

Everynight Life in Informal Settlements

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1. Introduction

In rapidly expanding cities in the Global South, life in growing ‘informal settlements’¹ requires wrestling with questions of accessibility in everyday and, importantly, *everynight life* (Briers 2023).² Many informal settlements are located on the urban periphery, and residents often face long daily commutes to the city centre to access opportunities, requiring them to use public transport in the dark hours of the early morning and night, typically on foot. Residents of informal settlements must also go outside at night to use shared basic services, such as taps and toilets.

In the sketch map shown in Figure 1, a resident of an informal settlement emotionally describes the struggles of accessing basic services when surrounded by constant darkness. These nighttime outdoor activities, forming part of *everynight life*, are often associated with fear and insecurity, despite the fact that commuting to and from job opportunities and access to basic services are explicitly linked to quality of life, which the Sustainable Development Goals, particularly SDG 11, are designed to create. As we approach the eleven-year anniversary of the SDGs, many cities have made progress towards achieving the SDG 11 goals—providing inclusive, safe, resilient and sustainable access to urban life. However, our research³ on nighttime and public lighting in informal settlements suggests that access to urban life at night remains understudied and is not a priority under the current SDG framework.

Indeed, access to streetlighting and electricity remains a persistent source of concern for informal settlements globally (UN-Habitat 2016; Socio-Economic Rights Institute of South Africa 2018) and, in our case study, in Cape Town, South Africa. Residents of informal settlements there identify the lack of adequate public lighting as a major contributor to their worries about *everynight life*. To the best of our knowledge, there is no research on the topic of public lighting, accessibility and

¹ The term ‘informal settlements’ is used here to describe self-built communities. This term is used by the City of Cape Town, the South African government, and South Africans to describe such communities.

² The term *everynight life* has been used before, but in the context of the performing arts in Latin America in the book: Delgado and Muñoz (1997). Briers (2023) uses this term in relation to Lefebvre’s writings on everyday life, refocusing on nighttime experiences.

³ This research was reviewed and approved by the ETH Ethics Commission, application EK 2019-N-19.

evernight life in informal settlements, despite the role public lighting could play in helping cities achieve SDG 11 through increased nighttime accessibility. Public lighting is also a useful lens through which to consider SDG 11 because it touches on technocratic questions of infrastructure access (Is there enough light at night?) as well as less tangible, socio-spatial aspects of access and what it means for urban space to feel safe, inclusive, resilient, and sustainable (Do I feel free and confident when I go outside?). City governments still treat public lighting infrastructure as a technocratic solution to a technical problem, rather than as a technological solution to socio-spatial needs.



Figure 1. Drawing and description of nighttime in Seskona Village Informal Settlement by a local resident. Source: Reprinted from (Briers 2023), used with permission.

Our research in Cape Town studies evernight life experiences in order to understand the socio-spatial relationship between improved public lighting, nighttime accessibility and societal needs in informal settlements. How can public lighting more adequately address obstacles to accessibility and more effectively meet social, psychological, and practical needs of residents seeking a higher quality of evernight life? The following section contains some lessons from our

public lighting project highlighting the struggles of everynight life in the dark and presenting existing barriers to the development of new public lighting solutions in informal settlements. Thereafter, opportunities that could improve everynight life and contribute to achieving SDG 11 in cities with high rates of informality are elaborated on.

2. Shedding Light on Accessibility in Everynight Life

Accessibility—with all its various meanings—is a vital component for cities to realise SDG 11 because it is so heavily linked to feelings of safety, inclusion, resilience, and sustainability. After all, when public infrastructure, common space, and opportunities are difficult to access after dark, they do not meaningfully improve the quality of life. Accessibility at night, and the role it plays in everynight life, should not be neglected, especially in informal settlements.

Studying the extent of access to and need for public lighting in informal settlements reveals many nighttime accessibility challenges, yet the fear of crime⁴ is the first, most obvious impediment to accessibility. Indeed, some research finds that different types of public light influence how safe pedestrians feel at night. For example, a study in Spain found that people felt safer on brighter streets than on streets with adequate, but lower lighting levels (Peña-García et al. 2015). However, this study, like most other research on public lighting, has focused on the Global North, where informality is not a major aspect of the urban landscape.

