DIGITISATION OF RETREATING INDUSTRIAL HERITAGE; MODELLING THE DECOMMISSIONING OF THE COAL WASHERIES OF ONLLWYN

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ABSTRACT:

Digitisation for the purposes of recording cultural heritage and its condition is conventionally associated with the task of documentation for conservation. Occasionally emergency recording will anticipate the potential imminent destruction of heritage at risk. By contrast here, although the heritage status of the site whilst proposed in the 1990s, it was never secured yet the closure and eventual dismemberment of the buildings is a plan that is already underway. The coal washeries of Onllwyn sit within a vast landscape that is now most widely recognised as a National Park. During the last century, however, it was a thriving industrial site. The assembly of buildings used to wash and sort coal prior to distribution were recorded using a terrestrial laser scanner and an aerial drone in August 2022 shortly prior to the closure of a site that had been part of a changing industrial landscape since the mid-nineteenth century. As part of a wide agreement to build a historic narrative for a once large industrial site with a planned closure a comprehensive historical review has been built. This included the acquisition of historic maps but also of numerous historical aerial and terrestrial photographs as well as the collation of films and oral histories. Here pointclouds generated from terrestrial laser scans, photogrammetry from drone imagery and photogrammetry from historical aerial images have been combined in an attempt to create a navigable digital backdrop to the decommissioning of a vast industrial landscape as it anticipates a new future. The aim of the models created is to provide a virtual spatial platform to co-locate memories of a community life that is left centred around a lost place of work.

1. INTRODUCTION

1.1 Research aim

Cultural Significance is defined in the Burra Charter as the “aesthetic, historic, scientific, social or spiritual value for past, present or future generations” (ICOMOS Australia 1987). This paper advocates a mixed method for augmenting a disrupted chronology using digital data capture to support an immersive narrative of change. By combining new models with pointclouds and measurable historic material taken from a series of aerial survey images it aims to extend current practices for a post-industrial landscape. Building on previous work (Shotton 2022) and adopting a range of photogrammetric and 3d modelling software, it seeks to progress the potential for multi-dimensional recording of daily activities in the context of decommissioning. It also seeks to advance the possibility of generating low-cost and accessible means to interrogate historic archives of aerial imagery that are engaging and accurate but also allow for the addition of subsequent data.

As a site that is in the process of demolition, the recording through digital models is an ongoing process. The acquisition of data from different sources and the attempts to collate these as a navigable 3D tool to provide a morphological investigation of the site after its destruction presents both challenges and opens possibilities for future work.
In terms of securing an adequate visual recording there were three key aims to be achieved within an economic timeframe:

1.1.1 To capture a working site as it closed: The working spaces were still operational at the time of the survey. Conventionally the significance of the buildings would have been determined primarily by their age. However, the impending closure made the recording of the current working environments as much of a responsibility as those of the past. Thus, the unremarkable office spaces with standard furniture and ancillary welfare areas should ideally have been included in the documentation as much as the dramatic mechanical assemblies of the plant since they are a part of the narrative of work. These rooms with showers, toilets, changing areas and kitchens were the threshold to the working day.

1.1.2 To capture a shifting landscape: As the site was still operational, coal heaps were being moved by vehicles of all sizes at all times and the physical form of the landscape being recorded was literally remoulded each day. Several short videos were made from the drone. Essentially the constant movement of material over the working day was a key characteristic of the place. To deliver a static model is in many ways to create a misrepresentation of a place that was constantly in flux. The scale of the endeavour is impressive and perhaps only a birds’ eye animation could properly relate the activity of the workings to future audiences. It may be beyond the scope of the current project but would be possible perhaps with the evidence it has gathered to animate these manoeuvres digitally in the future using Blender (blender.org) or similar software. It is hoped that the work here could serve to enable this at a later date. To capture the scope and detail of a working world.

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Figure 1. Aerial view of Onllwyn Coal washeries August 2022 OP.

Figure 2. Site office August 2022 OP.

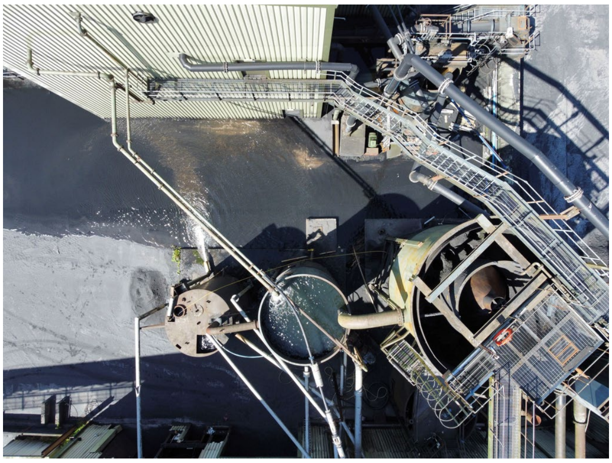

Figure 3. Aerial view of exterior water tanks 2022 OP.

