



Swansea - Bay Campus Analysis

Tony Stedman 05/07/2024

Swansea University – Swansea Bay City Deal Digital Infrastructure Project

Aim:

To deliver a unique, 5G testbed where SMEs and larger companies in the Life Sciences, Sports Tech and Med Tech sectors can establish a presence and access research, innovation and clinical facilities.

A regional partnership to support population health:

- Swansea Bay University Health Board
- Sport Wales
- Gower College Swansea
- Bishop Gore School
- Vodafone

Benefits:

Establishing a 5G network across education, research & innovation, health, sports and leisure facilities (including seafront and parkland) and residential areas will create a unique, geographically specific, living lab technology platform that unlocks a range of opportunities, including:

- uploading of realtime data for integration with other datasets
- device development for the clinical and non-clinical monitoring of patients, athletes and community sport participants
- creating a platform that brings together people, energy, infrastructure and other sensor data (e.g. pollution, weather) to help understand the interlinkages and accelerate (e.g.) improvements to population health and achieving net-zero



Financial Overview:

Infrastructure costs

- New macro sites (5): £1,550,000
- Upgraded sites (5): £440,000

Other costs

- PhD students (3): £127,500
- SIM cards (3,000): £360,000
- Staff time (SU): £52,500
- Rental fees: £48,000

Total: £2,578,000

- Grant income: £1,550,000 (60%)
- Matched funding: £1,028,000 (40%)

Insert Confidentiality Level in slide footer



Swansea University – Project statement

Vodafone have been requested by Swansea University to provide 5G connectivity to the University sites to enable both PHD research and provide coverage to the wider student/teaching body.

Vodafone are also adding 5G infrastructure to selected sites in between the main campus locations to create a “5G corridor” enabling a seamless digital space which will enhance the connectivity not only for the University but also for the general public within the Swansea Area.



- Singleton Campus (SA2 8PP)
- Bay Campus (SA1 8EN)
- Morrison hospital (SA6 6NL)

6.5 km*

13 km*



Bay Campus layout



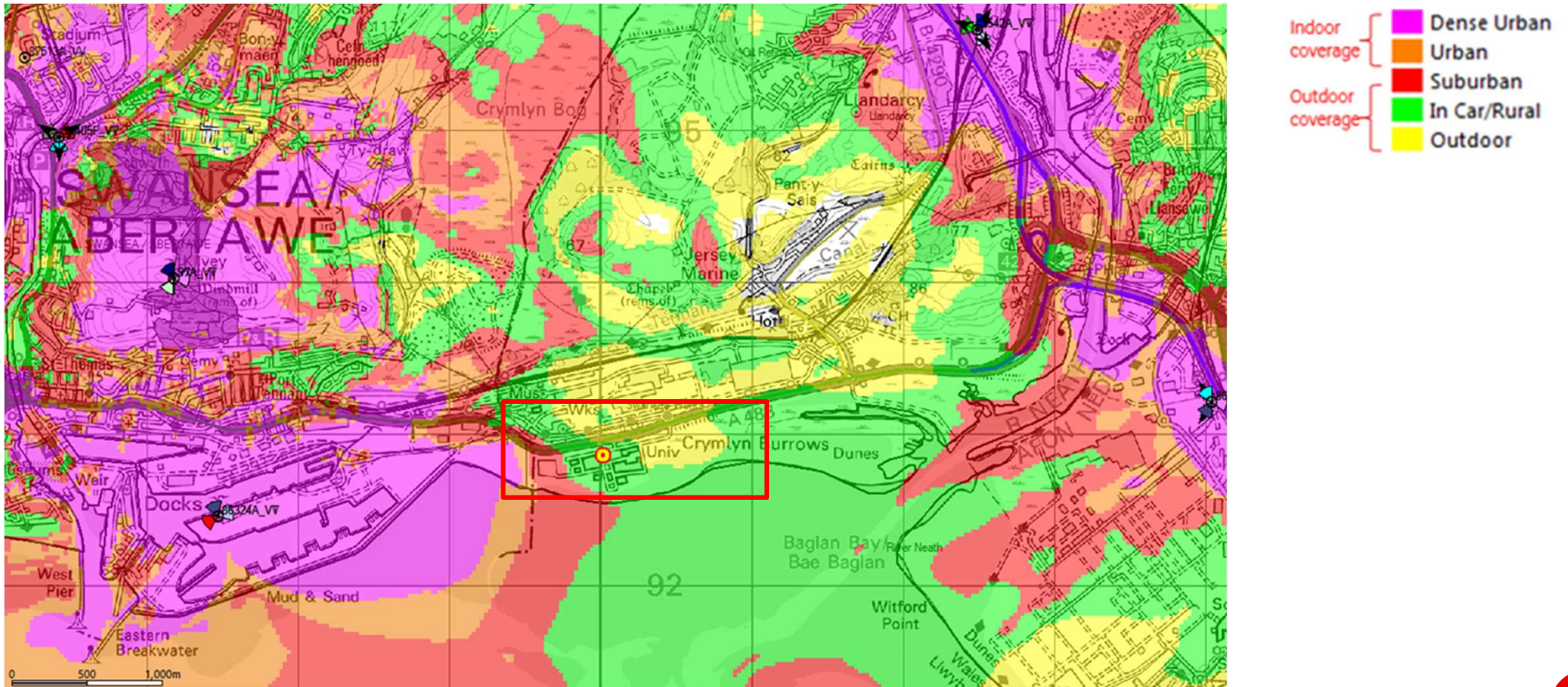
*Red box indicates the main academic space on the Campus.