On many levels, we find that perceptions of safety and security due to a lack of lighting represent a major concern for residents of informal settlements in Cape Town. Residents describe various onerous coping mechanisms that they use to manage their fear of crime. For example, darkness contributes to the fear of crime and motivates many residents not to venture out at night to access basic services, like shared toilets, often grouped in a concentrated area on the periphery of the settlement without dedicated lighting (Figure 2).

Instead, as described by a resident below, most residents of informal settlements use the ‘bucket system’ as a coping mechanism, in which residents use a bucket inside their dwelling after sunset and empty it out each morning after sunrise.

⁴ The distinction between *fear of crime* and *crime events* is important. Understanding the link between crime events and lighting is a complicated task due to a lack of data availability, especially in informal settlements. It is also the *fear* of a crime event that prevents people from venturing outside, reducing nighttime accessibility; thus, we feel this is more useful to study than the correlation between recorded crime events and public lighting.

"The family uses the baby's potty at night for there is not space and we can't go out at night even if you have a tummy bug, you have no choice but to use it at night, close to the door". (Anonymous. Photo Interview. Conducted by Stephanie Briers 17 November 2018)

This inadequate sanitation system contributes to waterborne diseases (Lewin et al. 2007) and compromises people's sense of dignity, which is considered a basic human right in South Africa (The Constitution of the Republic of South Africa 1996). Yet, residents cannot fully realise this basic right to dignity without safe access to adequate sanitation at any hour of the day or night.



Figure 2. Photograph of nighttime in Marikana informal settlement taken by a local resident. Source: Reprinted from (Briers 2023), used with permission.

Economic and social activities in informal settlements are also limited by poor public lighting, both because there is not enough light to see and because people are afraid to be outside. Many informal traders install their own outdoor lighting to attract more customers at night, and social gatherings often take place indoors in a more secure and well-lit environment.

Public lighting has also been linked to greater confidence in walking alone at night and more pedestrian activity, which could improve nighttime access to

basic services as well as provide a sense of freedom to spend time outside at night in public space (Nasar and Bokharaei 2017; Painter 1996). Furthermore, it is not just the physical infrastructure but also the quality of the nighttime atmosphere produced by public lighting that affects social activities in public spaces at night (Slater et al. 2018; Bille and Sørensen 2007; Gandy 2017; Chambers 2012). Different types of public lighting contribute to the degree of social interaction in public spaces. A 2017 action-research project by the interdisciplinary organisation Configuring Light studied the role of illumination in public space using small-scale, incremental lighting interventions to activate nighttime spaces by identifying key social spaces with local residents and collectively deciding how best to light those spaces. They found that their lighting interventions increased the legibility of spaces and the possibility of social encounters (Slater et al. 2018).

Taken together, all of these issues are linked to residents' concerns about the inability to move freely at night.

"It must be clear that we are living in a free country, not a fear country".

(Anonymous. Workshop. Conducted by Stephanie Briers. 13 July 2019)

But thinking about nighttime access to public space, or rather, common space in informal settlements, requires more nuance. Common space in informal settlements, as illustrated in Figure 3, is not as clearly defined or regulated as in formal parts of cities. It is used dynamically, following the rhythm of people's daily lives as well as changing and adapting to various needs and experiences. There is often a temporal blurring of common and private space, where different spaces assume different degrees of publicness depending on the time of day. A public thoroughfare by day may become a private courtyard by night, and activities in a common space may vary from washing clothing to hosting a public meeting (Figure 4).

Public lighting infrastructure could be designed to include both the concepts of regularity, by meeting certain pre-determined technical requirements, and provisionality, allowing people to self-determine and continuously adapt common space (Simone 2004). By supporting this dynamic spatial change, public lighting could foster unexpected and productive encounters between people in their everynight life (Lefebvre 1991).

Through the lens of everynight life, nighttime accessibility is defined by a range of needs, from very practical routines to notions of dignity and values. It is important to not only see public lighting as a technocratic solution that must fit into a regulatory framework, meeting predefined technical standards, but also as a tool that is shaped by and meets the array of abstract and concrete *everynight life* needs. The next section explores this technocratic approach to public lighting.