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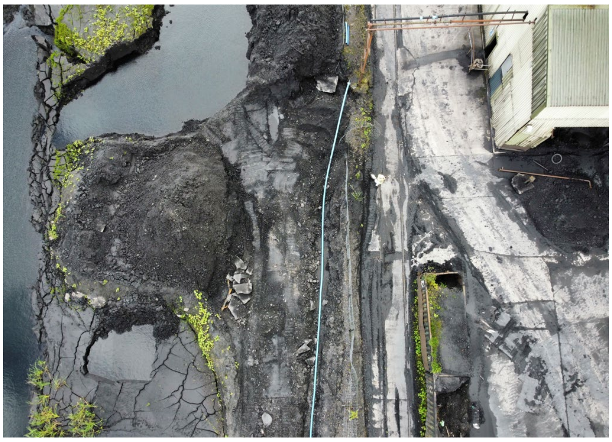

Figure 4. Aerial view between material and plant 2022 OP.

Figure 5. Aerial view with tyre tracks and coal heaps 2022 OP.

1.1.4 To adequately record the morphology of the site: The iterative nature of the sites' development and of interventions and adjustments to facilitate operations demonstrated the long process of adaptation that had allowed the workings to continue. The huge physical scale as well as the detail all reveal narratives of adaptation and of constant maintenance in service of maintaining continuous productivity. Clearly the identification of each part of the workings would take time to collate but the documentation should be sufficient to allow this to happen at a future date. The degree of corrosion or silt would hint at the age of each part but only conversation with site managers could relay either the purpose or the unexpected sequence and origin of each element.

Figure 6. Coal, water, and steel Aug 2022 OP

Figure 7. Coal conveyor Aug 2022 OP

1.2 Key Challenges

Figure 8. Intersecting gantries Aug 2022 OP

Figure 9. Inside the washery Aug 2022 OP

The spatial complexity of the gantries and workings externally was not straightforward and immediately highlighted the challenge of multiple visual occlusions making direct lines of sight for laser scanning or photogrammetry perplexing. In addition, the interior workings of the main washery building were significant and the overall scale of the operation vast. Nevertheless, the detail of human interaction as evidenced through plastic laminated health and safety notices, handrails untouchable because of bird faeces and the spacing of handles were testimony to manual interaction in the process. It was critical to find reasonable and cost-effective means to capture this continuous process of evolution for posterity.

Recording the shifting landscape itself was a challenge for two reasons: In addition to the pragmatic necessity of avoiding relatively fast-moving vehicles whilst waiting for a scan to complete and avoiding walking in vehicular paths altogether, there would be a challenge in automating the recognition and alignment process for creating pointclouds using either photogrammetry or laser scans. In addition, the pools of water, brightly reflective in the sunlight and changing in size caused confusion in the registration.

Finally, in attempting to create a historic pointcloud from archival images, the key challenge is that the vast majority of historic images are black and white, reducing the number of factors enabling swift automatic recognition of them. They also are in a range of formats and many of the aerial images are not oblique, limiting the means to generate pointclouds from three points of view under CIPA guidelines (Waldhäusl et al 2013).

1.3 Method summary: Collating 3d data old and new

This paper outlines the first steps in generating a 3d digital platform using photogrammetry, terrestrial laser scanning as well as photogrammetry derived from historic aerial imagery. The workflows, challenges, and limitations are described. The anticipated collation and synthesis of this material with diverse historic data is projected.
The methods outlined here build on that of Rault et al (2021), Maiwald et al (2018) and also on previous speculative attempts to collate 3d data from black and white historic images moving one step further in this quest. The projected methods for deploying modelling and augmentation workflows also build on previous attempts to provide accessible platforms for the deliberation of contested cultural heritage (Prizeman et al 2019). The specific context of deconstruction promises various future opportunities to conjoin rich material and to serve efforts to make it more accessible.