*Yellow box is primarily residential spaces for the student body.



Bay Campus - Existing Vodafone Coverage

The coverage plot below shows the existing 4G coverage at the Bay campus and the east end of the site has minimal outdoor coverage at best:



Initial solution Discussion

In consultation with the University faculty, Vodafone carried out multiple site visits with the required technical resources to assess the various possible solutions available on site.

Key considerations :

- ICNIRP compliance
- Coverage enhancement
- Site buildability/Cost
- The visual impact for staff and students across the Campus

Site design solutions considered & discounted:

- Small cells

Discounted at the start as the 5G capacity/in building penetration would not be sufficient for the overall use case.

- Streetwork Macro

Multiple sites reviewed in the academic space noting the proximity and height of the academic buildings area would prevent this solution meeting ICNIRP guidelines so discounted as not viable.

Multiple sites reviewed on the south & southwest areas of the campus and discounted as ICNIRP compliance meant only one location was viable, but this failed the coverage demand as due to the height of the antennas limited to 20m would be too far away to provide coverage to the academic space & would have negatively impacted the space visually.



Streetworks assessment



- Red box indicates area not suitable for Streetworks due to primarily ICNIRP considerations but as a secondary consideration the in building penetration due to the low antenna heights.
- Red arrows indicate Streetworks locations meeting ICNIRP considerations but discounted as not meeting the coverage demand for the academic area.



Rooftop assessment

Multiple locations were assessed for a rooftop macro solution:

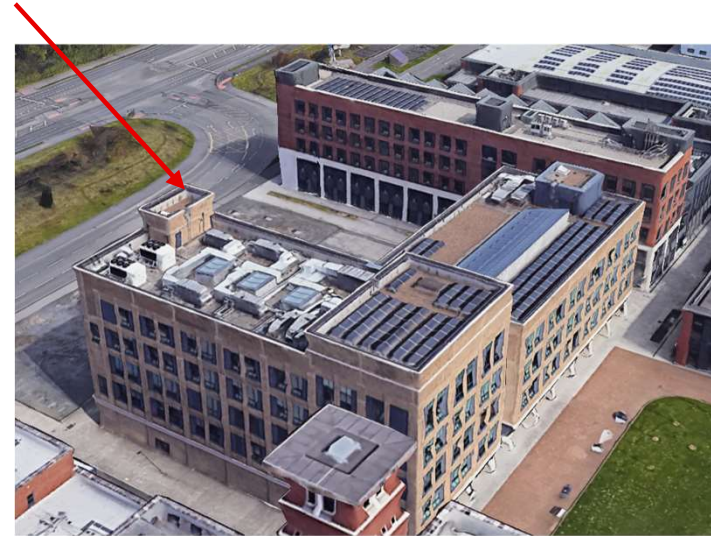


Rooftop assessment

- Location 1 – Would provide coverage to the academic area but fails ICNIRP assessment due to the adjacent building to the south.
- Location 2 – Meets ICNIRP regulations for adjacent buildings but antenna locations would sterilise balcony areas & antennas too low to provide the required coverage to the academic space.
- Location 3 – Meets ICNIRP regulations but antennas too low to provide the required coverage to the academic space.
- Location 4 – Does not meet ICNIRP regulations as these are higher for residential spaces & also does not provide the required coverage to the academic space.