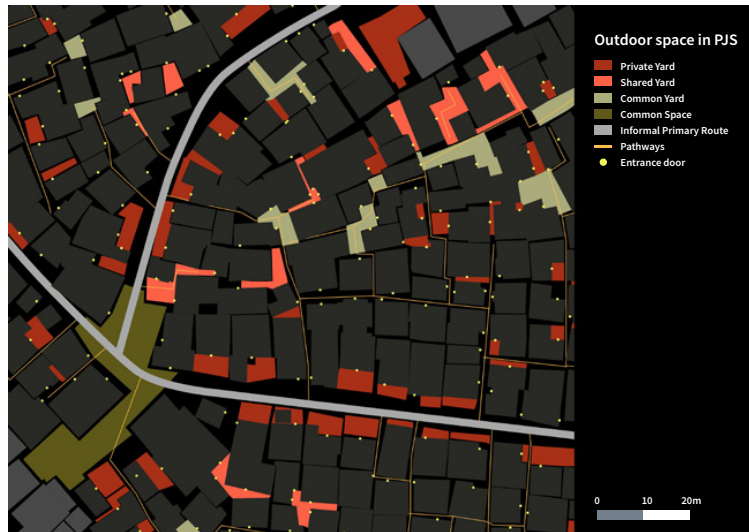


Figure 3. Varying degrees of publicness of outdoor space in PJS Informal Settlement, Khayelitsha. Source: Reprinted from (Briers 2023), used with permission.



Figure 4. Common space in PJS Informal Settlement hosting activities ranging from gambling (a,d), hanging washing, choir practice (b), and children playing (c). Source: Reprinted from (Briers 2023), used with permission.

3. Moving Away from Technocratic Lighting Solutions

The ad hoc, incremental, and often dense nature of informal settlements creates challenges for the provision of high-quality public lighting, such as evenly spaced streetlights. As a workaround, cities often provide these areas with lower-cost, lower-quality substitutes that are easier to install but function less effectively and contribute to a general sense of marginalization. This approach is deeply technocratic: a technical expert identifies a problem and finds the lowest-cost technology to address it. One problem with technocratic solutions is that in simplifying complex societal needs to purely technical problems, service delivery becomes decoupled from social development—the former being a technical-administrative task, and the latter involving a more layered and inclusive process of co-production (Chipkin 2003). The technical approach often undermines broad needs like accessibility, or the goals of SDG 11, because technical experts pre-define needs and develop technical solutions that are not necessarily intended to function as conduits for broader socio-economic development.

In South Africa, public lighting is regarded as a basic service and, thus, a human right (The Constitution of the Republic of South Africa 1996 1996). Yet, one example of such a technocratic response to this mandate is high-mast lighting, 40 m-tall floodlights that cast a deep yellow light in a coverage area 400 m in diameter (CoCT Energy and Climate Change 2019). High-mast lights were first used in the 1980s by the apartheid government in South Africa in areas designated for Black Africans. Today, high-mast lights not only remain the predominant lighting deployed in these areas, where the bulk of informal settlements are located, but they have also been adopted by other countries, such as Kenya, to light informal settlements (Adopt A Light 2009). In Cape Town specifically, the spatial distribution of high-mast lights replicates the apartheid urban planning structure, as shown in Figures 5 and 6. One can easily see high-mast lights jutting out of predominantly Black African neighbourhoods when arriving in Cape Town by plane, but in the city centre or any predominantly white, middle-class neighbourhood, such lights are nowhere to be seen.

From a technocratic perspective, high-mast lights seem like a great solution. The dense, unplanned nature of informal settlements leaves no space for the installation and maintenance of standard streetlights, and pathways are too narrow for equipment and service vehicles to pass. High-mast lights are often installed on the periphery of a settlement, casting light over the informal settlement and making maintenance easier. High-mast lights are also difficult to vandalise, whereas conventional streetlight components are frequently stolen or vandalised.

Furthermore, people cannot easily syphon electricity from high-mast lights. Syphoning electricity from streetlights is common and dangerous, causing fires in informal settlements and exposing residents to live electricity.

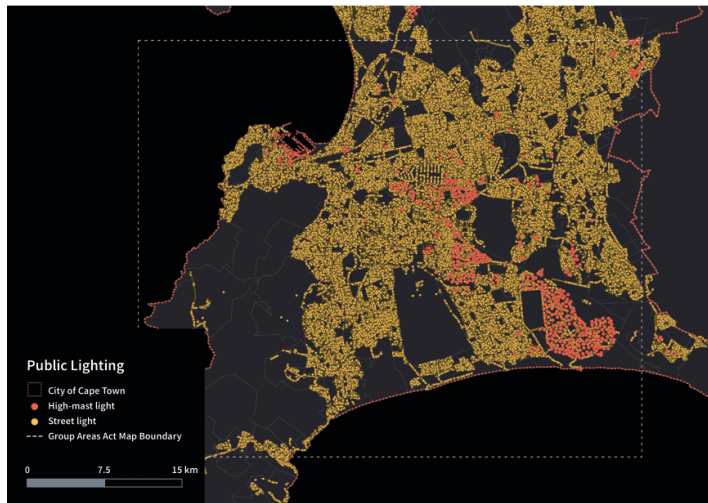


Figure 5. Distribution of public lighting (street lighting and high-mast lighting) in Cape Town. Source: Reprinted from (Briers 2023), used with permission.

