Facts and Figures

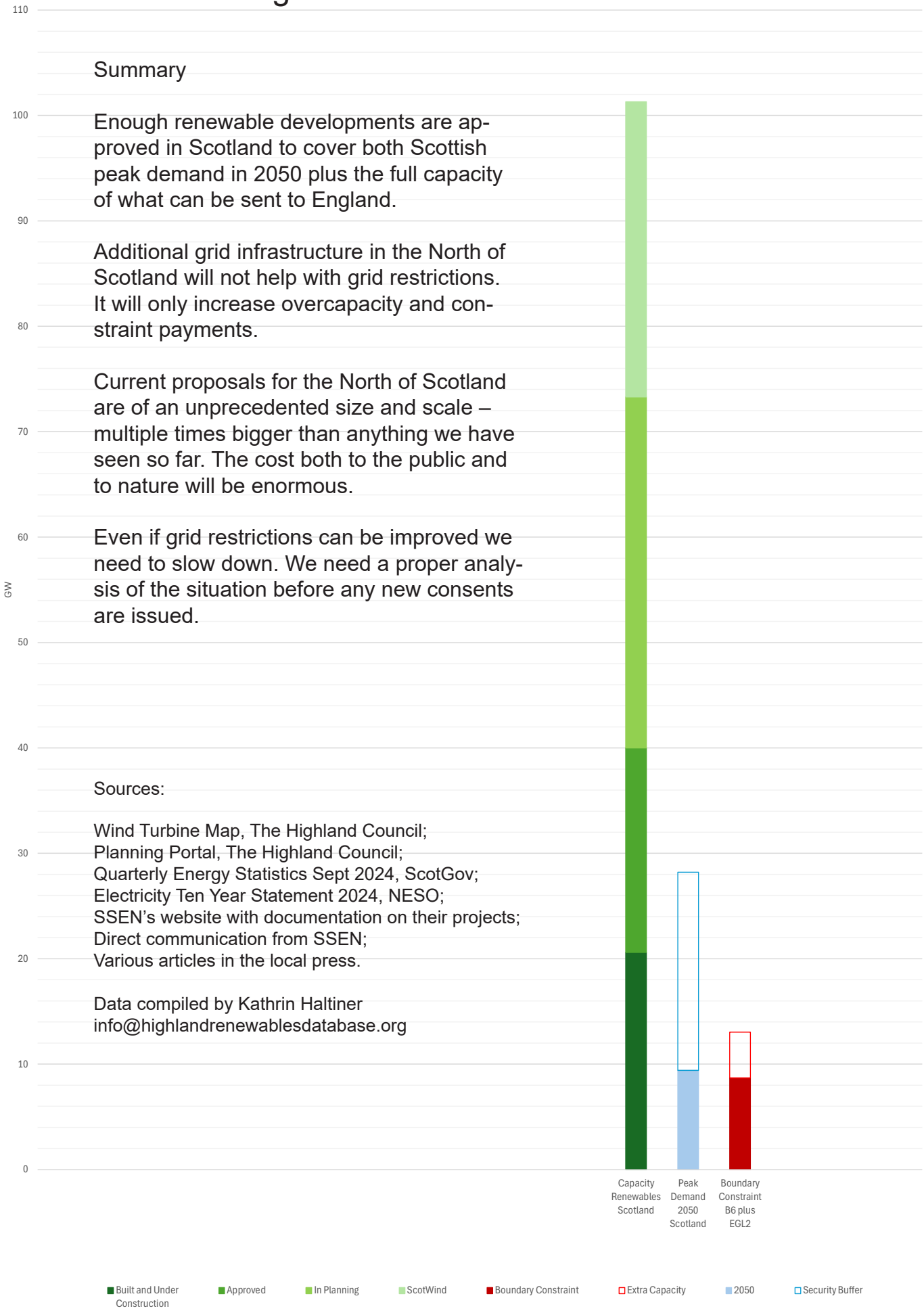
Summary

Enough renewable developments are approved in Scotland to cover both Scottish peak demand in 2050 plus the full capacity of what can be sent to England.

Additional grid infrastructure in the North of Scotland will not help with grid restrictions. It will only increase overcapacity and constraint payments.

Current proposals for the North of Scotland are of an unprecedented size and scale – multiple times bigger than anything we have seen so far. The cost both to the public and to nature will be enormous.

Even if grid restrictions can be improved we need to slow down. We need a proper analysis of the situation before any new consents are issued.



Sources:

Wind Turbine Map, The Highland Council;
Planning Portal, The Highland Council;
Quarterly Energy Statistics Sept 2024, ScotGov;
Electricity Ten Year Statement 2024, NESO;
SSEN's website with documentation on their projects;
Direct communication from SSEN;
Various articles in the local press.