Figure 10. Historic buildings Aug 2022 OP

1.4 Historical background

Located deep in the Swansea Valleys in South Wales, Onllwyn appears to be an unremarkable village in the UK today, with only a couple of humble terrace houses lining along the Wembley Avenue. However, another glance at the Onllwyn Welfare Hall might remind one of the arrivals of the LGSM (Lesbians and Gays Support the Miners) members in Onllwyn in the midst of the miners' strike (1984-85) and the HIV crisis, celebrated in the 2014 film 'Pride' (IMDb, 2014). Indeed, the Onllwyn Welfare Hall is but one of the few physical traces left from centuries of transformation of the industrial landscape in the Swansea Valley, the engine that once drove the UK's Industrial Revolution in the 19th century.

The emergence of the Onllwyn and Mynydd y Drum area as an industrial landscape started around the beginning of the 19th century, when John Christie, an adventurous Scottish merchant started his enterprise at the Great Forest (*Fforest Fawr*). He started his coal exploration there first, but soon realised there was no coal seam. He began leasing Drum (or 'Drim') Colliery from Sir Charles Morgan in c.1823 on the Drum Common, which is recorded on the Tithe Map (Hughes, 1990; Sayce and Martin, 1844). Christie extended the forest tramroads south of the Brecon Beacons to connect the Drum Colliery and the Swansea Port, an important strategic move. However, the Drum Colliery did not provide the anthracite coal that Christie was after. It turned out to be a "disastrous concern" by the mid-1830s, due to the impossibility of draining water out of the mine. John Christie declared bankruptcy in 1827, and his properties were passed to his principal creditor Joseph Claypon. Aware of the Drum Colliery's drainage problems, Claypon turned his attention to the land of Onllwyn, owned by Capel Hanbury Leigh from the Hanbury family, a prominent industrial family of iron and tinplate works in the Pontypool area. The opening of the colliery was costed on 23 May 1835 (Reynolds 1979, cited in Hughes, 1990).

Claypon and his agent Charles Gabell built another extension of the tramroad from Drum Colliery to Gurnos Wharf on the Swansea Canal in 1832-34. The new line was built to a higher standard intended for locomotive haulage, transporting passengers and freight. Branch lines were built to connect the new collieries at Onllwyn. The initial attempts at extracting coal at the Onllwyn collieries proved to be challenging. A new level was opened in June of 1835 but was almost abandoned by September of the same year, as workable coal seams could not be located. For the first quarter of 1836, Claypon had to pay his colliers extra to work under water in the water-logged Drum Colliery (Hughes, 1990).

By 1837-38, traffic on the tramroad increased exponentially due to the technological advancement of iron smelting in the Dulais Valley, especially at the Ynysgedwyn ironworks. This in turn made using the local anthracite coal for smelting iron ore possible. The owner of the Ynysgedwyn ironworks, George Crane, wanted to use coal from the Onllwyn Collieries to feed his ironworks. According to the Kirkhouse Journal, the Onllwyn Collieries were easily producing over 5000 tonnes of anthracite coal, which were probably all consumed by the ironworks locally, suggested by the absence of evidence of Claypon shipping any coal out (Kirkhouse, 1837, cited in Hughes, 1990).

Industrial activities in Onllwyn grew exponentially in the 1840s. By 1840, the Onllwyn Collieries were taken over by John Williams from Monmouthshire and a John Jones. In 1842-43, the production of coal at Onllwyn quadrupled. Williams brought two blast furnaces to Onllwyn in February 1844, using the locally produced anthracite and iron ores (The Cambrian, 1844). The blast furnaces were directed and managed by a Mr Rees Davies, who worked under George Crane. After John William's bankruptcy, the ironworks were bought by William Parsons, who operated it from 1859-1863 (Swansea Canal Ledger, 1813-63, cited in Hughes, 1990). The anthracite production in the Dulais and Swansea valleys was so significant by 1847 that it was reputed as the 'anthracite district'. Unfortunately, the ironworks at Onllwyn did not last long, due to the failure to use the anthracite coal (The Pembrokeshire Herald and General Advertiser, 1847). The furnaces had to be modified to use bituminous coal instead. The ironworks eventually failed to continue due to a financial collapse in 1866 (Ince, 1993).

It should be noted that, besides coal mining and metal working, various other supporting industrial activities also played a part in the making and transforming of the landscape. One such activity was related to limekilns. Limekilns were already part of John Christie's pursuits when he was managing his farms in the Great Forest. In addition, limekilns shown on the 19th century maps were sometimes mine kilns or iron-calcining kilns (Hughes, 1990). These kilns were just as crucial to the industrial development as mines and workings.