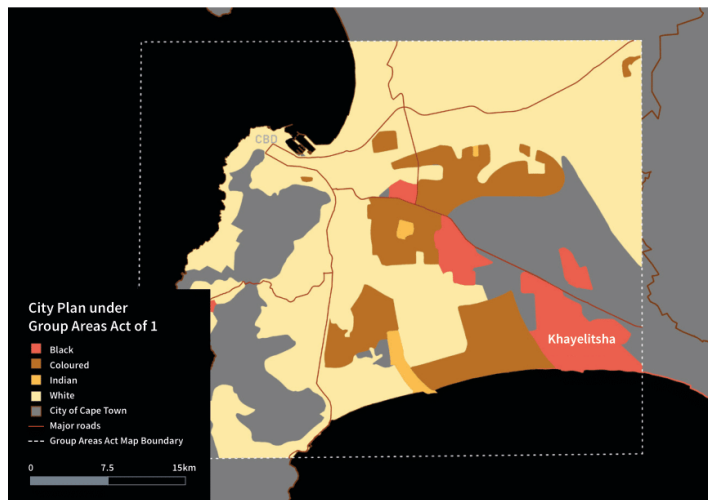


Figure 6. Cape Town Group Areas, racially segregating the population into district areas. Source: Reprinted from (Briers 2023), used with permission.

The problem, however, is that high-mast lights are designed to illuminate open areas such as football stadiums and parking lots. They do not provide even lighting in densely built areas with narrow pathways and instead cast dark shadows, as illustrated in Figure 7. To confirm this, we conducted interviews and carried out our own lighting measurements in an informal settlement serviced with high-mast lighting. With guidance from a lighting engineer and the collaboration of two community leaders, we used a lux meter to take measurements in various positions relative to the high-mast lighting (Figure 8). We found that several spots within the 175 m service radius of the high-mast light had readings below the required lighting level of 1 lux⁵, and others were well above. For example, one reading at a location 70 m and 199 m from two high-mast lights measured 0.06 lux, which is slightly higher than the light a quarter moon produces and far below the minimum requirement. Just a little more than 23 m away from this reading, a second reading (79 m and 178 m from the high-mast lights) showed 34.94 lux—twilight measures 10.72 lux as a comparison. The measurements show the extreme contrasts in lighting that can be found in a relatively small area. Furthermore, widespread, planned power outages, also known as load shedding, are increasingly frequent in South Africa and exacerbate public lighting problems by leaving whole neighbourhoods in the dark (Figure 9).

These problems have not gone unnoticed by the Cape Town public, and most requests for additional street lighting installations come from areas that the City of Cape Town (CoCT) services with high-mast lighting, indicating that high-mast lighting is perhaps not meeting residents' needs (CoCT Energy and Climate Change 2019). Additionally, a surge in violent crime in 2017 inspired a wave of media attention focused on inadequate public lighting in areas largely served by high-mast lighting and with high levels of informality, such as Khayelitsha, an apartheid-planned township designated for Black Africans that is now the second biggest township in South Africa.

⁵ The SI unit of illuminance, equal to one lumen per square meter. The City of Cape Town standard is a minimum of 1 lux in public space.



Figure 7. High-mast lighting casting dark shadows in PJS Informal Settlement. Source: Reprinted from (Briers 2023), used with permission.



Figure 8. Lux measurements taken at each household's front door, where less than 1 lux (blue) is below the City of Cape Town's accepted standards. Source: Reprinted from (Briers 2023), used with permission.



Figure 9. The failure of a single high-mast light affects hundreds of people. Source: Photo by authors.

