

22. Bibliography

- Anderson, M. S. 2009. *Marothodi: The Historical Archaeology of an African Capital*. 1st ed. Northamptonshire: Attikam Media Limited.
- Baillie, B. 2020. *CHRC Seminar - African Heritage Challenges*, s.l.: Cambridge Heritage Research Centre.
- Baillie, B. & Sørensen, S. M. L. 2021. Globalization, Urbanization and Development in Africa. In: *African Heritage Challenges : Communities and Sustainable Development*. Singapore: Palgrave Macmillan.
- Bakshi, A. 2017. *Topographies of Memories: A New Poetics of Commemoration*. New Brunswick: Springer nature.
- Brockington, D. 2002. Introduction. In: *Fortress Conservation: The Preservation of the Mkomazi Game Reserve, Tanzania*. Bloomington: Indiana university press, 1-31.
- Artefacts, n.d. *Mapungubwe Interpretation Centre*. [Online] Available at: <http://www.artefacts.co.za/main/Buildings/bldgframes.php?bldgid=9546> [Accessed 18 March 2021].
- Balfour, A. 009. *The rebirth of the Neues museum is the latest stage in the architectural and political evolution of the Spreeinsel, Berlin's historic museum island*. *The architectural review*, 225(1347), 88-91.
- Coppolino, F. n.d. *Ruins and new narrations. Design strategies for a cultural re-appropriation of spaces in ruin*. Napels: University of Naples Federico II.
- de Klerk, M. 2001. *Recovering the aesthetics of the Alhambra*. Pretoria: University of Pretoria.
- Fagan, G., 2010. *Mapungubwe interpretation centre*. *The architectural review*, 227(1356), 40-47.
- Fontein, J. 2006. Silence, Destruction and Closure at Great Zimbabwe: Local Narratives of Desecration and Alienation. *Journal of Southern African Studies*, 32(4), 771-794.
- Hays, K. M. 1984. Critical Architecture: Between Culture and Form. *Perspecta*, Volume 21,14-29.
- Hartoonian, G. 2012. *Topology in the Architecture of Alvar Aalto*. Seinäjoki: Alvar Aalto Museum.
- Heizer, M. 1969. *Double Negative*. [Art] (Museum of Contemporary Art).
- Hill, J. 2019. Conclusion: A Monument to a Ruin. In: *The Architecture of Ruins*. New York: Routledge, pp. 294-302.
- Holm, D. 1996. *Manual for energy conscious design*. 1st ed. Pretoria: University of Pretoria.
- Holm, D. & Viljoen, R. 1996. *Primer for energy conscious design*. 1st ed. Pretoria: Department of Minerals and Energy.
- Jordaan, J. & Raman, P. G. 2014. *Ruin cities: sources of nostalgia, consolation, revenge, tectonic landscape*. Cape Town: Cape Peninsula University of Technology.
- Latour, B. 2014. Another way to compose the common world. *Hau: Journal of Ethnographic Theory*, 4(1), 301-307.
- Maape, S. 2020. *Drawing Creepy Places Representing liminal space of Kuruman*. [Online] Available at: <https://www.youtube.com/watch?v=ZmDdVPXMSug> [Accessed 25 March 2021].
- Magdziarz, S. 2018. *How to Carve a Giant*, London: Bartlett School of Architecture.
- Melvin, J. 2018. *The living, the dead and the unborn*. *The architectural review journal*, Issue 1447, 118-123.
- Milne, M., and Givoni, B. 1979. Architectural Design Based on Climate, In: *Energy Conservation Through Building Design*. New York: McGraw-Hill, Inc., 96-113
- MMA design studio, n.d. *Maropeng cradle of humankind world heritage site*. [Online] Available at: <http://mmastudio.co.za/portfolio/maropeng-cradle-of-humankind-world-heritage-site/> [Accessed 18 March 2021].
- Moore, R. 009. *Neues Museum by David Chipperfield Architects, Berlin, Germany*. *The architectural review*, 225(1347), 82-87.
- Pallasmaa, J., 2000. Hapticity and time. *Architectural review*, 207(1239), 78.
- Plowright, P. 2009. *The poverty of contemporary theory in architecture*, Southfield: s.n.

Bibliography continued

- Peter Rich architects, 2020. *Mapungubwe interpretation centre*. [Online] Available at: <https://www.peterricharchitects.com/mapungubwe-interpretation-centre> [Accessed 05 06 2021].
- Roshan, G. R., Farrokhzad, M. & Attiac, S. 2017. Defining thermal comfort boundaries for heating and cooling demand estimation in Iran's urban settlements. *Building and Environment*, Volume 121, 168-189.
- Somol, R. & Whiting, S. 2002. Notes around the doppler effect and other moods of modernism. *Perspecta*, Issue 33, 190-203.
- Steyn, G. 2011. *The spatial patterns of Tswana stone-walled towns in perspective*. Pretoria: Tshwane University of Technology.
- Stone circle tours, 2021. *Stone circle museum*. [Online] Available at: <https://www.stonecircuitours.co.za/museum> [Accessed 18 March 2021].
- Tschumi, B. 1994. Spaces and events. In: *Architecture and Disjunction*. 1st ed. London: MIT press, 7-13.
- van Vuuren, C. J. 2011. *A lifetime in ruins: the farm life of blacks on the Mpumalanga Highveld*, Pretoria: University of Pretoria.
- van Vuuren, C. J. 2001. *Exhibiting the Ndebele: myths, stereotypes and identity*, Pretoria: University of Pretoria.
- van Vuuren, C. J. 2015. *In memory of the Ndebele homestead: women as earthen builders and mural artists*, Pretoria: University of Pretoria.
- van Vuuren, C. J. 2008. *Let's go visit the ruins: oral tradition and settlement reconstruction: two Ndebele case studies*, Pretoria: University of Pretoria.
- van Vuuren, C. J. 2010. *Memory, landscape and event: How Ndebele labour tenants interpret and reclaim the past*, Pretoria: University of Pretoria.
- van Vuuren, C. J. 2006. *Ndebele place names and settlement in Pretoria*, Pretoria: University of Pretoria.
- van Vuuren, C. J. 2017. *The heritage of the cone-on-cylinder dwelling of the Ndebele of South Africa*, Pretoria: University of Pretoria.
- van Vuuren, C. J. 2008. *The intricacy of intangible cultural heritage: some perspectives on Ndebele earthen architecture*, Pretoria: University of Pretoria.
- Viljoen, M. 2011. *The dialectic of ruin*. Pretoria: University of Pretoria.
- Young, J. E. 1994. *The texture of memory*. New Haven: Yale University Press.