1.5 The Coal Washery

A coal washery is a plant that cleans mined coal of soil and rock, breaks, and sorts it into pieces of similar size, stockpiles the material ready for transport, and loads it into vehicles for distribution. Archival records of the Onllwyn Coal Washery are primarily stored in Aberystwyth within the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) collection in the National Library of Wales in Aberystwyth (Wright, 1993, Malaws, 2010). They include extensive aerial photographs from the 1930s to the 1990s, ground-level colour photographs and descriptive notes from the 1990s. Also available in Aberystwyth are the records of the mine owning family who first developed the washery – in the Evans and Bevan Anthracite Collieries records.

These records show that the washery, along with a processing and distribution centre was first built to service local drift mines in the Onllwn area in 1932 by Evans & Bevan Ltd (Wright, 1993). The family firm controlled large areas of coal reserves in the Dulais Valley from the 1870s. It was altered in 1950 following nationalisation by the National Coal Board, which took over the Onllwyn collieries in 1947. It again received an overhaul in 1998 by Celtic Energy which bought British Coal's opencast operations in 1995. At the time, it was the last gravity-worked example of a coal washery in the country.

Photographs of the 1950s washery by Peter Wakelin from the early 1990s reveal a complex aggregation of buildings (Wakelin, 1992). The various building elements were steel-framed, their facades formed in brick and series of pitched rooves a mix of metal and translucent corrugated sheeting. Surrounding the main complex were a series of one-storey brick huts (remnants of which remained in 2022).

Some of these, as marked on plans, were surveyor's offices. The main complex bridged the railway tracks – five lines altogether – enabling washed and graded coal to be loaded onto wagons and transported around the site. Buildings were interconnected by chutes that sailed over the pitched rooves transporting coal to different areas of the plant sections as well as to the mineral railway line. To the north side was a large funnel-shaped structure associated with coal washing.

Notes held in the RCAHMW archives and based on an interview with the site manager Frank Stagg in 1993 suggest that 30% of the coal produced then was for the domestic anthracite market while 70% was used in industry. The complex could produce 14,000 tons of coal a week. Coal exports were shipped from Swansea, Neath Abbey, and Briton Ferry to destinations across Europe (Wright, 1993).

The reconstruction of the washery in the 1990s was done to enable the facility to process the output of all of Celtic Energy's sites, including the vast Nant Helen opencast mine north of Onllwyn. The new plant, which included a Heavy Media Drum Separator for coal greater than 22 mm and Heavy Media cyclones for small coal, could operate up to 24 hours per day, processing far more coal than previously - up to 26,000 tonnes of coal per week at its peak. The plant produced five different sizes of coal in each of three different coal qualities: Black Diamond, Premium and Economy. A Froth Flotation Plant was added to the complex in 2005 to recover fine coal from washery slurry, which had until then been treated as discard. The main customers for the coal produced here were the power station at Aberthaw and the Corus steelworks (later Tata) at Port Talbot (Malaws, 2010).

2. METHOD

2.1 Desktop survey (maps and interviews)

This began with archival searches from April-November 2022 to identify maps, photographs, and other records (including newspaper reports) in order to piece together an account of the landscape's changing topography and material fabric. The arising records tell a story of large-scale transformation at the landscape level, which dramatically shaped the character of Onllwyn through time – from rural to industrial to semi-rural again but also of development followed by decline. Visual records of material remains, ranging from coal tips which are now overgrown, mine passages now lost from view to buildings long vanished, clearly illustrated a place and a community that was steadily dismantled from the 1960s onwards. While Onllwyn today gives relatively little away about its past – a cemetery with no chapel, a miner's welfare hall set within a now largely rural landscape, and some housing from the 1920s are some of the few vestiges that remain – the record of maps and photographs is rich and extensive, bringing a lively but vanished world back to visibility.

The research went on from December 2022 to involve interviews with older residents of the locality who had lived or worked in Onllwyn to understand better the places evidenced by archival records. Between January and March 2023, eight people (seven men and one woman) participated in these interviews. Semi-structured conversations focused on understanding the area's intertwined material and social fabrics and the experience of remaking from their perspectives. Through them, it became possible to understand how buildings were used and lived locally. Different facets of everyday life in Onllwyn were revealed including the working routines associated with the underground networks of pits and drift mines, and also the coal washery.

