THE INDUSTRIAL ARCHAEOLOGY OF THE NZASM IN SOUTH AFRICA AND SOME OF ITS UNIQUE ARTEFACTUAL RESIDUE

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"Industrial archaeology", according to the Nizhny Tagil Charter for Industrial Heritage (2003) of the International Committee for the Conservation of the Industrial Heritage (TICCIH), the world organisation representing industrial heritage and special adviser to ICOMOS[1] on industrial heritage, is "an interdisciplinary method of studying all the evidence, material and immaterial, of documents, artefacts, stratigraphy and structures, human settlements and natural and urban landscapes, created for or by industrial processes[2]". This charter provides guidance on the definition, the values, identification and legal protection of industrial archaeology.

THE SOUTH AFRICAN HERITAGE RESOURCES ACT AND INDUSTRIAL ARCHAEOLOGY

While South Africa has had a functioning ICOMOS National Committee since 1995[3], there are no formalised structures or adequate provision in legislation for the recording, listing, protection, conservation and sustainable use of the vast industrial legacy of the country as a specifically designated category of heritage resource. Thus, there is no specific provision, neither through definition nor directions for the specific identification of Industrial Archaeology in the South African National Heritage Resources Act (NHR Act) (25 of 1999). Whatever is to be understood of this specialist field of heritage and its conservation in South Africa is either through deduction or extrapolation.

Umbrella mechanisms for Industrial Archaeology in South Africa

Terms in the legislation which apply to industrial archaeological heritage resources are where:

2. (ii) "archaeological" means –
(a) material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
(vi) "cultural significance" means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance;
(xxxii) "place" includes –
(a) a site, area or region;

(b) a building or other structure which may include equipment, furniture, fittings and articles associated with or connected such building or other structure;
(c) a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures;
(d) an open space, including a public square, street or park; and
(e) in relation to the management of a place, includes the immediate surroundings of a place;
(xiii) "site" means any area of land, including land covered by water, and including any structures or objects thereon;
(xiv) "structure" means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith[4];

Hence, for our purposes, these terms will be specifically related to the material residue of the *Nederlandsche Zuid-Afrikaansche Spoorweg Maatschappij* (NZASM), the topic of this essay.

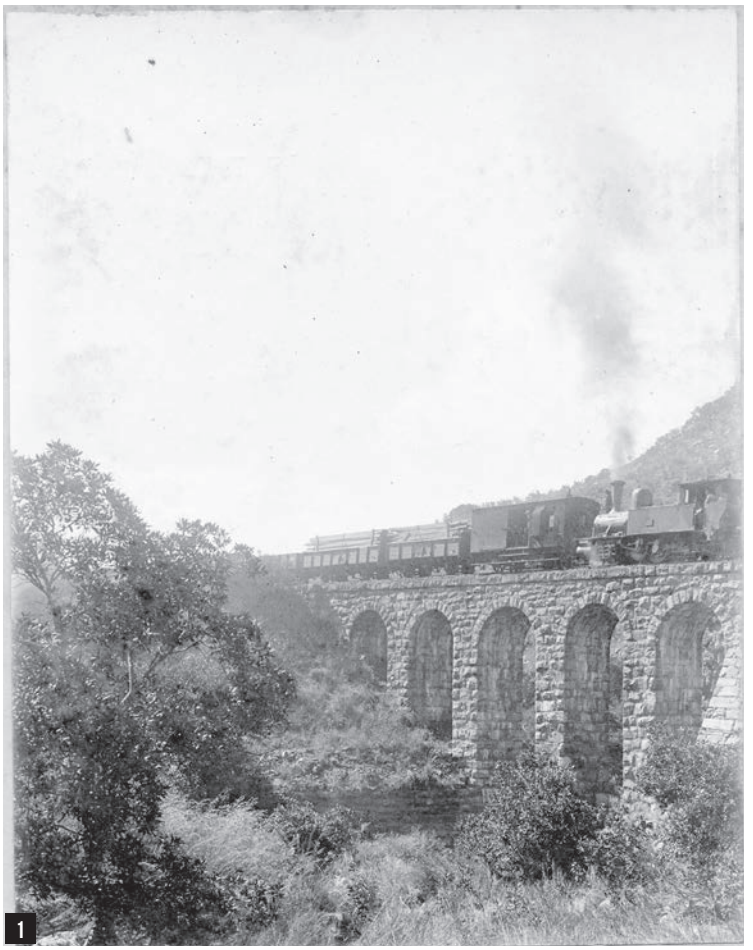
A BRIEF BACKGROUND TO THE *NEDERLANDSCHE ZUID-AFRIKAANSCHE SPOORWEG MAATSCHAPPIJ* (NZASM) (Figure 1)