While those calling for more effective public lighting in hope of curbing violent crime and improving the quality of life in vulnerable informal settlements rightly highlight many barriers to change, the CoCT's public lighting department also acknowledges the shortcomings of high-mast lights and has produced their own evidence to better understand them (Ibid). Yet, existing policies, such as the dual-lighting policy,⁶ coupled with a lack of research on alternative public lighting solutions for informal settlements, perpetuate the continued deployment of high-mast lights. In some cases, legislation and policy prevent the CoCT from providing any lighting at all in historically Black African townships and informal settlements. One such example is that the CoCT cannot implement permanent infrastructure in certain land use zones. This restriction affects many informal settlements located in these zones (e.g., privately owned land), meaning they are not eligible for permanent infrastructure, such as high-mast lighting, since rezoning can be extremely complicated. Both the technology and policy environment are failing to meet the societal needs of everynight life in informal settlements and are thus failing to achieve the standards of SDG 11, highlighting the necessity of a different approach to public lighting.

In response, our research also focuses on understanding channels for more meaningful engagement between the CoCT, residents of informal settlements, and other stakeholders in service of finding more effective alternatives to high-mast lights. The findings from our work reveal new modes of engagement that can create opportunities for the CoCT to provide more effective public lighting infrastructure that is in line with achieving SDG 11 and improving everynight life.

4. Barriers to More Effective Public Lighting

Our research on public lighting started in 2017, shortly before the spike in media attention,⁷ and focuses on identifying and testing public lighting alternatives in informal settlements that could enhance accessibility.

We used various methods including analysing documents, conducting highly participatory fieldwork, and exploring different modes of engagement with a broad

⁶ This policy restricts the City of Cape Town from installing more than one type of public lighting in the same service area.

⁷ Newspaper articles on inadequate access to public lighting in Khayelitsha appeared in two newspapers; "Township left in the dark: Khayelitsha won't get a cent from R62.5m City budget", Cape Argus, (Charles 2019, p. 1); "Khayelitsha residents want better lighting", Sunday Argus, (Mtembu 2017).

range of stakeholders to understand the history and context of inadequate public lighting in informal settlements. Stakeholders include residents in informal settlements across Cape Town, Cape-Town-based lighting manufacturers, non-governmental organisations and government departments, all of whom played an integral part in painting a robust picture of the challenges as well as the opportunities for providing public lighting that is technically effective in meeting the specific everynight life needs in informal settlements.

Where There's a Will, There's Red Tape

The first barrier we encountered was political: the link between high-mast lighting and the apartheid regime. High-mast lighting was first implemented in townships during the late apartheid period in the 1980s, in line with new counter-revolutionary and reformist strategies of apartheid governance, such as The Winning of Hearts and Minds (WHAM) infrastructure upgrading program. This new approach was a response to the increasingly turbulent political situation and international pressure to abolish the apartheid doctrine (Boraine 1988). Thus, many speculate that the apartheid government initially installed the lights to address international demands, while simultaneously allowing for easier surveillance of the township areas by the police and defence force to curb the increased turbulence in the townships (Von Schnitzler 2016). For many, high-mast lights carry the symbol of apartheid, setting areas with high-mast lighting, like Khayelitsha, apart from the rest of the city and intensifying inequality between areas that were racially segregated by the apartheid government.

In an interview with a CoCT officer, however, we learned that moving away from high-mast lighting by adding more street lighting in Khayelitsha is more challenging than it seems. The CoCT's dual-lighting policy does not allow the use of two different kinds of lighting in the same area (City of Cape Town Electricity Service 2013). If an area that has high-mast lighting requests streetlighting, the CoCT needs to remove the high-mast lights before installing streetlights. The dual-lighting policy is particularly problematic for informal settlements with high-mast lighting that are upgraded into formal neighbourhoods with serviceable streets, as they often remain stuck with high-mast lighting. One can only imagine the laborious and costly process of removing 218 high-mast lights in Khayelitsha as well as the potential socio-political issues that may develop in a context that bears the history of mistrust in the government due to the apartheid regime.

In addition to these policy-related barriers, our interviews revealed a lack of trust as a persistent barrier, exacerbated by ineffective stakeholder engagement.

City officials highlighted the challenges of productively engaging stakeholders in informal settlements, describing community hostility around inadequate service provision as a major obstacle to developing a better understanding of lighting needs and preferences. Meanwhile, several residents characterized the CoCT's attempts to engage with them as superficial, expressing that they feel unheard and forgotten even when participating in public meetings. To explore ways the CoCT could ameliorate this obstacle, we tested whether virtual reality could serve as a communication tool for public lighting solutions to facilitate understanding between residents and city officials (Figure 10).⁸ By creating virtual environments representing an informal settlement with different types of public lighting, we allowed both residents and officials to experience the same three lighting scenarios and reflect on their preferences. While this approach is in its early days, both groups of stakeholders found that it helped stimulate an understanding of their lighting preferences.