2.2 Site survey

The coal washery site was surveyed in August 2022 using a FARO Focus 3d x130 Terrestrial Laser scanner and 2 separate drone surveys using a DJI Mavic III drone as well as a number of photographs for reference. A total of 21 terrestrial laser scans were made using a range of 20-130m and a resolution of 10240 pt/360°. The scans were located using GPS and the units' inclinometer and compass. The drone survey was passed in parallel rows running first EW using vertical and 45-degree oblique views in each direction and then NS. A total of 365 images were used from the first survey and 475 from the second.

Over 600 photographs taken using a Sony RII were used to record the details of the site at a high resolution. These images were also used to record the interior of the main washery shed. Although a single laser scan was made inside the building for scale, a complete digital survey was not undertaken as the detail and complexity of the overhanging elements was deemed to be too challenging to complete in a sensible timeframe.

The resultant data were processed to produce three datasets, using FARO Scene to produce a pointcloud from the laser scanner and also tested in Autodesk ReCap Pro (in an effort to export to AutoCAD more seamlessly). The drone surveys were registered and processed both in Pix 4D Mapper and Agisoft Metashape. Finally, all 2022 pointclouds were joined in CloudCompare before being converted to a mesh using MeshLab for export to 3d PDF. Meanwhile the historic aerial images were registered using Agisoft Metashape but not yet joined to the rest.

2.3 Project extension: Using historic aerial imagery for photogrammetry

In an attempt to push the potential for the generation of an iterative three dimensional record of the site, attempts were made to generate a pointcloud from historic aerial images.

3. RESULTS

3.1 Initial Processing

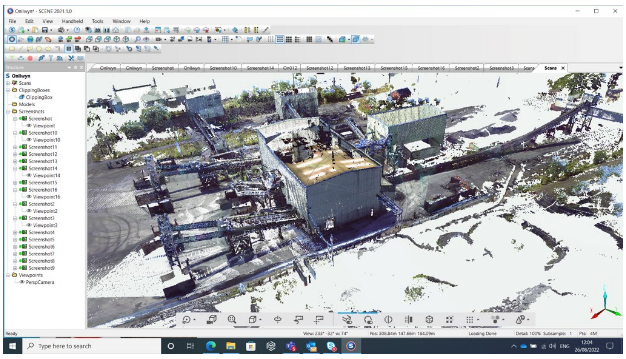

Figure 11. Laser scans registered in FARO Scene

Figure 12. Clipping box showing interior of washery and extent of conveyor captured in laser scans

Using Faro Scene software to register the laser scans, a pointcloud of c. 350m points was generated with a deviation of 15.1mm. As can be seen in Figure 12 the laser scan enabled some ability to capture the interior of the main washeries. It was also particularly useful for the detail it provided on the complex undersides of the gantries (see Figure 11) which the drone survey would omit to record. The 130m extent of the scanner’s range was also particularly useful in enabling the far distant elements of the site to be recorded also. As although the drone could photograph these in 2d images, there was not sufficient time available to photograph the entire workings in adequate detail to build a Structure-from-motion pointcloud of every element.

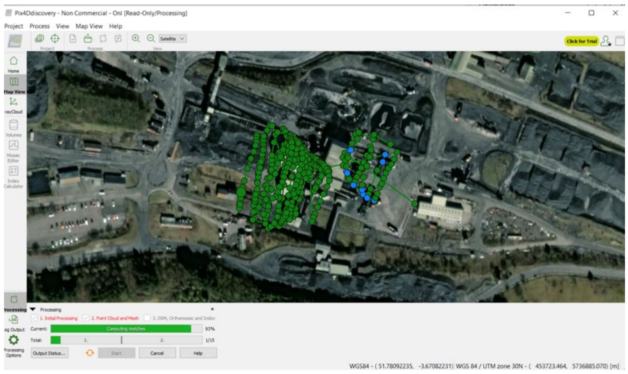

Figure 13. Registration of first drone survey in Pix4D

By contrast, the drone survey of course allowed the external detail of roofs and high-level machinery to be recorded. The first drone survey was processed and registered using Pix4D Mapper, however it proved difficult to subsequently join this with the second drone survey. Perhaps in part this was because several mounds of coal had shifted in the week between surveys as highlighted above.