The NZASM was the company floated on the Amsterdam Stock Exchange on 31 June 1887 for the construction and operation of the *Zuid-Afrikaansche Republiek* (ZAR, Transvaal Republic) railway network, particularly the connection between Pretoria and Komatipoort for the connecting of a line yet to be constructed by the Portuguese Government across its friendly territory, Portuguese East Africa (Mozambique) to Lorenço Marques, now Maputo. This was to enable the Boer Republic a link to the outside world without it having to traverse or be dependent upon British territorial holdings. However, in time this ambition was compromised by the political expedience of linking of the gold-producing region of the ZAR through the Orange Free State Republic to the Cape Colony and directly to the Natal Colony railway systems. There had been various delays in creating the so-called *Oosterlijn* or Eastern Line, brought on by disease, difficult terrain, contractual disputes over import tariffs, and suchlike. Consequently, a rail "tram" – a twist of nomenclature to avoid infringement of rights and contract[5] – to service the mines of the Witwatersrand was first completed by the NZASM, and even links to the neighbouring British colonies preceded the Eastern Line to Komatipoort before the latter was finally opened. The whole endeavour had barely been completed[6] when the Second Anglo-Boer War (1899–1902) broke out.

On 13 September 1899, the Executive Council of the ZAR commandeered the near 1 400 kilometres of NZASM railway lines[7], the staff and the rolling stock of the NZASM under a provision in the concession contract with the NZASM. The entire enterprise was put at the disposal of the Commandant-General.

After the British occupation of Pretoria, the local NZASM archives were taken over by the Imperial Military Railways (IMR) on 03 August 1900. All NZASM properties were confiscated on 12 September 1900, after 1 400 members of foreign staff and their families had been repatriated to Europe by the British authorities. The last serving foreign members of NZASM staff left Komatipoort for the Delagoa Bay harbour, and consequently Europe, on 18 September 1900. Newly-built lines and bridges were consequently destroyed by retreating Boer forces, in cases blown up by demolition explosion experts that had worked in the teams who had helped construct the lines over the preceding decade!

Only in 1908, six years after the signing of the Treaty of Vereeniging on 31 May 1902 to end the Anglo-Boer War, was an arrangement reached between the British government and the NZASM in the Netherlands by which the company would receive more than £300 000 in compensation while the British government undertook to destroy all shares that were in the possession of Crown agents for the colonies. The NZASM was dissolved on 13 October 1908. Thus, ending its colourful, yet ambitious contribution to the infrastructural development of South Africa. Its legacy, however, endures. ›



1 *A 1902 photograph of the old NZASM line under British Colonial rule with a shunting locomotive preparing to drive the ratchet-rail section of the Elandspoort ascent from Waterval Onder to Waterval Boven. The stone bridge is a mass masonry structure rather than of steel so as to counteract the traction of the gearing on the ratchet rail.*

THE NZASM AND ITS HERITAGE SIGNIFICANCE AS INDUSTRIAL ARCHAEOLOGY

(Figure 2)

In the specific instance of the topic of this essay, The built legacy of NZASM, all associated structures are older than 100 years and many are abandoned or no longer in use. These fall under the term "archaeological" and specifically "structure", which then puts them, in terms of the NHR Act (25 of 1999), in the domain of the archaeologists. While recognising the expertise of these specialists, few if any are trained or qualified to deal with products of industrial culture.