Bibliography continued

Charters accepted by the general assembly of ICOMOS

(listed in chronological order of acceptance)

- International Council on Monuments and Sites, **International charter for the conservation and restoration of monuments and sites** (the Venice charter), 1964, available at: https://www.icomos.org/charters/venice_e.pdf [accessed 25 January 2021]
- International Council on Monuments and Sites, **Appleton Charter for the Protection and Enhancement of the Built Environment**, 1983, available at: <https://www.icomos.org/charters/appleton.pdf> [accessed 25 January 2021]
- International Council on Monuments and Sites, **Charter for the protection and management of the archaeological heritage**, 1990, available at: https://www.icomos.org/images/DOCUMENTS/Charters/arch_e.pdf [accessed 25 January 2021]
- International Council on Monuments and Sites, **Charter on the built vernacular heritage**, 1999, available at: https://www.icomos.org/images/DOCUMENTS/Charters/vernacular_e.pdf [accessed 25 January 2021]
- International Council on Monuments and Sites, **The ICOMOS charter for the interpretation and presentation of cultural heritage sites**, 2008, available at: https://www.icomos.org/images/DOCUMENTS/Charters/interpretation_e.pdf [accessed 25 January 2021]
- International Council on Monuments and Sites, **The Burra Charter**, 2013, available at: <https://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf> [accessed 25 January 2021]
- International Council on Monuments and Sites, **Living heritage: A summary**, n.d., available at: <https://www.icomos.org/charters.pdf> [accessed 25 January 2021]

Resolutions and declarations

(listed in chronological order of acceptance)

- International Council on Monuments and Sites, **Québec declaration on the preservation of the spirit of place**, 2008, available at: https://www.icomos.org/images/DOCUMENTS/Charters/GA16_Quebec_Declaration_Final_EN.pdf [accessed 25 January 2021]
- International Council on Monuments and Sites, **The Paris Declaration On heritage as a driver of development**, 2011, available at: https://www.icomos.org/images/DOCUMENTS/Charters/GA2011_Declaration_de_Paris_EN_20120109.pdf [accessed 25 January 2021]
- International Council on Monuments and Sites, **The Nara document on authenticity**, 2013, available at: <https://www.icomos.org/charters/nara-e.pdf> [accessed 25 January 2021]

South African charter

- South African department of arts and culture, **National policy on South African living heritage**, 2009, available at: https://www.maropeng.co.za/uploads/files/National_Policy_on_South_African_Living_Heritage__ICH.pdf [accessed 25 January 2021]

Climate data sources

- Climate-data.org, 2021. Climate Bronkhorstspuit (South Africa). [Online] Available at: <https://en.climate-data.org/africa/south-africa/gauteng/bronkhorstspuit-14251/#climate-graph> [Accessed 15 10 2021].
- Meteoblue, 2021. Simulated historical climate & weather data for Bronkhorstspuit. [Online] Available at: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/bronkhorstspuit_republic-of-south-africa_1015504 [Accessed 15 10 2021].
- Weather Spark, 2021. Compare the Climate and Weather in Bronkhorstspuit and Pretoria. [Online] Available at: <https://weatherspark.com/compare/y/95271~95267/Comparison-of-the-Average-Weather-in-Bronkhorstspuit-and-Pretoria> [Accessed 15 10 2021].

23. Appendix

Appendix A:

A genealogy graph illustrating the various ideas contained within heritage charters, and the overarching paradigm shift that occurs over time, tending from static preservation to situational rehabilitation, and later, a living heritage approach (Author, 2021).

Appendix B:

Three declarations illustrated in a continuum where approaches to managing change sit at the core of conservation practice. A shift from heritage as objects for extraction, towards spaces for generation is noted. Tangible significance paired with an active programme, presents a counter to the threat of globalisation and deterioration. Heritage can be protected and change can be guided to drive development outward (Author, 2021).

Appendix C:

Posters created for the masters mini-conference comparing approaches in representative architecture and activity driven architecture. This study informs the programme driven approach taken in this project rather than visual mimicry of the ruin morphology (Author, et. al., 2021).

Appendix D:

Accommodation schedule for the arrival pavilion showing room functions, estimated energy loads and water requirements.

Appendix E:

Accommodation schedule for the mediation node showing room functions, estimated energy loads and water requirements.

Appendix F:

Accommodation schedule for the heritage gallery showing room functions, estimated energy loads and water requirements.

Appendix G:

Accommodation schedule for the research repository showing room functions, estimated energy loads and water requirements.

Appendix H:

Various tables showing the required photovoltaic panel quantities for each building to meet energy loads.