Figure 10. Virtual Reality experience of public lighting simulations in informal settlements. Source: Photo by authors.

⁸ This was a collaborative project between Stephanie Briers and Michael Walczak, a former PhD student in the Urban Research Incubator at the Institute of Science Technology and Policy, ETH Zurich.

Along with the abovementioned impediments, fair allocation of the budget for public lighting remains one of the largest barriers to improved public lighting. The CoCT did not allocate any of the ZAR 62.5 million (approximately USD 4.5 million) lighting budget for 2019/2020 to Khayelitsha (Charles 2019), which raises the question: who pays for public lighting in Khayelitsha and similar areas with inefficient public lighting? Interviews with the CoCT's public lighting department and sub-council meeting minutes indicate that ward councillors in Khayelitsha spend a substantial portion of their ward allocation on public lighting. Meanwhile, wards in higher-income areas spend far less or none of their allocations on public lighting because they already have sufficient street lighting. In an op-ed for the Daily Maverick, Dalli Weyers, formerly of an NGO called the Social Justice Coalition, points out that while some wards finance public lighting through direct budget allocation, those that do not must decide whether to allocate their limited ward budgets to public lighting or other critical needs (Weyers 2019). Weyers argues that lower-income, predominantly Black wards spend more of their ward budget on public lighting than other wards, replicating historical inequality. To highlight the severity of the inequality in public lighting, Weyers compares the lighting in Khayelitsha and a higher-income, largely white ward called Rondebosch. Using georeferenced lighting data from the City of Cape Town Open Data Portal (2017), we analysed the public light distribution in Khayelitsha and the Southern Suburbs, where Rondebosch is located. Indeed, Khayelitsha, with an area of 46.7 km², has 2825 streetlights and 218 high-mast lights, while the upper-middle class Southern Suburbs is similar in size but has 13,106 streetlights and no high-mast lights (Figure 11).

The sheer density of informal settlements also reveals major technology and policy barriers to better lighting, largely because the CoCT has not designed lighting policies specific to the informal settlement context. A recent CoCT report on Khayelitsha's public lighting situation points to the encroachment of informal structures on formal public pavements as a major barrier to the installation of more street lighting. The report never addresses the density of informal settlements driving this encroachment, nor does it mention that such density also precludes streetlighting within informal settlements. In response to the extreme physical density of informal settlements, as well as zoning regulations and property laws that apply when informal settlements arise on private land, the CoCT typically installs high-mast lights on the periphery of informal settlements, causing poor lighting conditions, which can nonetheless lead to the displacement of households to make space for the large concrete foundations needed for the lights (CoCT Energy and Climate Change 2019).

“The public lighting is lighting but it’s too far from us on this side, because it’s there next to the police station but it’s (supposed to be) lighting for all of us. It’s too far from us, when I come to my house, there’s darkness here in front of my house”. (Anonymous. Interview. Conducted by Stephanie Briers. 17 November 2018)