Data compiled by Kathrin Haltiner
info@highlandrenewablesdatabase.org

Grid Restrictions and Capacity

The actual output of a wind farm is below its nominal capacity. Here, this is taken into account by adding extra capacity to grid capacity and by adding a security buffer to demand. The guidelines used come from SSE for grid capacity and from NESO for demand.

A boundary is a pinch point in the grid where the amount of electricity that can be sent past this point is limited. The concept of a boundary in the grid infrastructure comes from NESO and is explained in the Electricity Ten Year Statement (ETYS for short, a summary is attached).

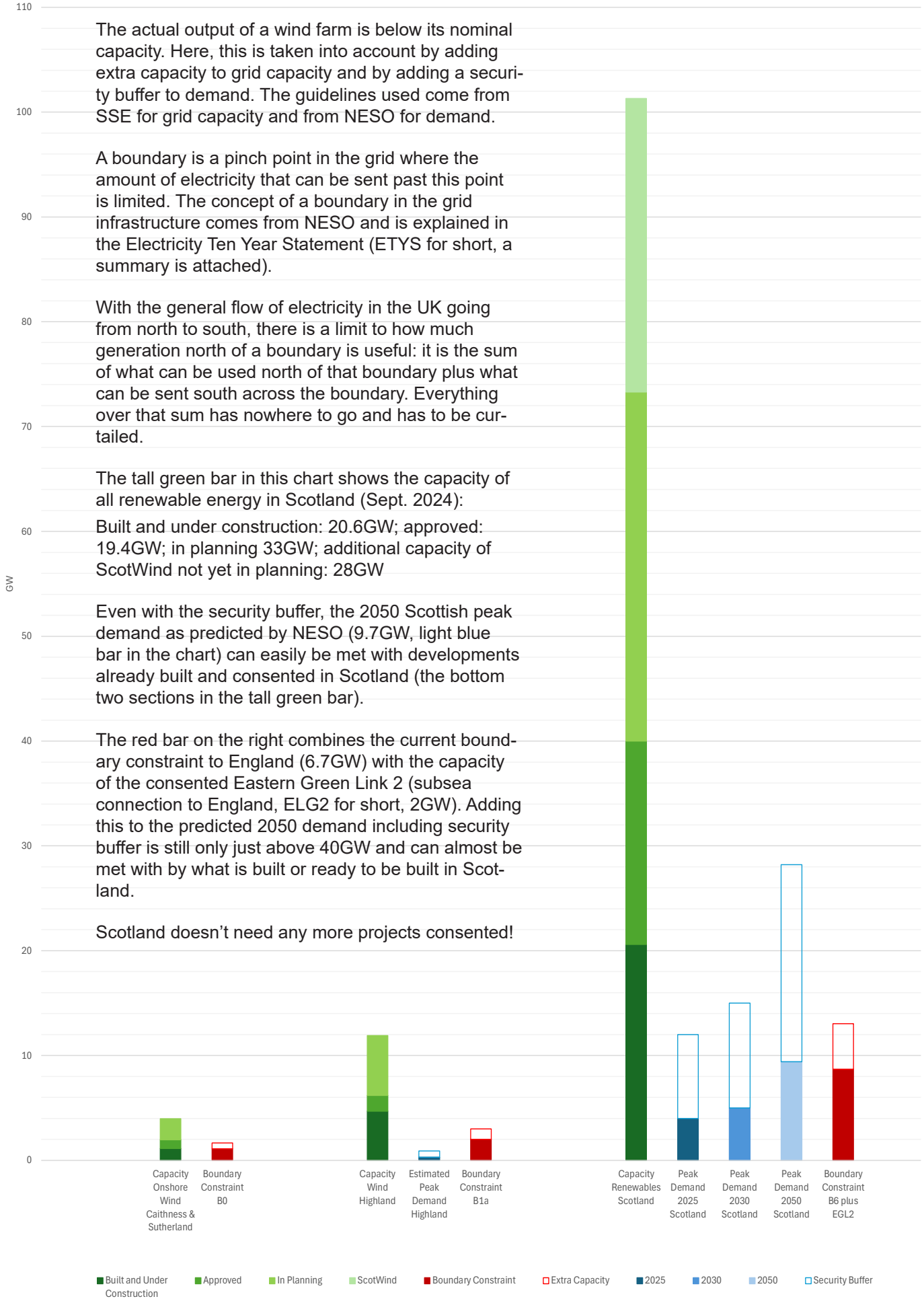
With the general flow of electricity in the UK going from north to south, there is a limit to how much generation north of a boundary is useful: it is the sum of what can be used north of that boundary plus what can be sent south across the boundary. Everything over that sum has nowhere to go and has to be curtailed.