Another aspect that needs addressing is the idea of "place" or "site". Rail lines are linear, hence all structures are serially located along their trajectory. If the line is entire, such as in the instance of the NZASM's Barberton Branch Line[8], then the whole trajectory is in single ownership and the "place" or "site" – although attenuated – still geographically and, in terms of single ownership, definable. Over time, however, certain associated structures, such as houses and ganger cottages and suchlike, have been alienated in title and should any protection or declaration be envisaged, would require complex procedures. The problem of the rest of the NZASM heritage is that, over the decades in most instances, there have been various changes and re-alignments of the original rail trajectory of most of the lines. Some lines and the associated structures are abandoned, others subsumed into subsequent constructions. It is thus difficult, for purposes of protection, to always define the 'place' or 'site' of what are serially connected industrial heritage resources.

In our study, we have identified over 360 artefactual remains, including many bridges, houses, stations and culverts still in daily use. With the assistance of Clinton Jackson, Manager: National Inventory Unit at the South African Heritage Agency (SAHRA), who is in charge of the South African Heritage Resources Information System (SAHRIS) web-based data management system, we created an Excel spreadsheet for populating in matching data fields for bulk rapid upload onto the SAHRIS[9]. While this goes some way in establishing the record, it does not address the problem of serial protection.

In South Africa, there are, as yet, no mechanisms in place for defining and inscribing serially connected artefactual residue related to a historically connected episode or enterprise. The closest the legislation comes to this is to have "slavery" as a specific category for consideration in assessing heritage significance. We would suggest that even this category could be broadened to "Unfair Labour Practice" in which case the NZASM endeavour would certainly become more significant, as highlighted by the essay of Barker[10].

THE FIELD AS LABORATORY

The authors undertook a research project 'NZASM Footsteps Along the Tracks' during 2016. The project, located at the Department of Architecture at the University of Pretoria and managed through Enterprises UP, was part-funded by the Royal Netherlands Embassy through their Shared Heritage Fund. The chief objective of this research project was to identify in the field the restant built fabric of the NZASM endeavour of the late C19 in the then ZAR.

Here we raise the issue, as we did in the final project publication[11], of the hegemony of the academy as to what is considered "research" and what its acceptable outcomes might be, hence worthy of reward within the funding structures of academic institutions. In the academic industry of research, the idea prevails that writing or the document are the only primary sources. What is lost is the conception that the structures, if built, and their documentation, both built or unbuilt, are primary sources. Another distraction and perplexity for highbrow academe is that the research results, conveyed pictorially as complementary evidence, are often picturesque, hence academically suspect!

For the architectural researcher, much as for the archaeologist, the artefact is the primary source. It is part of the repository. A built artefact persists through time. Its material sheds, accretes, stays useful, takes on new uses, persists, decays, becomes ruinous or is razed or celebrated as monument or memorial. All the possibilities become a palimpsest of a "text" encoded in its fabric, traces of its existence, or memory that it once was or might have been.

The field is our archive. It is where we find our primary sources. Hence only by researching in the field does one find the artefact. Here we can "read" the artefact. All other sources elucidate, illuminate, verify, challenge or debunk this reading.

2 *An everyday scene on the Gauteng line – a Transnet freight train trundles over the residue of a NZASM stone underway bridge subsumed into later concrete superstructure.* **3** *Bridge over the Kaap River near Avoca along the Barberton Branch line in the region of the Sheba Mine, in the countryside of Rider Haggard's "grim grandeur".*

READING AND RESEARCHING THE CULTURAL LANDSCAPE

In traversing the South African countryside in search of the remnants of the NZASM enterprise, one is impressed by the enormity of the task the builders faced and the incredible achievement of the enterprise. One is also reminded, yet again, of the immense beauty of the country we are privileged to call home.

Clarke is particularly adept at reading the landscape – both in its aerial photography format and also in the field. Our landscape colleague Bernie Oberholzer has prepared a small guide *Reading the landscape: notebook* (2011)[12]. Although aimed at the designer, this is a useful tool in assisting a retrospective reading of the cultural landscape, for it alerts one to features and topographies that need to be considered in understanding the domestication and occupation of the terrain, which, in analysis, alerts the researcher where to look and find residue of occupation and habitation.