Appendix I:

Various tables showing the potential rainwater harvesting capacity of each building. Municipal water connections will be required to compensate for water needs during the dryer months. Harvested rainwater will be used in WC and irrigation.

Appendix J:

The full graph showing the scores achieved by the project according to the Sustainable Building Assessment Tool (SBAT).

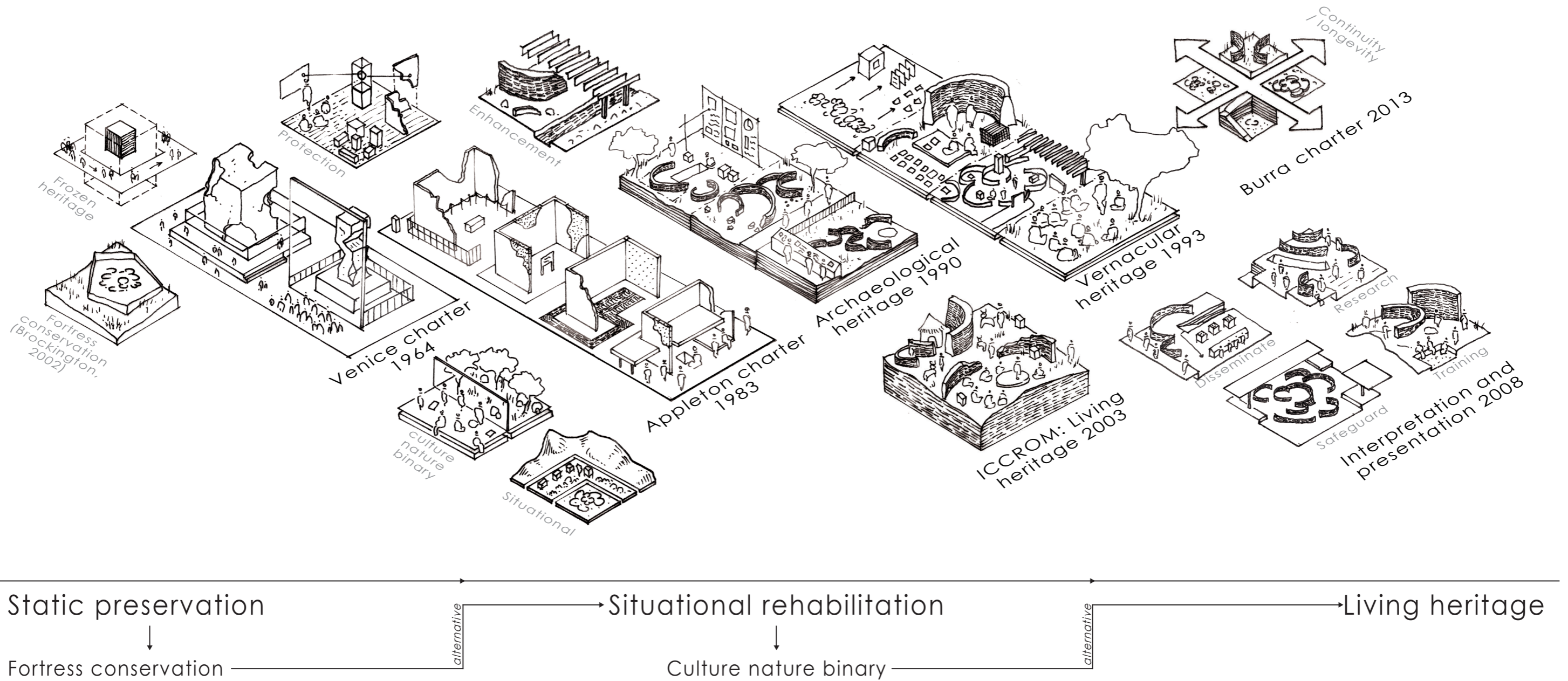
Appendix K:

A retrospective and conclusionary collaged landscape diagram showing the conceptual programmes developed within this project in conjunction with the conceptual programmes generated in the previous year of studies. This collage shows a living heritage intention that has grown over the course of two years' worth of conceptual exploration into the theme of living heritage frameworks at ruin landscapes (Author, 2020-2021).

Appendix A

ICOMOS Charter review

a lineage of heritage practice



A genealogy graph illustrating the various ideas contained within heritage charters, and the overarching paradigm shift that occurs over time, tending from static preservation to situational rehabilitation, and later, a living heritage approach (Author, 2021).