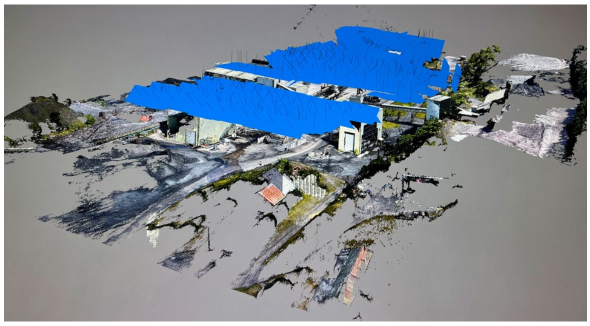

Figure 14. Registration of second drone survey in Agisoft Metashape

The second survey was processed using Agisoft Metashape Professional Version: 1.8.1 which eventually enabled the alignment two sets of photogrammetric data to form a single pointcloud. The pointcloud of 381908 points and tie points was generated. The Dense cloud produced being 99663898 points, high quality.

3.2 Combining pointclouds

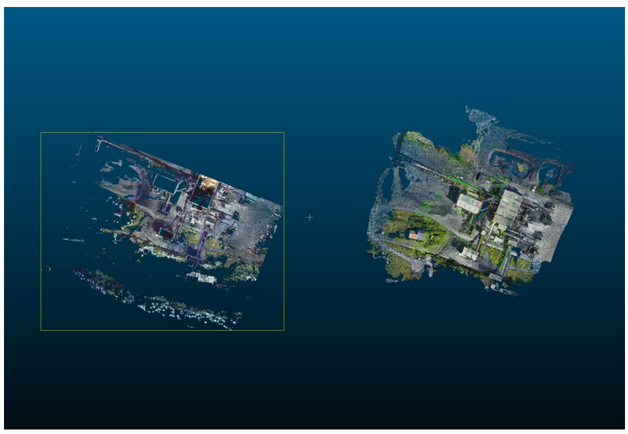

Figure 15. Locating pointclouds from laser scans (left) and drone survey (right) in CloudCompare.

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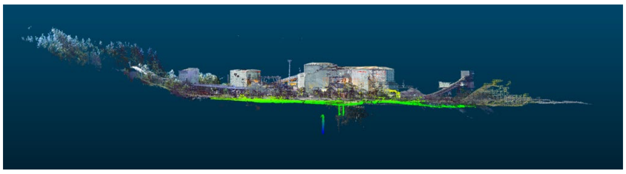

Figure 16. Initial alignment of pointclouds from laser scans and drones in CloudCompare

The two resultant pointclouds from the Laser Scanner and the drone surveys were finally successfully joined using CloudCompare as shown in figures 15 and 16. Figure 16 below shows the depth attributed to the water protruding below the surface. The drone survey was exported as a .LAS file with georeferencing data taken from Pix4D.

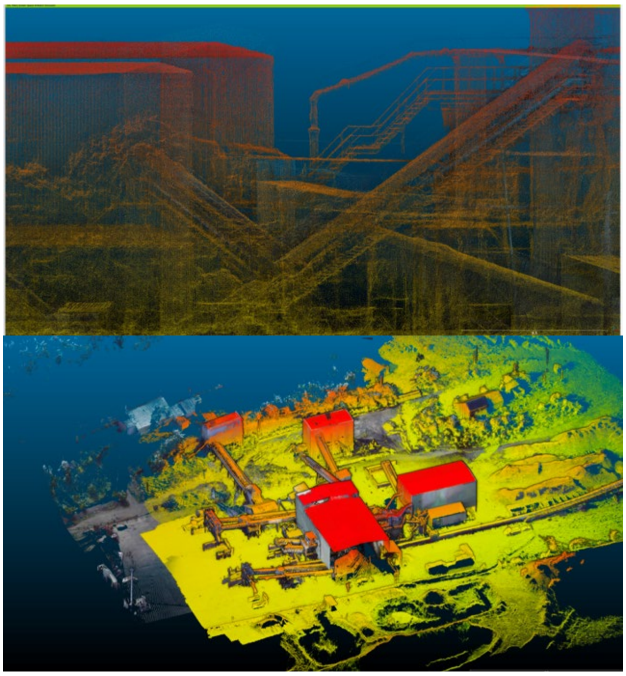

Figure 17. Detailed and Overall alignment of pointclouds from laser scans and drones in CloudCompare

Figure 17 shows the process of alignment using colorised depth maps in detail and at the scale of the site. The complex physical character of the workings made precise alignment by visual means easier than might be the case with less elaborate subject matter and a satisfactory result was achieved.