The tall green bar in this chart shows the capacity of all renewable energy in Scotland (Sept. 2024):
Built and under construction: 20.6GW; approved: 19.4GW; in planning 33GW; additional capacity of ScotWind not yet in planning: 28GW

Even with the security buffer, the 2050 Scottish peak demand as predicted by NESO (9.7GW, light blue bar in the chart) can easily be met with developments already built and consented in Scotland (the bottom two sections in the tall green bar).

The red bar on the right combines the current boundary constraint to England (6.7GW) with the capacity of the consented Eastern Green Link 2 (subsea connection to England, ELG2 for short, 2GW). Adding this to the predicted 2050 demand including security buffer is still only just above 40GW and can almost be met with by what is built or ready to be built in Scotland.

Scotland doesn't need any more projects consented!



The Situation in the Far North

Capacity Onshore Wind in Caithness February 2025:
Built and under construction: 500MW; approved: 190MW; in planning incl. scoping: 470MW

Capacity Onshore Wind in Sutherland February 2025:
Built and under construction: 627MW; approved: 643MW; in planning incl. scoping: 1533MW

It would be perfectly possible to export all the electricity Caithness and Sutherland can produce (dark green section of first green bar) with the existing infrastructure (second bar in orange which is bigger than the dark green section).

Boundary B0 lies south of Caithness and Sutherland. Even though the electricity currently produced in the Far North is less than what can be sent south, it is a common sight in Caithness to have turbines turned off and constraint payments being paid out. This is because boundaries further south cannot cope with the amount of electricity potentially available there.

After every boundary more generation gets added and is competing for transmission capacity. Thus even if boundary capacities further south are larger, they can be more restricting.

The third bar shows the export capacity for the proposed Banniskirk Hub in Spittal. It can export more than the current export limit to England!
The proposed infrastructure will allow the construction of an additional 10.5GW – that is 21 times the capacity already built and under construction in Caithness! It is grossly out of proportion.

Once the additional grid infrastructure for the Far North is approved, the generation to fill it will soon follow. The impact all these developments will have on the Far North is unprecedented. The cumulative map for Caithness and Sutherland (attached at the end of this document) shows all the projects included in the first green bar (a total of 4GW) on one map. That is still less than half of the capacity necessary to make good use of the infrastructure proposed for Banniskirk.

To summarise, SSEN's infrastructure projects proposed for the Far North will not help with grid restrictions because the problems are not in the Far North but further south all through the UK. More infrastructure in the Far North will only increase the pressure on grid pinch points further south. In addition, it will lead to an unprecedented destruction of nature, and will have a big impact on quality of life for residents.

Cost to the Consumer

The costs will be absolutely staggering!

Beatrice Offshore Wind Farm has already received more than £1.2bn in constraint payments since 2018, all paid for by the consumer. Beatrice Offshore Wind Farm only has a capacity of 580MW (marked in the chart below) - the 400kV OHL and the HVDC subsea link proposed for Banniskirk will enable 18 times that capacity! It will all have to be curtailed and we will have to pay for it.

Also marked is the capacity of the Eastern Green Link 2 (EGL2), a 'Multi-billion-pound electricity 'superhighway' from Peterhead', 'UK's biggest subsea connection project' (the P&J August 24) which was approved last summer. However, this 'electricity superhighway' only has a capacity of 2GW and predicted costs are £4.3bn.