Appendix B

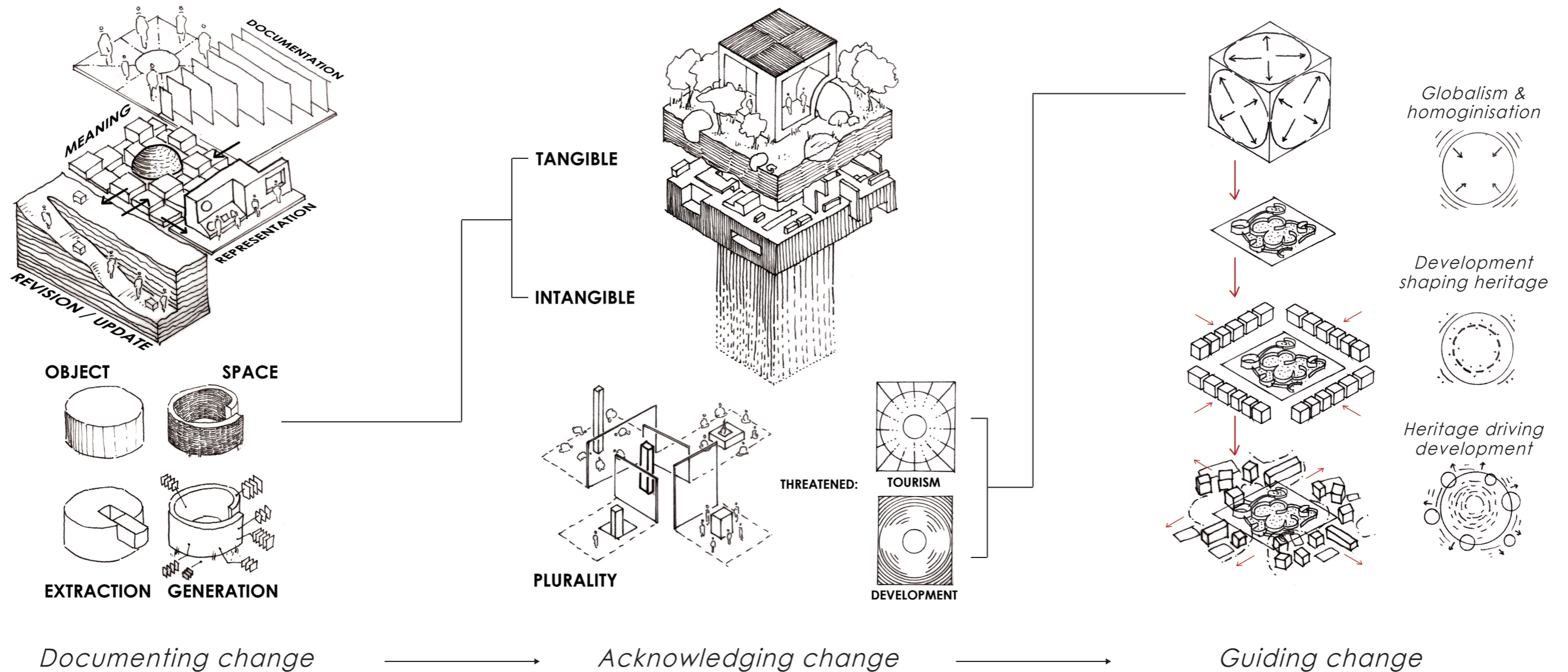
ICOMOS Declaration review

managing change within cultural heritage

Nara: Document on authenticity
1994

Quebec: Preservation of spirit of place
2008

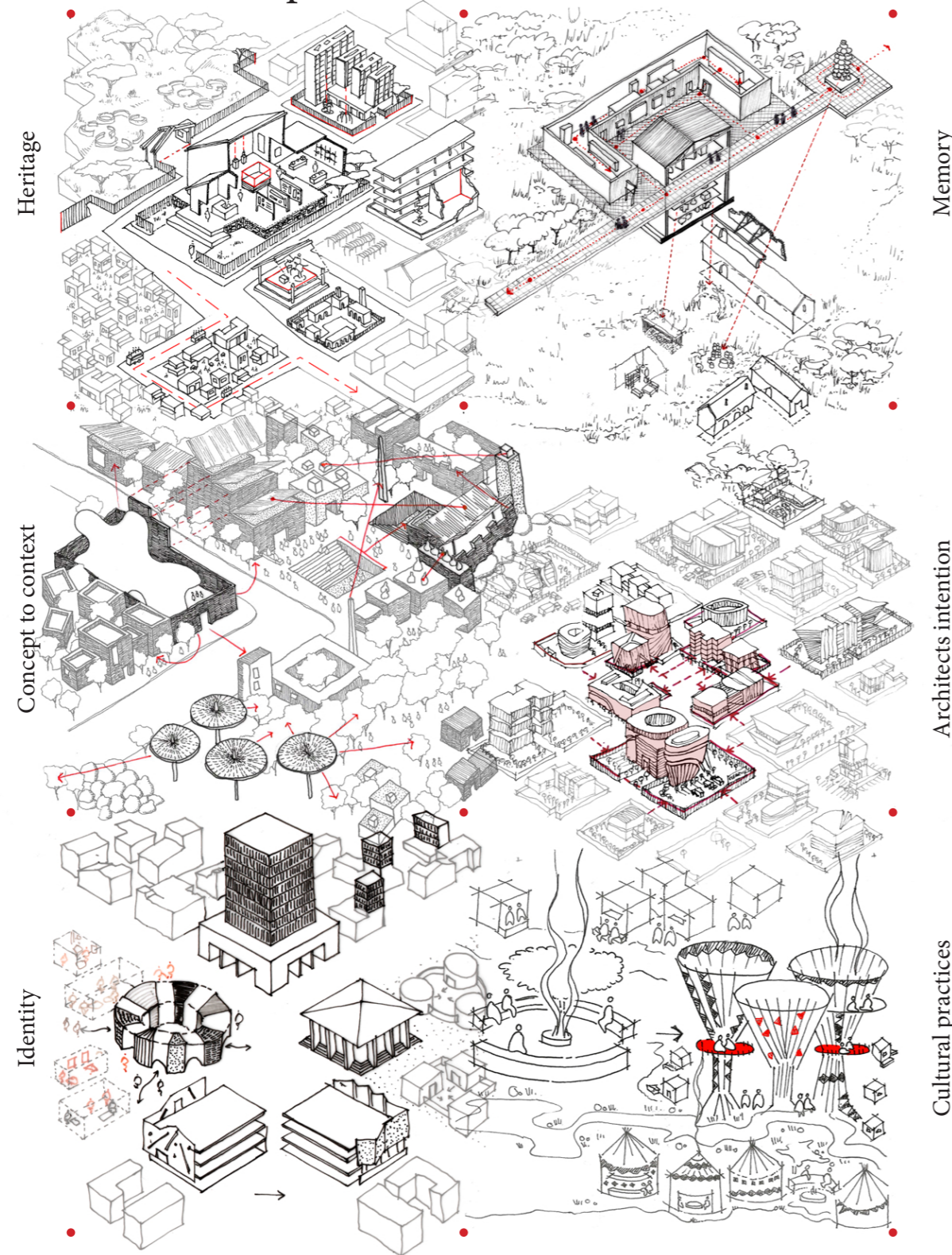
Paris: Heritage driving development
2011



Three declarations illustrated in a continuum where approaches to managing change sit at the core of conservation practice. A shift from heritage as objects for extraction, towards spaces for generation is noted. Tangible significance paired with an active programme, presents a counter to the threat of globalisation and deterioration. Heritage can be protected and change can be guided to drive development outward (Author, 2021).