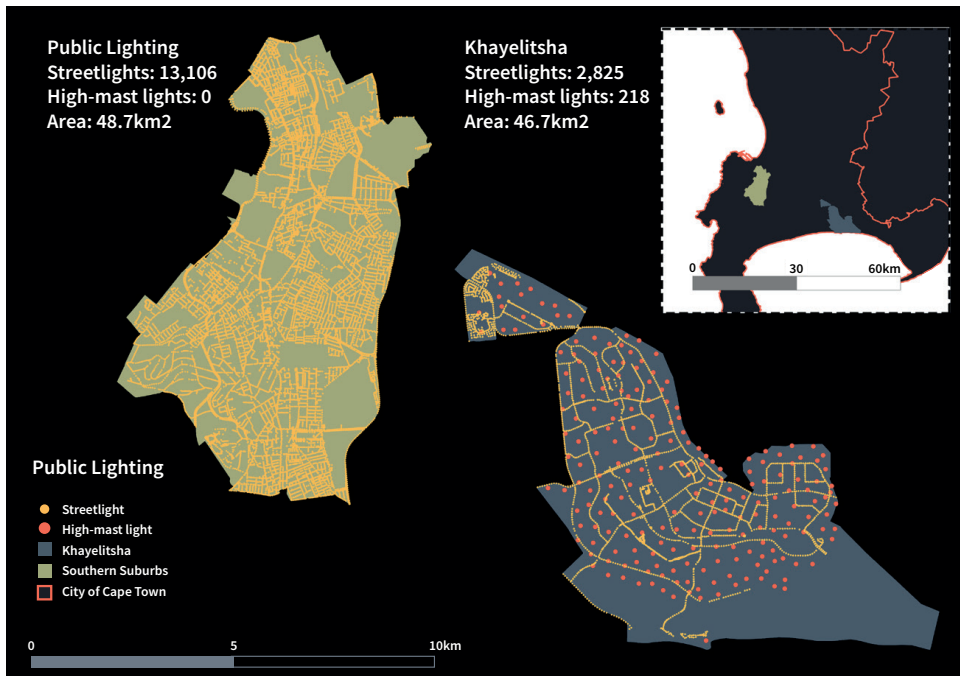


Figure 11. Map of public lighting in the Southern Suburbs and Khayelitsha. Source: Reprinted from (Briers 2023), used with permission.

The various barriers to improved public lighting that persist in policy need to be addressed to provide public lighting that addresses the needs of residents of informal settlements more effectively. Having considered the various limitations to high-mast lighting paired with these policy barriers resulting in poor lighting conditions in informal settlements, the following section considers what lighting alternatives could be considered that would be conducive to safer, more resilient urban environments.

5. Recommendations on Lighting for Resilience

Just as we identified some of the barriers preventing changes to the public lighting status quo in informal settlements, many of our engagements and

investigations uncovered great opportunities for the City of Cape Town to improve accessibility and everyday life in informal settlements with more effective public lighting. One such opportunity is the CoCT Resilience Strategy (CoCT 2019) compiled by the CoCT's new Resilience Department between 2018 and 2019. The department forms part of the Rockefeller Foundation initiative launched in 2013, in which the CoCT was selected to be part of the international Resilient Cities Network.⁹ The Resilience Strategy is a holistic proposal to make Cape Town more resilient to acute shocks, such as drought and infrastructure failure, as well as chronic stresses, such as climate change, rapid urbanization, and lack of housing. The strategy puts forward a framework for a set of actions that can serve as an effective lens through which to understand how Cape Town is already working towards SDG 11. In the proposal, innovation in basic service delivery, including improved public lighting, is highlighted, with an emphasis on engagement with local residents. This echoes our recommendations for more effective public lighting in informal settlements that arose after installing 768 wall-mounted solar public lights with the residents of an informal settlement in Cape Town between 2020 and 2021. Our evidence-based recommendations, outlined in the following paragraphs, encourage innovation in both the engagement process and final product of more effective public lighting for informal settlements.

5.1. Human-Scale

In response to the technical limitations of high-mast lighting as well as the density and dynamism of informal settlements, which makes conventional streetlighting infeasible, we propose a human-scale approach. As demonstrated in Figure 12, decentralised, wall-mounted, outdoor lights installed directly onto each house can provide more consistent, even lighting, particularly in narrow pathways (Briers 2023). These lights do not take up valuable space and serve as both pathway lighting as well as common-space lighting, aiming to increase the legibility and, importantly, accessibility of space.

⁹ <https://resilientcitiesnetwork.org/> (accessed on 3 December 2019).



Figure 12. Wall-mounted solar light installed by the locally trained team in PJS Informal Settlement, Khayelitsha. Source: Photo by authors.

5.2. Solar-Powered

Both the imminent threat of climate change and the persistent struggle with grid reliability in South Africa are major cross-cutting concerns of the Resilience Strategy and the SDGs. Solar-powered public lighting can respond to these concerns by providing sustainable, grid-independent light, and it also reduces risks of electrical fires in informal settlements and does not require advanced training to install (Figure 13). Solar lighting is also flexible and easy to remove, meaning it can be installed in informal settlements built on private property. The distribution of solar-powered public lighting can also be incorporated into the CoCT's disaster

response program,¹⁰ which provides building materials to residents of informal settlements who have lost their homes in a fire.¹¹