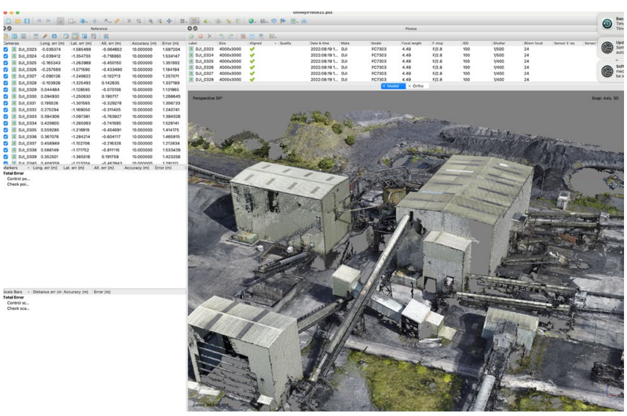

Figure 18. Final combined pointcloud detail

Figure 19. Pointcloud from TLS in Autodesk ReCAP Pro

In order to import the pointcloud to use in AutoCAD. It was necessary to re-register the scans first in Autodesk ReCAP Pro see Figure 19. The idea being that the model could subsequently be linked with other available datasets such as the large-scale LiDAR landscape surveys of South Wales available through Edina DIGIMAP and also other Ordnance survey products. This work has not been completed but remains a possibility for the future.

3.3 Creation of a mesh and paths towards navigable platforms

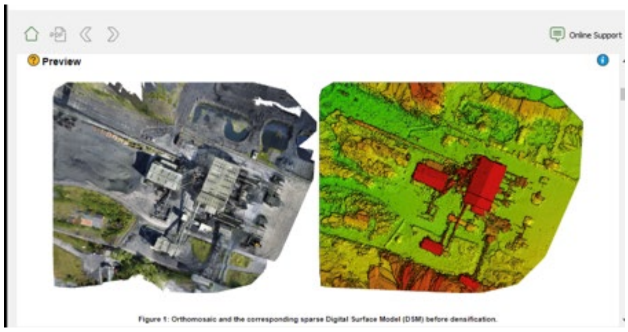

Figure 20. Pointcloud from TLS generated in Autodesk ReCap Pro

Once the pointclouds were joined attempts were made in both Pix4D and MeshLab (Cignoni, P et al 2008) to generate a 3d mesh to publish – this has yet to be completed. Finally, a 3d mesh was generated with 9811986 faces. A navigable 3d PDF was produced for the project team.

3.4 Generating photogrammetric models from historic images

The Royal Commission for Ancient and Historic Monuments in Wales hold a substantive photographic archive including aerial images from which it was hoped to generate a historic pointcloud. Amongst other terrestrial photographs in the collection, not everything is yet catalogued so the selection and curation of images is a manual process. This has potential for future work. A very limited number (14) of high quality black and white historic oblique aerial photographs were available form a survey taken in 1935. In addition, there are a few from 1957, 1994, and 2007. However, there has been some success using the limited number of aerial images that are available to create a "backdrop of the past" that corresponds with current data acquired form drone photogrammetry and terrestrial laser scans. In addition, there is the clear potential to align historic maps and orthogonal aerial images together with manual recognition of buildings in photographs to reconstruct the morphology of the buildings as additions to the pointclouds as an evolving 3d archive.

A 1935 group of black and white glass slides (Evans & Bevan, Neath, 1935) were successfully aligned through the Agisoft Metashape workflow to derive a basic pointcloud. Although only a very small number of images were available, remarkably it was possible to align a number of them and also to identify the previous morphology of the buildings from them. The chequerboard to the left of the image in Figure 21 is recognisable in the historic photographs as the characteristic historic washery building in the inset photograph.

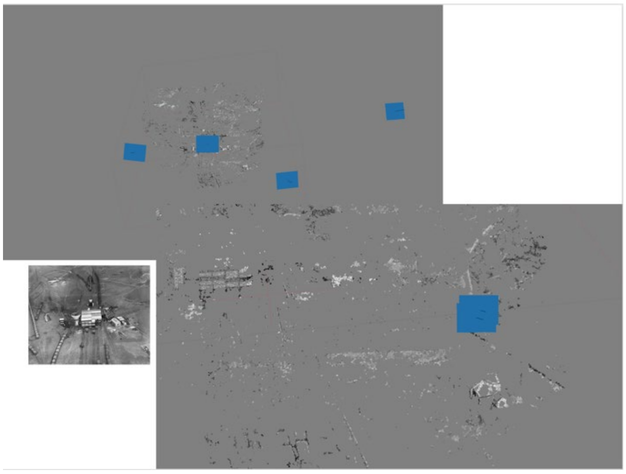

Figure 21. Pointcloud generated from historic aerial images

4. LIMITATIONS

This research was undertaken as a side output to a larger project and had limited funding. The entire photographic, drone and TLS data capture outlined here were undertaken in two days by one researcher accompanied by her partner on the first day. Clearly the uncharacteristically fine, dry and calm weather played a large part in the success of the work. Winds were low which was absolutely necessary for the drone photography in such an exposed location. However, given the complexity and scope of the site this could have absorbed several weeks of work on site for a more substantial team.