Location 5 – became the primary solution selected noting the height of the roofhouse means ICNIRP requirements are met, using the lower roof or the upper roof to the south isn't possible due to the congestion of existing plant/solar panels & would fail ICNIRP due to the proximity of the buildings adjacent.

Proposed antenna siting



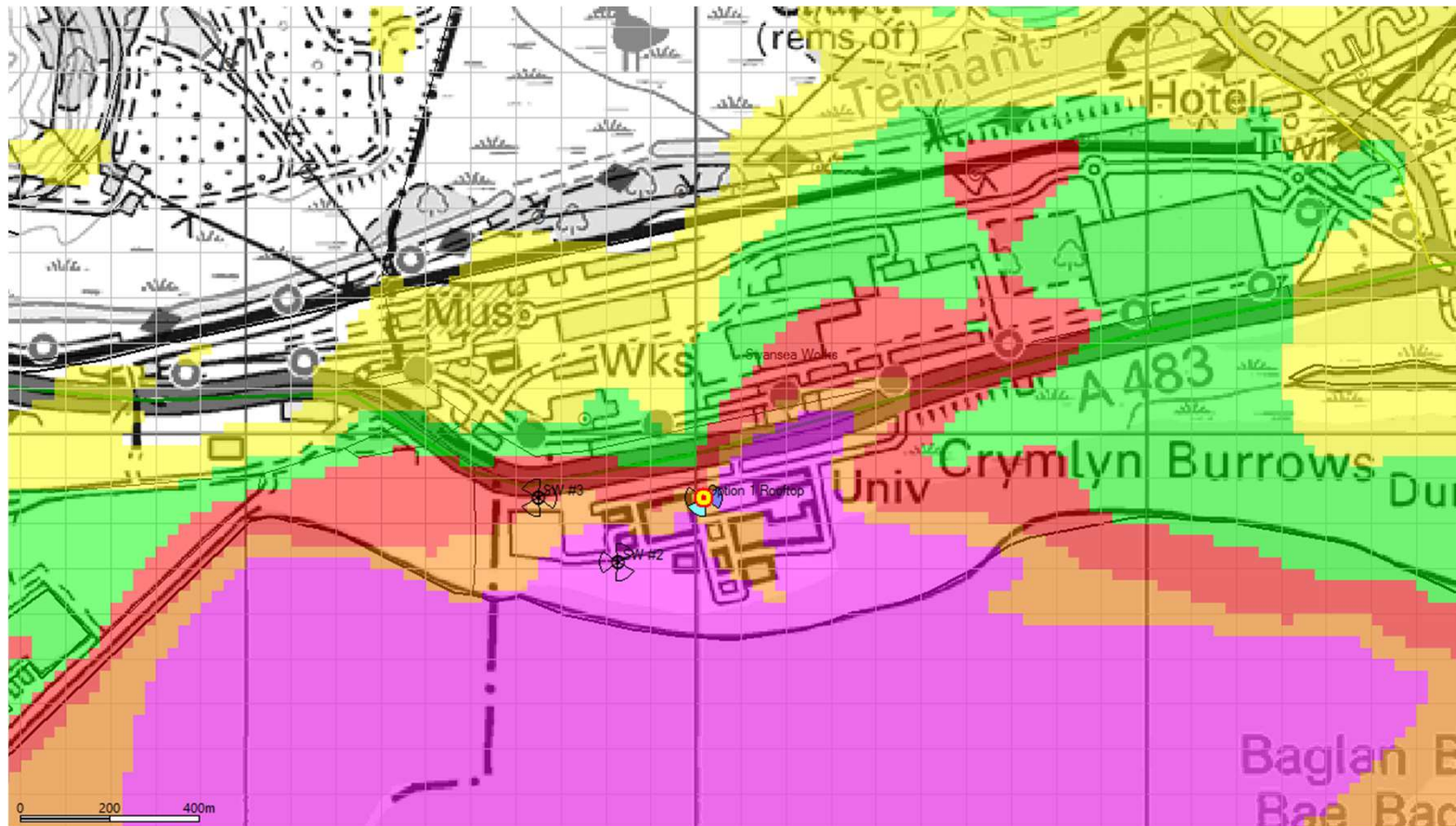
Primary site selection – Computational Foundry



NGR 270017 192857
~27m height



New 4G Coverage prediction #1



New 4G Coverage prediction #2