One needs also to have an understanding of intent and practices of the designer and makers of the enterprise as well as the available technologies, in this instance those available to and employed by the NZASM in their original creation of the rail line. In other words, one must enter the field intellectually prepared through thorough reading and research to anticipate what one might find and hence direct the gaze so as to be able to explore intelligently.

The maps at our disposal were scant, even, in many instances, non-existent. Names have disappeared or changed. Some sections of terrain are inaccessible. In other instances, features have been ploughed out or bulldozed. Swamps have been drained, or marshes arisen and drowned out distinguishing features. One hundred years is a long time in a rapidly urbanising environment such as the Witwatersrand. But, by the same token, in the realm of the legendary Queen of Sheba of the Barberton-Makonjwa Mountain lands, it is as if it were yesterday!

SOME REMARKABLE ARTEFACTUAL RESIDUE OF THE NZASM ENDEAVOUR

The Barberton Branch Line (Figure 3)

Having mentioned the realm of Queen of Sheba and the Barberton-Makonjwa Mountain lands, (recently declared a World Heritage Site), the Barberton Branch Line in its entirety is a remarkable residue of the NZASM enterprise located within a breathtaking landscape.

Hear the words of Rider Haggard in *She*:

It is quite impossible for me to describe its grim grandeur as it appeared to me while my patient bearers toiled along the bed of the ancient watercourse towards the spot where the rich brown-hued cliff shot up from precipice to precipice till its crown lost itself in a cloud. All I can say is that it almost awed me by the intensity of its lonesome and most solemn greatness[13].

For here we find the Sheba Gold Mine and the Queen's River.

The populace of Barberton felt aggrieved – and short-changed – when the gold-rush town, destined to lie along the Eastern Line, was bypassed when resourceful engineers, fresh from the Dutch Colony of Sumatra (now part of Indonesia), surveyed a path through the Elands Valley, shortening the line and thereby saving on costs. As an aside, the announcement in parliament at the time that the Dutch had found a route through the Crocodile River Valley *poort* was met with hilarity and mirth. Paul Kruger, as president, thundered at the members of the Volksraad: "If I tell you that the Hollanders have found a way through the *Poort* then you don't have the right to contradict me!"[14] The construction of the line through the *poort* was an immense undertaking. The Dutch had found a way, but to clear this way for the track, an average of 2 500 dynamite blasts per day echoed through the valley for a period of 5–6 months[15]!

But what the NZASM won on the swings, they lost on the roundabout.

Initially, after agitation by the good folk of Barberton, a branch line was put out to tender. Lewis and Marks with the local Frank Watkins created a syndicate to build the line and to this end contracted Pettigrew & Co. The same travails as beset the building of the Eastern Line prevailed, namely difficult terrain, disease and the unseasonal deluges of 1895, which washed away the two incomplete bridges over the Kaap River. The syndicate floundered and terminated the contract. The NZASM had no recourse but to take over the construction, completed by them in 1896.

This line has the most impressive steel bridge structures of the NZASM endeavour and traverses a spectacular landscape of mythical association and spectacular ›

4 *An extant cast-iron water tank and steel stand at Pan, a declared Heritage Resource, now ruinous with the residue left to the vagaries of the elements and recycling metal harvesters.*
5 *Semi-circular sandstone block-lined percolation well in the vicinity of Klerksdorp on the South-western Line in the North West Province of the NZASM endeavour.*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7


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beauty. The rail runs as it once did, following the original trajectory, with, in cases, 1890s profile track still in use, and has not suffered the vagaries of electrification.

Water tanks (Figure 4)
Steam needs water and South Africa is unpredictable in its availability at all times. Hence water would have to be stored for replenishing the steam trains at suitable intervals. We have discovered a number of cubic cast-iron tanks of Dutch manufacture still in place along the various routes – large to refill locomotive kettles, and small for household supply to station and residences – few but scarce residue of the endeavour. Scrap steel is a desirable resource so what is left is quite likely to be plundered for the scrap metal recycling market. We suggest that an example of these be dismantled and moved to a place such as the Railways Heritage Museum in George, or the privately-owned Sandstone Heritage Trust in the Ladysmith district of the Free State.