The key challenges of processing the models lay in the difficulty of aligning the pointclouds from two sources. In addition, as the ground is literally being shifted there were some inevitable discrepancies between the survey days made a week apart as mounds of coal had been moved in the interim. For the subsequent work using historic images, their black and white nature was not a challenge as anticipated, however limited quantities of material and a lack of obliques generally curtailed the scope.

In terms of generating a navigable mesh, the overall complexity and filigree nature of the construction has made this a step too far to achieve a desirable result. Nevertheless, the pointcloud is satisfactorily detailed and geometrically accurate to sustain further work in creating diachronic models to illustrate the process of decommissioning.

5. FURTHER OPPORTUNITIES

It is hoped that subsequent aerial drone surveys may be possible as the site is dismantled. The intention is to combine these models and to make them navigable as virtual eras of the site, a diachronic model. In parallel, the researchers have collated detailed maps, substantive photographic and archival material and are in the process of collating valuable oral histories that stitch these images together. At the landscape scale, existing Digimap® aerial LiDAR data could be used to embed these models in a very large-scale context that is relevant to the natural and post-industrial valorisation of the site.

At a detailed scale, the Cwm Dulais Historical Society (CDHS)’s archive, along with other archival materials scattered in different institutions, create a distinctive yet fragile record of their community’s mining history. Those who run the CDHS archive are deeply passionate about what has been collected but worry that it may not outlive them, may even end up ‘in the bin’ (Davis & Tam, 2023, 59 min).

The CDHS was established in 1964 as the village of Onllwyn was undergoing its traumatic process of dismantling, described throughout this document. Its principal objective since then has been to encourage and support interest in the local history of the Dulais Valley, helping local people preserve a cognisance of the industrial past. Until late 2022, its president was George Brinley Evans (aged 96 at the time). Today, in 2023, the lead archivist is aged 94, supported by a community member who is in his 80s. Part of the physical archive of photographs and other records is held at the Dove Workshops, but a large part of it, only partially catalogued, is in the archivist’s own home. The gallery on the Society’s website contains a wide range of images. Based on the catalogue, the archive contains over 3000 items of different types, such as photos, documents, and maps, all with relevant metadata painstakingly compiled by the archivist over the years. However, the photos have been scanned at low resolution – a digital collection of high-resolution images does not yet exist. Furthermore, the catalogue has been produced using software that is no longer readily available. Therefore, despite the incredible care that has gone into forming it over the years, this rich archive is as fragile as the physical material, with much urgency for improved storage and accessibility.

Creating a sustainable record of the past for future generations will take investment and expertise to bring together fragile records which, as the CDHS acknowledge ‘is a bit chaotic in places’ (Davis & Tam, 2023, 1 hour 3 minutes). This expertise will need to relate to digitisation, computer modelling, recording, filming, curating, and displaying techniques. Without such efforts, there is a risk that an opportunity to showcase the history of Dulais Valley, which is, at a small scale, a history of the whole of Britain, to people locally and far more widely, may also be lost.

6. CONCLUSION

Figure 22. Final combined pointcloud

Onllwyn has been valorised in cinema through the 2014 film *Pride* which championed the contribution of gay rights campaigners to miners striking in the 1980s. Forty years later, the final impending dismantling of the site is imminent. The fragility of human memories and physical magnitude of the built landscape bring urgency to the aim to develop digital tools which might co-locate the means to share both the spectre and the detail of this vibrant past with future generations.

The site was not an engineered manufacturing works that had been designed but a manifestation of working life demonstrating iterative alterations and re-use all driven by a quest for economy. The main workings of the washery were bought from Canada and fitted into an existing building. The machinery is now destined for a new life in the southern hemisphere.

The responsibility of creating a 3d record which might begin to facilitate the longer-term detailed recording and identification of memories and multi-generational testimony is significant. The specific context of conscious deconstruction raises novel concerns and possibilities for the role of digital documentation.

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