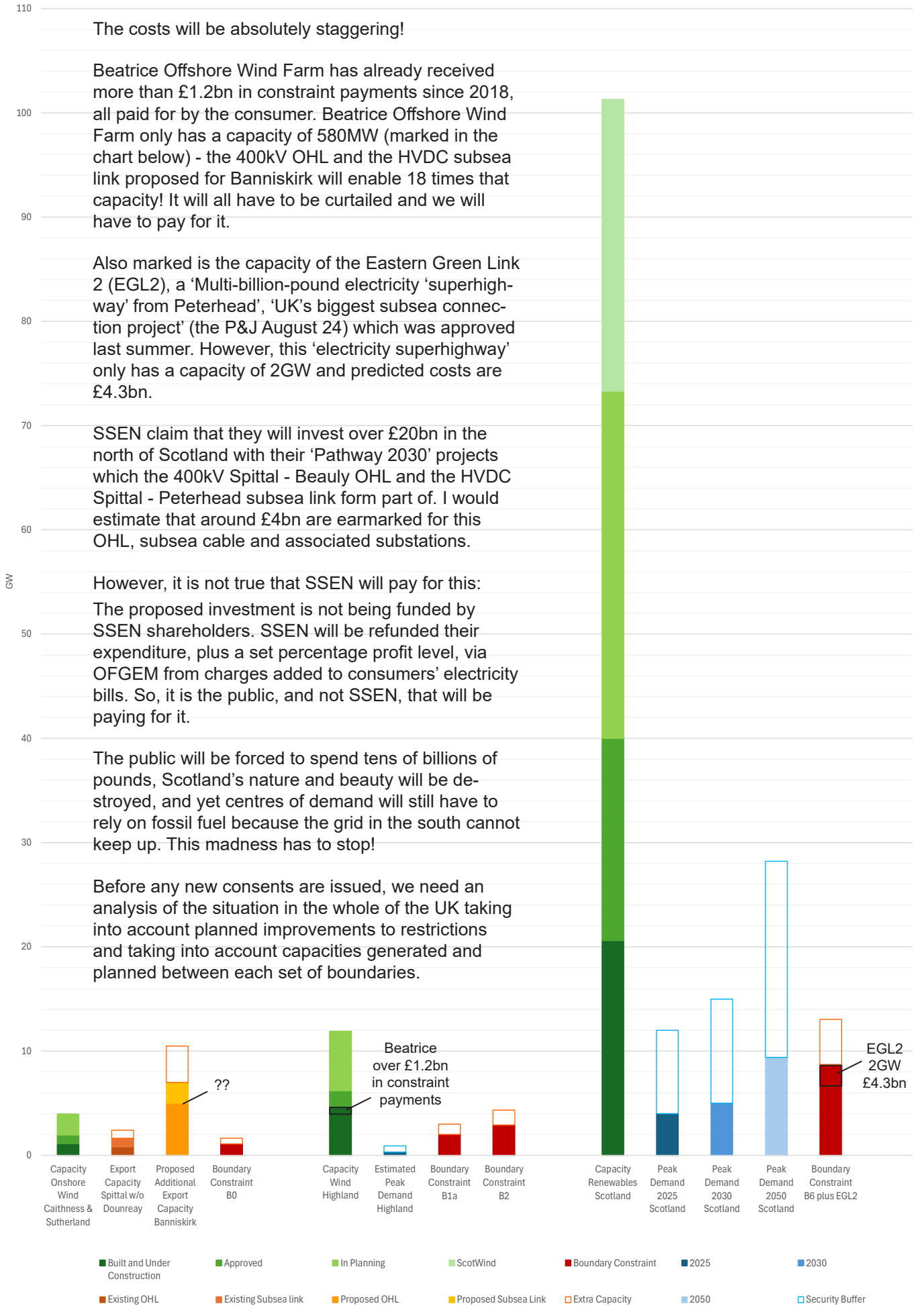
SSEN claim that they will invest over £20bn in the north of Scotland with their 'Pathway 2030' projects which the 400kV Spittal - Beauly OHL and the HVDC Spittal - Peterhead subsea link form part of. I would estimate that around £4bn are earmarked for this OHL, subsea cable and associated substations.

However, it is not true that SSEN will pay for this:

The proposed investment is not being funded by SSEN shareholders. SSEN will be refunded their expenditure, plus a set percentage profit level, via OFGEM from charges added to consumers' electricity bills. So, it is the public, and not SSEN, that will be paying for it.

The public will be forced to spend tens of billions of pounds, Scotland's nature and beauty will be destroyed, and yet centres of demand will still have to rely on fossil fuel because the grid in the south cannot keep up. This madness has to stop!

Before any new consents are issued, we need an analysis of the situation in the whole of the UK taking into account planned improvements to restrictions and taking into account capacities generated and planned between each set of boundaries.



Extract from Electricity Ten Year Statement 2024 from NESO

Source: www.neso.energy/publications/electricity-ten-year-statement-etys

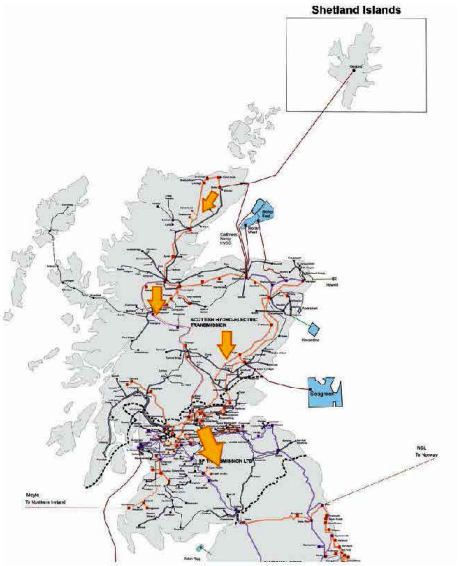
Scotland

The onshore transmission network in Scotland is owned by SSEN Transmission and SP Transmission.

The Scottish NETS is divided into 7 boundaries:

- B0 – Upper North SSEN Transmission
- B1a – North West SSEN Transmission
- B2 – North to South SSEN Transmission
- B3b – Kintyre and Argyll SSEN Transmission
- B4 – SSEN Transmission to SP Transmission boundary (shared by SSEN Transmission and SP Transmission)
- B5 – North to South SP Transmission
- B6 – SP Transmission to NGET (shared by SP Transmission and National Grid Electricity Transmission)

The figure to the right shows the general pattern of power flow directions expected to occur most of the time in the years to come up to 2036, i.e. power will generally flow from north to south. The arrows in the diagram illustrate power flow directions and are approximately scaled relative to the winter peak flows.



