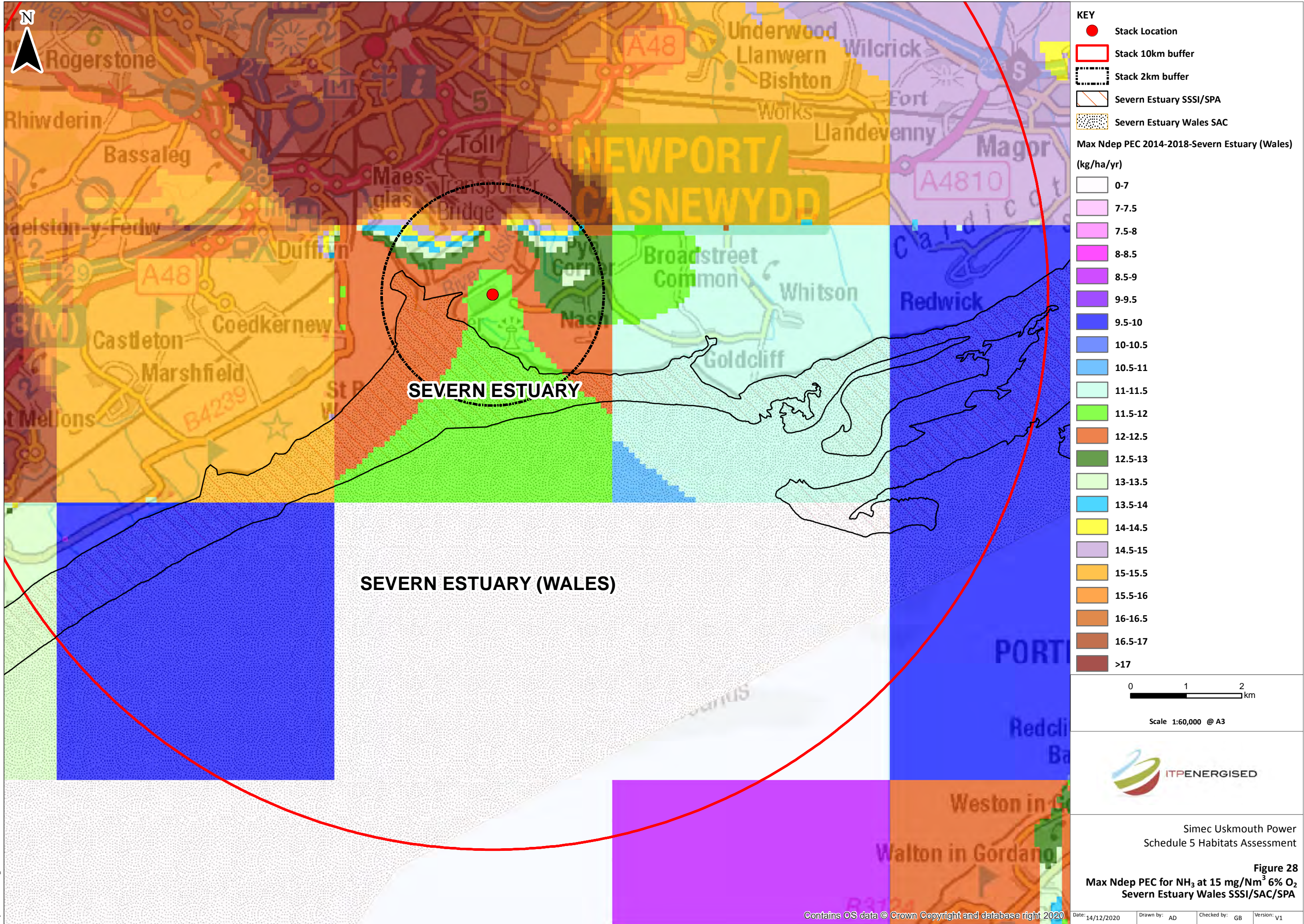
















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