Appendix C

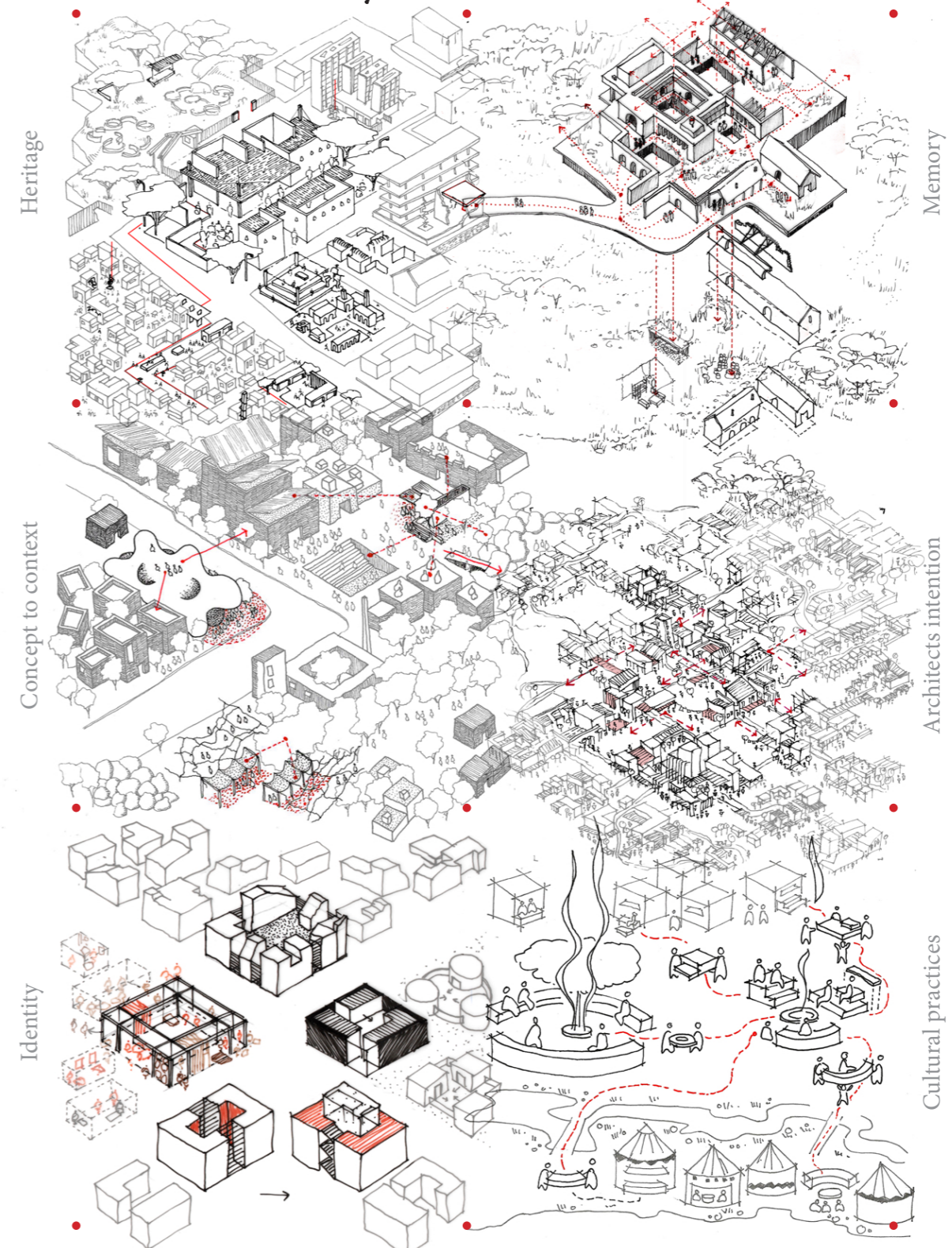
Representative architecture



Translation of meaning found in the cultural, physical or temporal context into abstract, symbolic or ocularcentric architectural form.

Cameron / Laura / Hano / Heike / Wian / Jade

Activity driven architecture



The extraction of meaning- from context- into architectural form requires the architect to understand the factors that contribute to the occurrence of particular rituals or practices, rather than simply recreating the morphology of the referenced situation.

University of Pretoria / 2021 / Masters mini conference

Posters created for the masters mini-conference comparing approaches in representative architecture and activity driven architecture. This study informs the programme driven approach taken in this project rather than visual mimicry of the ruin morphology (Author, et al., 2021).