Water wells and Eucalyptus plantations (Figure 5)
As stated above, access to water was imperative. Another scarce feature is the one or two sandstone block-lined percolation wells adjacent to the lines in river courses. These wells were extended upwards to the level of the tracks. This would allow for the ingress of water through the permeable walls ensuring clean and filtered water for steam trains along the route. More research is required on the exact nature of the pumping and storage installation and especially the fuel source: coal, timber, paraffin or muscle? These wells provide an intriguing view into historical water management strategies in resource-stressed environments.

Resource scarcity was a problem along the drier reaches of the so-called South-western Line in the North West Province. These grass plains were devoid of trees. Fuel for heating and cooking had to be provided for the maintenance and operations staff along the line to Klerksdorp and the NZASM seems to have established Eucalyptus woodlots at regular intervals. These can still be observed on aerial photographs today. One question remains: Was this Eucalyptus wood also intended to fire the locomotives? This strategy is known to have been employed by the Caminho de Ferro de Benguela in Angola well into the 1970s.

Rondavels (Figure 6)
The scant past reviews of residue from the NZASM endeavour have focused on the architectural representation of railway structural types: Stations, and, to a smaller extent, the houses for the white employees of the company. Ten years after its founding, the company employed just short of 10 000 people in its maintenance and operations divisions in South Africa, of whom about 7 000 were black South Africans. However, in the course of our fieldwork, two sets of hexagonal rondavels were discovered, at Malelane and Kaapmuiden stations, the former still in use by Transnet for its staff. These are unique and rare remains that provide a window to the unstudied and little-understood contribution of black South Africans to the industrial development of our country.

Wood-and-iron Ganger's Cottage (Figure 7)
One unusual example of a prefabricated wood-and-iron Ganger's Cottage was discovered unrecorded and still used for habitation in Bethal. It stands in proximity to stone-built type houses of the NZASM era, now adapted and extended and in private ownership. Its survival is remarkable, a rare remnant of a once ubiquitous technology of the C19 industrial era.

Fish Belly Girders (Figure 8)
Clarke, as is his wont, did some veldt bundu-bashing in search of a feature that had shown up on the Google Earth map image of the old trajectory after we had previously discovered a reused stone ganger's cottage in the district of Bronkhorstspruit further along the line. A set of fish-belly girders – a rare survivor of a standard type – was found still in place, but derelict, across the stream it once bridged. As was the case with all suchlike steelwork of the NZASM, these were all replaced to carry the heavier loading of the British Colonial era of the early C20. But, unusually, this set, of Dutch manufacture, had only been augmented by additional structural supports for the cross-sleepers, a most unusual, unrecorded and rare find, preserved because the rail trajectory had been later realigned and this relict abandoned in the veldt, still not victim to the scrap-metal harvesters (yet!). ›

6 *Hexagonal rondavels at Malelane along the NZASM Eastern Line still in use by Transnet for its staff. These unique and rare remains form part of the residue of the contribution of black South Africans to the industrial development of our country, an aspect still requiring in-depth study.* **7** *An unusual example discovered in the researches, proximate to stone-built type houses of the NZASM era, is a prefabricated wood-and-iron Ganger's Cottage, unrecorded and still used for habitation in Bethal, a rare remnant of a once ubiquitous technology of the C19 industrial era extensively used in the NZASM endeavour, from cottage to stations and locomotive roundhouses, fabric mostly now disappeared.* **8** *A set of fish-belly girders of Dutch manufacture along the old trajectory of the NZASM Eastern Line in the District of Bronkhorstspruit – a rare survivor of a standard type – intact but derelict across the stream it once bridged, a rare find, preserved and abandoned in the veldt, not yet victim to the scrap-metal harvesters.*

DEPARTURE

That South African heritage is a valuable resource, is acknowledged by the NHR Act. The NZASM residue forms part of this, but its potential as a valuable heritage resource has not yet been unlocked. This heritage is also internationally shared, hence the willingness of the Royal Netherlands Embassy to fund the research into the NZASM through its Shared Heritage programme[16]. Their interest is not in its past glory, but in its future potential: Can the NZASM-built heritage continue to play a role as resource in the socioeconomic development of South Africa?