ETYS 2024 / Scotland 22

What is a boundary?

A boundary splits the system into two parts, crossing critical circuit paths that carry power between the areas where power flow limitations may be encountered.

Defining the boundaries has evolved over many years of planning and operating the transmission system. When significant changes occur, new boundaries may be defined and some boundaries either removed or amended and we communicate any changes with our stakeholders.

We do not study all boundaries, specifically those where no significant changes are identified in the FES generation and demand data compared to previous years. We assume the same capability as the previous year for these boundaries.

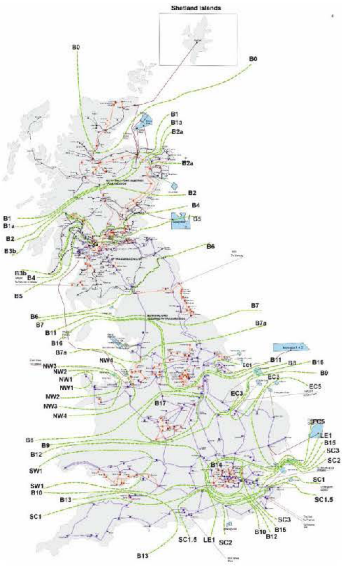
The boundaries used by ETYS can be split into two different types:

Local boundaries

Small areas of the NETS with a high concentration of generation. These small power export areas can give high probability of overloading the local transmission network due to too much generation operating simultaneously.

Wider boundaries

Large areas containing significant amounts of both generation and demand. The System Security and Quality of Supply Standard (SQSS) boundary scaling methodologies assess the capability of the wider boundaries. These consider both the geographical and technological effects of generation, allowing for a consistent capability and requirements assessment.



ETYS 2024 / Our ETYS analysis 12

In Scotland electricity flows from north to south (page 22, pictured above). The situation in England is a bit more complex but broadly speaking the electricity there flows towards London (pages 31, 35, 38, 42,45). An overview over all the boundaries NESO looks at is on page 12 (pictured above) and the restrictions on these boundaries take up the bulk of the document from pages 24-54. I will list the restrictions for boundaries going right across the country here:

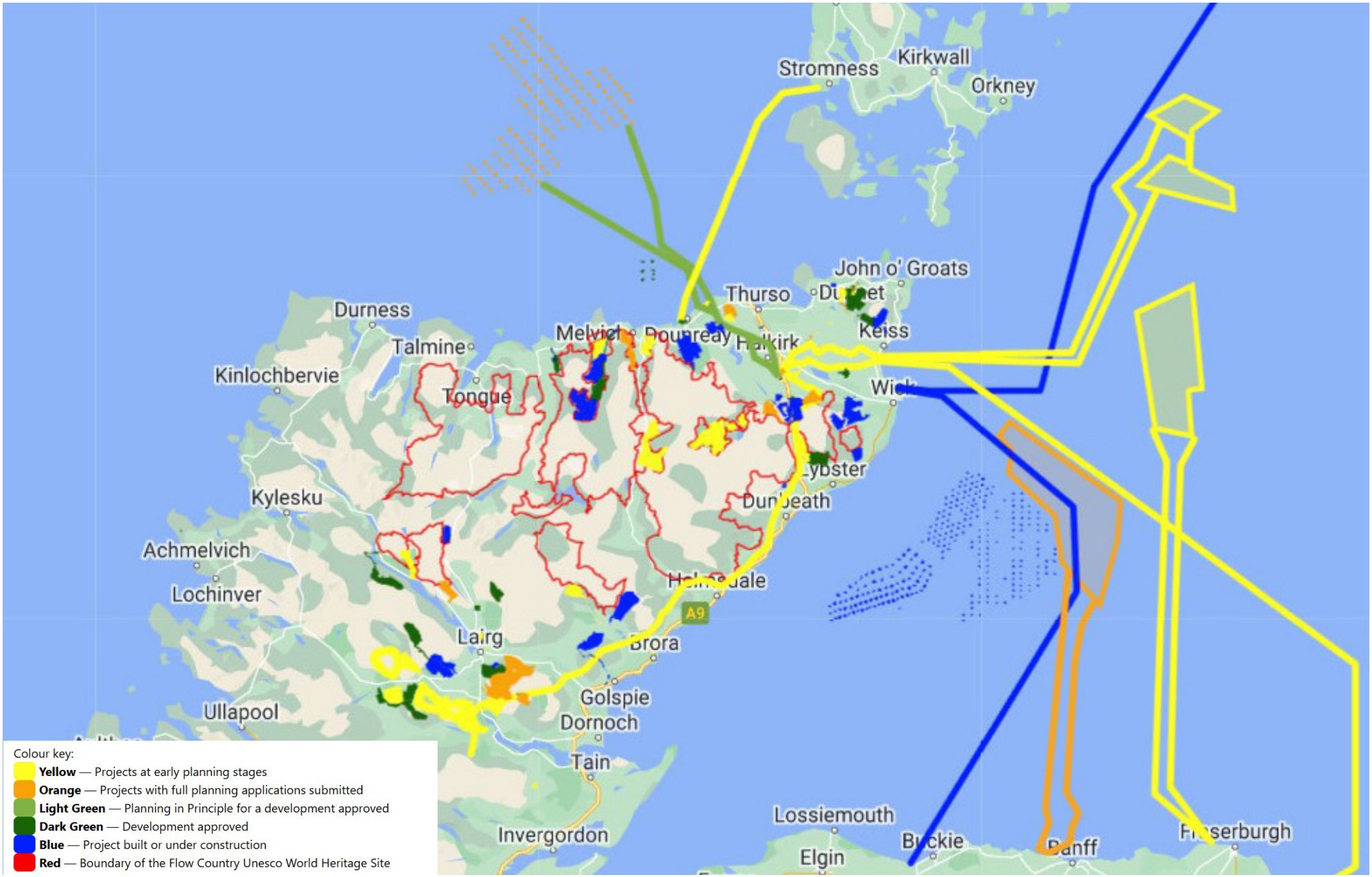
In Scotland - B0: 1.1GW; B1a: 2GW; B2: 2.9GW; B4: 4GW; B5: 3.9GW; B6: 6.7GW;