Appendix D

Arrival pavilion										
Room type	Room function	no.	Total area m2	Occupants	Device type	Total estimated monthly energy load (kWh)	Device type	no.	Total estimated monthly water requirement (ltr)	water type
Accommodation unit	Short and long term accommodation units with ablutions and kitchenettes for residency practitioners and visitors	14	1312.5	Residency practitioners, visitors, community members and leaders	Microwave*	1.8	Sink	1	47250	Potable
					130ltr dual fridge freezer	31.2	WHB*	1	6720	Potable
					Computer	44.0	WC**	1	224	Non-potable
					Short-term interior night lighting	945.0	Shower***	1	33600	Potable
	Computer		168.0	Clothes washing machine****	1	3360				
	Veranda		147		Night-time outdoor lighting	66.2				
Threshold	Transition pavilions between suburbs and ruins	2	158	All	Night-time outdoor lighting	71.1				
Storage room	Shelving for tools, equipment and materials required for operation and maintenance.	1	6	Tradesman, repairman, custodians	Short-term interior lighting	2.2				
Utilities	Solar energy storage and solar heated water distribution and storage.	1	6	Tradesman, repairman, custodians	Short-term interior lighting	2.2	Irrigation (4ltr/m2)		2400	Non-potable
TOTAL			1629.5			1331.6			93554	
					*Assuming 3min/day average use at 1200W Gas stove and kettle and solar water heater limit energy load		*Assuming 4ltr per person, twice daily (2 occupants average) **Assuming 4ltr flush per person, twice daily (2 occupants/unit average) ***Assuming 4ltr/min in 10min showers per person, (2 occupants/unit average) ****Assuming 60ltr/wash in 4 washes per month			Non-potable need Potable need

Accommodation schedule for the arrival pavilion showing room functions, estimated energy loads and water requirements.

Appendix E

Mediation node										
Room type	Room function	no.	Total area m2	Occupants	Device type	Total estimated monthly energy load (kWh)	Device type	no.	Total estimated monthly water requirement (ltr)	water type
Meeting hall	A large space for community discussion and engagement.	1	54	Community leaders, landowners, municipal representatives, municipal and heritage board members, arbitrators	Overhead projector*	12.0				
					Short-term interior lighting	19.4				
					Computer**	8.8				
Offices/ discussion rooms	Rooms to for discussion and documentation of community decisions.	3	36	Community leaders, landowners, municipal representatives, board members	Computer	44.0				
					Short-term interior lighting	13.0				
Utilities room	Storage for tools and equipment required for operation and maintenance, includes a kitchenette.	1	15	Tradesman, repairman, custodians, office workers	Short-term interior lighting	5.4	Sink	1	540	Potable
					Kettle***	15.0				
					Microwave****	3.6				
					130ltr dual fridge freezer	31.2				
Veranda	A large gathering/rest space with a vista of the landscape	1	60	All	Night-time outdoor lighting	27.0				
Ablutions		1	66.5	All	Short-term interior Lighting	23.9	WC*	8	3600	Non-potable
							WHB**	4	3600	Potable
							Urinal***	3	3600	Non-potable
Utilities	Solar energy and solar heated water storage and distribution	1	3	Tradesman, repairman, custodians	Short-term interior Lighting	1.1				
Other	Outside decking and pathways	n/a	115.5	All	Night-time outdoor lighting	52.0	Irrigation (4ltr/m2)		2400	Non-potable
TOTAL			350			256.4			13740	
					*Assuming 8hr/week average use at 300W	*Assuming 4ltr flush per person, thrice daily (10 occupants average)				
					**Assuming 6hr/day average use at 50W	**Assuming 4ltr per person, thrice daily (10 occupants average)				
					***Assuming 25min/day average use at 1500W	***Assuming 4ltr flush per person, thrice daily (10 occupants average)				
					****Assuming 6min/day average use at 1200W					

Accommodation schedule for the mediation node showing room functions, estimated energy loads and water requirements.

Appendix F

Heritage gallery										
Room type	Room function	no.	Total area m2	Occupants	Device type	Total estimated monthly energy load (kWh)	Device type	no.	Total estimated monthly water requirement (ltr)	water type
Studios	Makers-spaces for residency practitioners and community engagement. Platforms for the creation of landscape-inspired artworks and ideas about the future of heritage and heritage production.	5	100	Residency practitioners, community members and leaders	Outlets for various equipments					
					Night-time interior lighting		2.3			
Niches	Small open spaces for the display of artefacts and information for public access	13	73	Visitors from the public, scholars, artists, members of the press	Night-time lighting	26.3				
Storage room	Shelving for artworks and objects produced here during their display rotation	1	45.5	Residency practitioners, scholars	Short-term interior lighting	16.4				
Foyer	Gathering space at the entrance of the building with vistas to the landscape	1	24	All	Night-time outdoor lighting	10.8				
Kitchenette	Small kitchen for use by practitioners	1	11.25	Residency practitioners	Short-term interior lighting	4.1	Sink	1	396	Potable
					Microwave*	5.4				
					130ltr dual fridge freezer	31.2				
Ablutions		1	88	All	Short-term interior lighting	31.7	WC*	8	7200	Non-potable
							WHB**	6	7200	Potable
Utilities	Solar energy storage and solar heated water distribution and storage.	1	3.5	Tradesman, repairman, custodians	Short-term interior lighting	1.3				
Other	Outside decking and pathways.	n/a	119.75	All	Night-time outdoor lighting	53.9	Irrigation (4ltr/m2)		2400	Non-potable
TOTAL			465			183.2			17196	
					*Assuming 10min/day average use at 1200W					
						*Assuming 4ltr flush per person, twice daily (30 occupants average)				
						**Assuming 4ltr per person, twice daily (30 occupants average)				

Accommodation schedule for the heritage gallery showing room functions, estimated energy loads and water requirements.