IN CONCLUSION

The NZASM endeavour was not an isolated incident: Many of the engineers engaged in its strategic planning had cut their teeth in the former Dutch colony of the Netherlands Indies (now Indonesia). A first overview of this historic link between two colonised countries from the global south has now been undertaken by the Cultural Heritage Agency of the Netherlands, highlighting the potential for south-south international collaboration in the exploration of the potential of rail heritage.

We have stated that the field is our archive. A valuable resource to understanding that which we encounter in the field is historic documentation. During our investigations, we consulted the Transnet Heritage Library in Johannesburg: A small but invaluable institution that also contains the historic NZASM period engineering and architectural drawings collection (see http://drisa.co.za). This collection is in a dire state of preservation, but – in part through the attention drawn to it through the 'Footsteps' research endeavour – plans for its conservation are in the making with support from international partners.

First steps towards discovering the potential of NZASM heritage have also been taken. The 'Footsteps' project has created opportunities for a new generation. In 2017, the foundation Zuid-Afrikahuis Nederland (benefactors of the British payout for the NZASM in 1908) funded a visit by Siphiwe Simelane, a student of architecture from the University of Pretoria, to the Netherlands for a period of three months to research strategies for the adaptive reuse of the NZASM industrial heritage in preparation of his professional master's thesis. In this, he will focus on Waterval Boven, a town founded by the NZASM and replete in built heritage of that era. The same foundation has also funded an internship of Lehlognolo Mkhonza, a young tourism management graduate from the University of Johannesburg, under the guidance of Clarke for the investigation of the local economic potential of NZASM heritage sites along the former Eastern Line. This internship report is now under review by the funder for possible future implementation.

The industrial archaeology related to the NZASM rail episode forms a small but significant part of South African rail heritage. It is ideally located to act as a springboard for our exploration of the value of industrial archaeology in general, in part due to international interest (and therefore support) but also because its history winds through some of the most scenic areas of South Africa. Yet, this resource should be valued not only for its tourism potential but primarily for the contribution this infrastructure continues to make to the South African economy daily – nay – hourly. ■

IMAGES SUPPLIED

ABOUT THE BOOK AND THE AUTHORS

The 2018 Corobrick SAIA Award for Excellence in Architecture recipient *NZASM Footsteps Along the Tracks: The Identified Built Residue of the 'Nederlandsche Zuid-Afrikaansche Spoorweg-Maatschappij' (1887–1902)* (Clarke, NJ. and Fisher, RC. assisted by Simelane, S. 2016. Pretoria: Visual Books) publication can be downloaded as a free e-book from http://repository.up.ac.za/handle/2263/57875.

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END NOTES

1. The International Council on Monuments and Sites, a global voluntary organisation of heritage professionals.
2. TICCIH, 2003: 1
3. The statutes were formally presented to the ICOMOS general assembly in 1996. Clarke, 2015: 435.
4. Republic of South Africa, 1999: 7–12.
5. De Jong et al, 1988: 71.
6. New lines had just been or were being surveyed, such as the line from Pretoria to Rustenburg. ZAR, 1899: 150.
7. Clarke, 2017: 75
8. This branch line runs from Kaapmuiden to Barberton in Mpumalanga.
9. The SAHRIS entries can be found at: http://sahra.org.za/sahris/recording-projects/footsteps-along-tracks-fat-mapping-extant-nzasm-built-heritage-structures
10. Barker, 2015: 32–35.
11. Clarke, N. and Fisher, R. 2016. *NZASM Footsteps Along the Tracks: The Identified Extant Built Residue of the Nederlandsche Zuid-Afrikaansche Spoorweg-Maatschappij (1887-1902).* Pretoria: Visual Books.
12. Oberholzer, 2014.
13. Haggard, 1912: 126
14. De Jong et al, 1988: 107
15. Bouten, 1941: 43
16. The Netherlands and South Africa signed an accord on collaboration in cultural matters in 1996, followed by a programme for implementation on Shared Heritage in 2004.