In England - B7a: 9.4GW; B8: 11GW; B9: 12 GW; LE1: 10.2GW.

And finally a ring around London - B14: 11.6GW

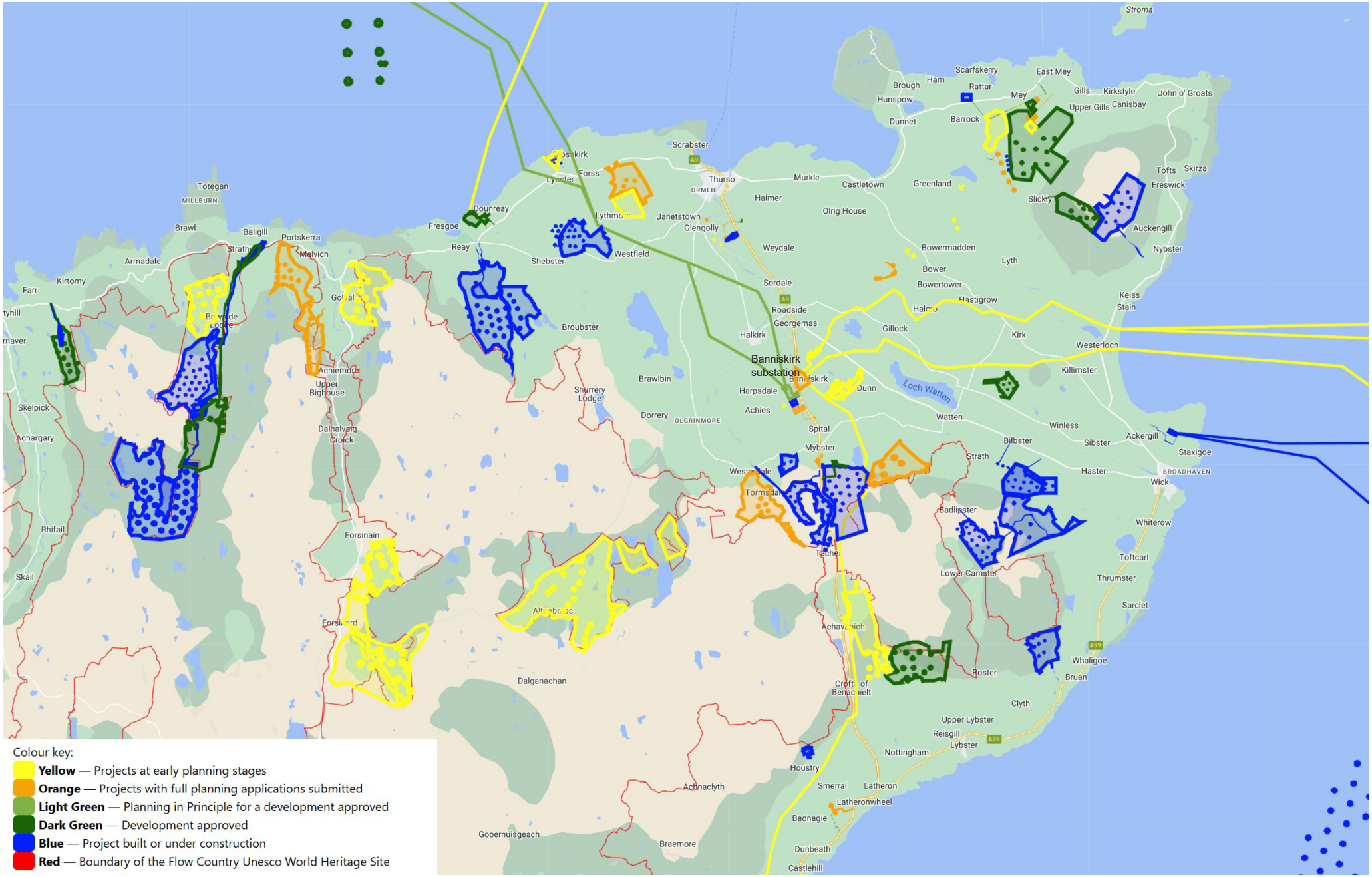
Cumulative Impact Map - Caithness and Sutherland including Offshore - February 2025