Appendix G

Research repository										
Room type	Room function	no.	Total area m2	Occupants	Device type	Total estimated monthly energy load (kWh)	Device type	no.	Total estimated monthly water requirement (ltr)	water type
Archive	Short and long term storage of excavated material and artefacts during processing and analysis.	1	84	Archivists, archaeologists, students, scientists, board representatives	Short-term interior lighting	30.2				
Discussion room	Host spaces for discussion and dissemination of knowledge generated about extracted heritage material.	2	78	Scholars, archaeologists, visitors, residency practitioners	Short-term interior lighting	28.1				
					Computer					
Storage room	Shelving for tools, equipment and materials required for archaeological excavations	2	32	Archaeologists, custodians	Short-term interior lighting	11.5				
Kitchenette	Small kitchen for use by practitioners	1	11.25	Residency practitioners	Microwave*	5.4	Sink	1	396	Potable
					130ltr dual fridge freezer	31.2				
Collection zone	Drop-off space for excavated materials	1	27.5	Archaeologists, scientists	Night-time outdoor lighting	12.4				
Laboratory	Laboratory for analysis of excavated material and artefacts.	1	30	Archaeologists, scientists	Long-term interior lighting	21.6				
					Specialised laboratory equipment**	440.0				
					Computer					
Ablutions		1	26	All	Short-term interior lighting	9.4	WC*	8	7200	Non-potable
							WHB**	4	7200	Potable
Utilities	Solar energy storage and solar heated water distribution and storage.	1	4	Tradesman, repairman, custodians	Short-term interior lighting	1.4				
Other	Outside decking and pathways.	n/a	61	All	Night-time outdoor lighting	27.5	Irrigation (4ltr/m2)		2400	Non-potable
TOTAL			353.75			618.7			51192	
					*Assuming 10min/day average use at 1200W		*Assuming 4ltr flush per person, twice daily (20 occupants average)			
					**Assuming an estimated average daily load of 20kWh		**Assuming 4ltr per person, twice daily (20 occupants average)			

Accommodation schedule for the research repository showing room functions, estimated energy loads and water requirements.

Appendix H

	Average daily hours of shortwave radiation (Climate-data.org, 2021)	Average maximum potential energy generation capacity of one 540W panel /day (kWh)
January	9.2	4.97
February	9.2	4.97
March	8.8	4.75
April	8.3	4.48
May	8.9	4.81
June	8.8	4.75
July	9	4.86
August	9.5	5.13
September	9.8	5.29
October	9.8	5.29
November	9.6	5.18
December	9.6	5.18

Potential energy generation capacity /month of each building (kWh)				
Building:	Arrival pavillion	Meidation node	Heritage gallery	Research repository
Energy load required (kWh)	1332	256	183	619
no. of panels required	10	2	2	5
January	1490.4	298.1	298.1	745.2
February	1490.4	298.1	298.1	745.2
March	1425.6	285.1	285.1	712.8
April	1344.6	268.9	268.9	672.3
May	1441.8	288.4	288.4	720.9
June	1425.6	285.1	285.1	712.8
July	1458.0	291.6	291.6	729.0
August	1539.0	307.8	307.8	769.5
September	1587.6	317.5	317.5	793.8
October	1587.6	317.5	317.5	793.8
November	1555.2	311.0	311.0	777.6
December	1555.2	311.0	311.0	777.6

average estimated building load /month (kWh)	number of 540W panel photovoltaic panels required (1.1m x 2.3m)
Arrival pavillion	1332 10
Meidation node	256 2
Heritage gallery	183 2
Research repository	619 5

	Lighting requirement (Lumens/m2)	LED fixture requirement (W/m2)	Usage period	Average usage/24hrs (hrs)	Average energy load/day (kWh/m2)	Average energy load/month (kWh/m2)		
Short-term interior lighting	400	6	Periodic use when occupied*	2	0.012	0.36	0.006	kW/m2
Short-term interior night lighting	400	6	Night time use**	4	0.024	0.72	0.006	kW/m2
Long-term interior lighting	400	6	Extended day and night time use	10	0.06	1.8	0.006	kW/m2
Night-time outdoor lighting	100	1.5	Night time use when occupied***	10	0.015	0.45	0.0015	kW/m2
*Rely on daylighting								
**After hour use from 18:00-22:00								
***Lighting set to seasonal timer from 18:00-04:00								

Various tables showing the required photovoltaic panel quantities for each building to meet energy loads.

Appendix I

Arrival pavilion		Roof surface area (m ²):	1176
Month	Monthly rainfall (mm)	Rain water roof catchment potential (ltr/month)	Water available/day
January	95.8	112660.8	3755.4
February	78.1	91845.6	3061.5
March	63.3	74440.8	2481.4
April	28.9	33986.4	1132.9
May	10	11760	392.0
June	5.1	5997.6	199.9
July	1.9	2234.4	74.5
August	5.2	6115.2	203.8
September	16.7	19639.2	654.6
October	56	65856	2195.2
November	86.8	102076.8	3402.6
December	95.1	111837.6	3727.9
Water requirement		93554	3118

Heritage gallery		Roof surface area (m ²):	166
Month	Monthly rainfall (mm)	Rain water roof catchment potential (ltr/month)	Water available/day
January	95.8	15902.8	530.1
February	78.1	12964.6	432.2
March	63.3	10507.8	350.3
April	28.9	4797.4	159.9
May	10	1660	55.3
June	5.1	846.6	28.2
July	1.9	315.4	10.5
August	5.2	863.2	28.8
September	16.7	2772.2	92.4
October	56	9296	309.9
November	86.8	14408.8	480.3
December	95.1	15786.6	526.2
Water requirement		17196	573

Mediation node		Roof surface area (m ²):	501
Month	Monthly rainfall (mm)	Rain water roof catchment potential (ltr/month)	Water available/day
January	95.8	47995.8	1599.9
February	78.1	39128.1	1304.3
March	63.3	31713.3	1057.1
April	28.9	14478.9	482.6
May	10	5010	167.0
June	5.1	2555.1	85.2
July	1.9	951.9	31.7
August	5.2	2605.2	86.8
September	16.7	8366.7	278.9
October	56	28056	935.2
November	86.8	43486.8	1449.6
December	95.1	47645.1	1588.2
Water requirement		13740	458

Research repository		Roof surface area (m ²):	240.5
Month	Monthly rainfall (mm)	Rain water roof catchment potential (ltr/month)	Water available/day
January	95.8	23039.9	768.0
February	78.1	18783.05	626.1
March	63.3	15223.65	507.5
April	28.9	6950.45	231.7
May	10	2405	80.2
June	5.1	1226.55	40.9
July	1.9	456.95	15.2
August	5.2	1250.6	41.7
September	16.7	4016.35	133.9
October	56	13468	448.9
November	86.8	20875.4	695.8
December	95.1	22871.55	762.4
Water requirement		51192	1706

Various tables showing the potential rainwater harvesting capacity of each building. Municipal water connections will be required to compensate for water needs during the dryer months. Harvested rainwater will be used in WC and irrigation.

Appendix J

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL

1.04

Achieved

SB SBAT REPORT

3.8

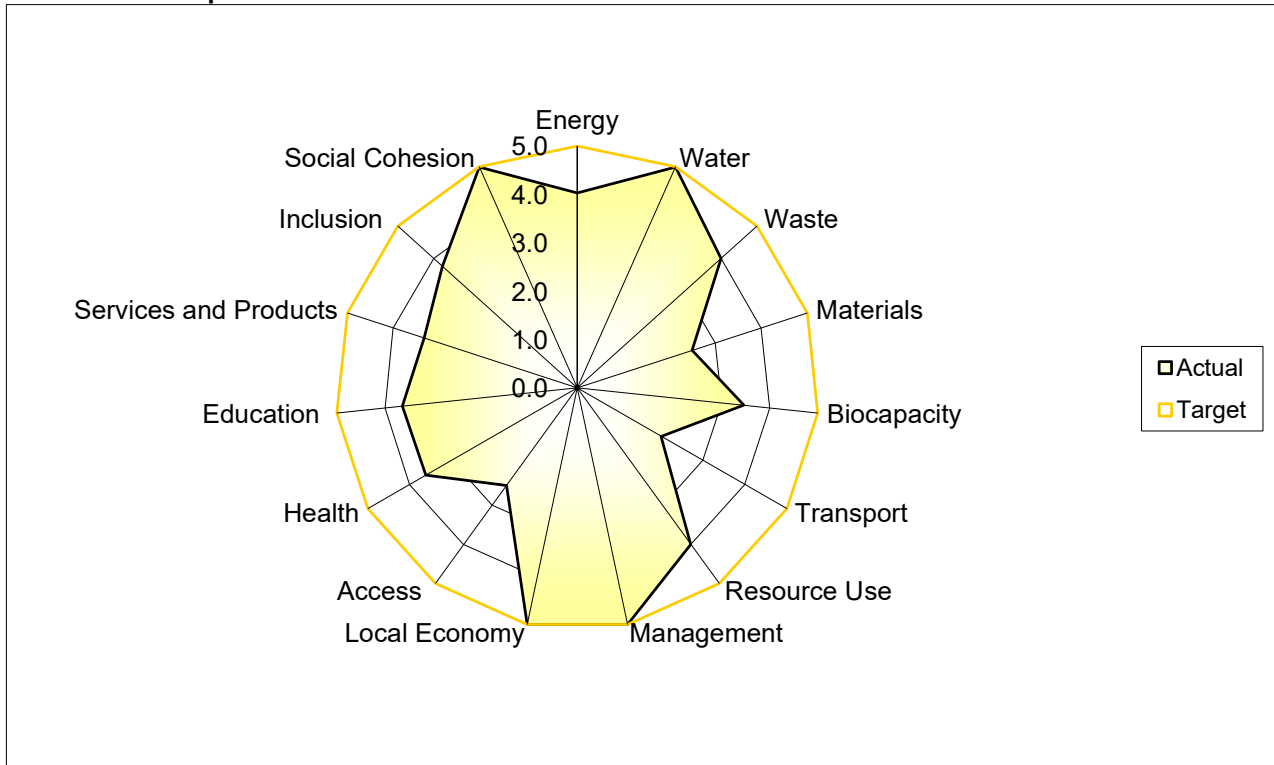
SB1 Project

Living heritage at the Bronkhorstspuit iron age ruins

SB2 Address

Entrance at 41 Drakensburg street, Bronkhorstspuit dam

SB3 SBAT Graph



SB4 Environmental, Social and Economic Performance

Score

Environmental	3.8
Economic	3.7
Social	3.9
SBAT Rating	3.8

SB5 EF and HDI Factors

Score

EF Factor	3.3
HDI Factor	4.0

SB6 Targets

Percentage

Environmental	76
Economic	74
Social	77

The full graph showing the scores achieved by the project according to the Sustainable Building Assessment Tool (SBAT).

Appendix K



A retrospective and conclusionary collaged landscape diagram showing the conceptual programmes developed within this project in conjunction with the conceptual programmes generated in the previous year of studies. This collage shows a living heritage intention that has grown over the course of two years' worth of conceptual exploration into the theme of living heritage frameworks at ruin landscapes (Author, 2020-2021).