Source: www.highlandrenewablesdatabase.org/map.html



Cumulative Impact Map - Caithness and North Sutherland - February 2025

Source: www.highlandrenewablesdatabase.org/map.html

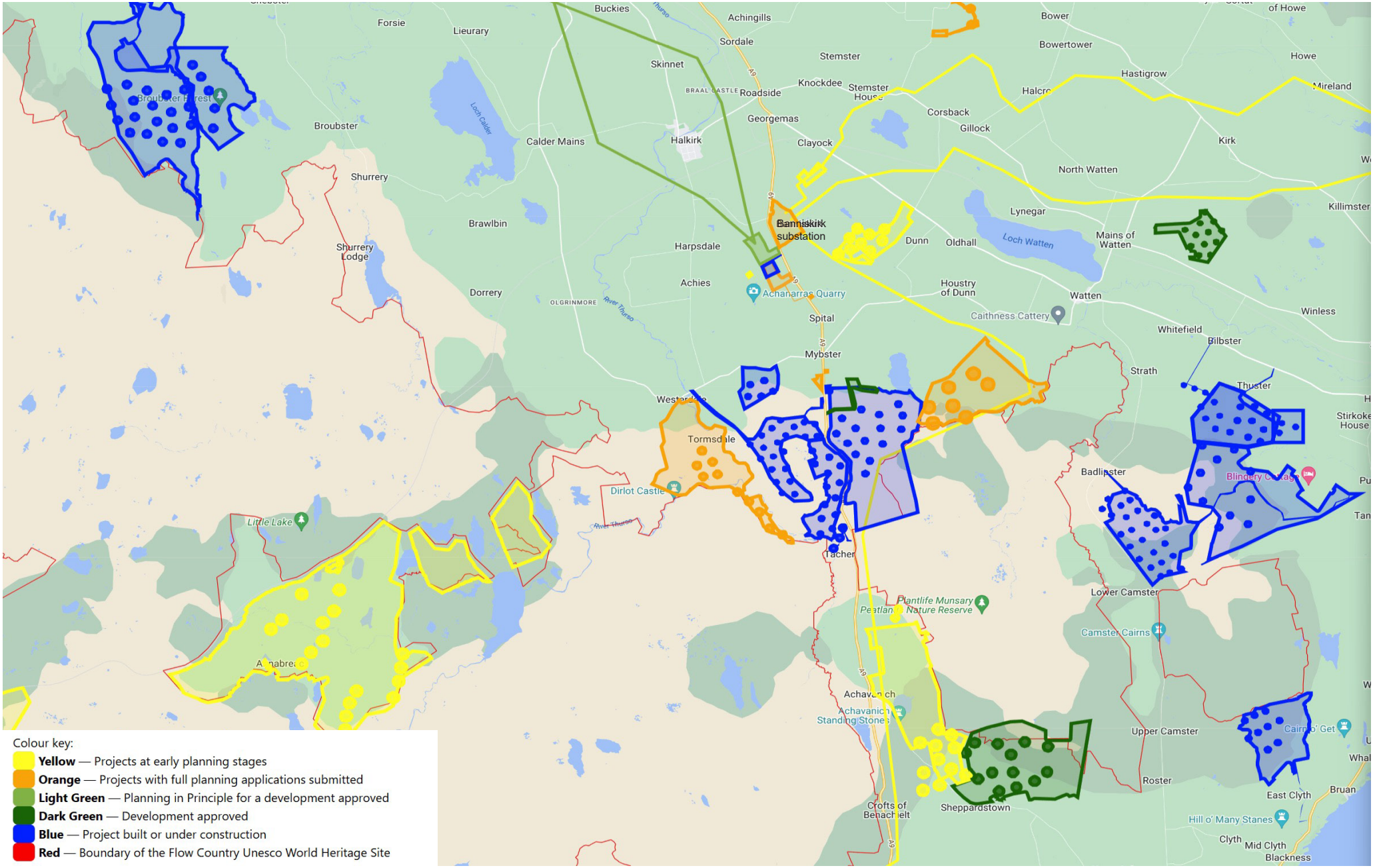


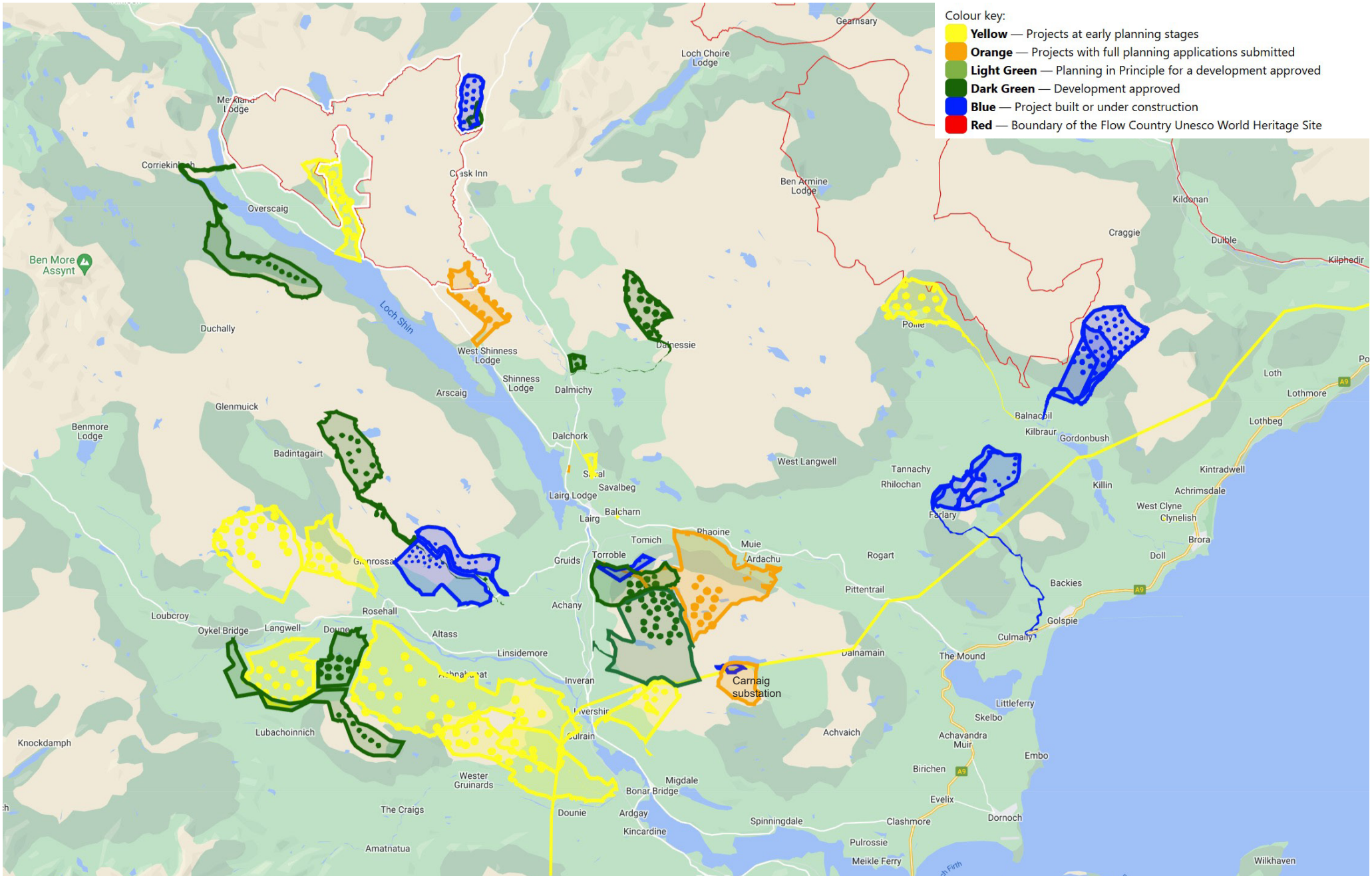
Colour key:

- **Yellow** — Projects at early planning stages
- **Orange** — Projects with full planning applications submitted
- **Light Green** — Planning in Principle for a development approved
- **Dark Green** — Development approved
- **Blue** — Project built or under construction
- **Red** — Boundary of the Flow Country Unesco World Heritage Site

Cumulative Impact Map - Central Caithness - February 2025

Source: www.highlandrenewablesdatabase.org/map.html



Cumulative Impact Map - South Sutherland - February 2025

Source: www.highlandrenewablesdatabase.org/map.html