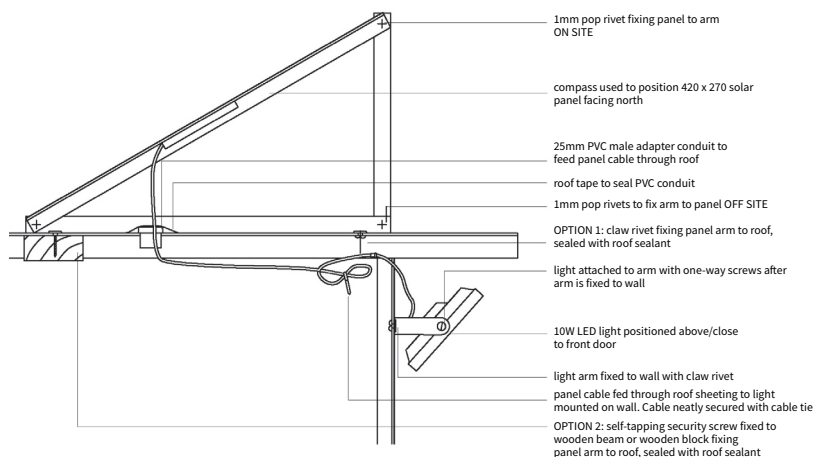


Figure 13. Technical details of installing a wall-mounted solar light, requiring little time and skill. Source: Reprinted from (Briers 2023), used with permission.

5.3. Smart

Although we did not test smart lighting in our project, we see great potential in lighting that offers features beyond illumination. Smart public lighting, which integrates various functions and interfaces, can allow lighting to become more dynamic, controllable, interactive and adaptive to normal variation in daily conditions as well as in response to unexpected disasters (Castro et al. 2013). Thinking of public lighting as part of an interdependent disaster risk management system for informal settlements, with features such as integrated GPS, fire sensors, and colour-responsive LED lighting programmed to alert residents to danger or indicate escape routes, could foster resilience and address SDG 11 by enabling a more effective disaster response and making informal settlements more secure places to live.

¹⁰ This program is overseen by the City of Cape Town Disaster Risk Management Centre.

¹¹ Some local NGOs already distribute solar lighting for indoor lighting in informal settlements after fire disasters.

5.4. Integrated and Inclusive Stakeholder Engagement

Stakeholder engagement is continuously highlighted in both the SDGs and the Resilience Strategy. Yet, in order to achieve *inclusive* stakeholder engagement, we recommend that cities develop an integrated system of engagement, where co-creating policies and solutions redefines who is considered the expert, incorporating residents of informal settlements as societal experts, next to technical and policy experts. We recommend new and experimental methods to ensure inclusive engagement. Stakeholder engagement can be resource-intensive and time-consuming, but co-benefits can be gained through formal collaborations with universities and NGOs such as the collaboration we established in our public lighting project between ETH Zurich, the CoCT, the local community and the Social Justice Coalition, a local NGO. Universities are continually looking for new areas of research, and the city and NGOs can benefit by setting up such mutually beneficial collaborations.

5.5. Local Agency

Fostering local agency was a central element in our wall-mounted solar public lighting project, where a locally trained team has both installed and will work to maintain the lights (Figure 14). Cities could move beyond community engagement to give residents of informal settlements agency where light is co-produced and maintained by employing local residents as *city agents*¹² to implement and maintain the lighting infrastructure in their neighbourhood. Such a system is in line with the existing CoCT Expanded Public Works Programme,¹³ which supports local employment. We propose that city agents are within easy-to-reach locations such as in sub-council offices or satellite offices in informal settlements, where they would manage the City–community interface, providing access to and assistance with policy documents and reporting on service issues in their neighbourhood.

¹² This term was inspired by conversations with CoCT and NGO VPUU's Community Register project, where residents of informal settlements are given agency to collect and manage data for the CoCT in their neighbourhoods (See: Community Register Community Register Office (2018)).

¹³ The EPWP is one of the South African government's key programmes aimed at providing poverty and income relief through temporary work for the unemployed, covering all spheres of government and state-owned enterprises.



Figure 14. Locally trained team installing wall-mounted solar lighting in PJS Informal Settlement, Khayelitsha, Cape Town. Source: Photo by authors.

5.6. *Lessons Learnt*

Implementing this public lighting project brought to the fore many of the resilience issues addressed by the SDGs and the Resilience Strategy. First, the onset of a global disaster—the COVID-19 pandemic—and its follow-on effects highlighted the importance of training residents to install and repair lights. When our access to the informal settlement was limited due to social distancing restrictions, this local knowledge allowed for continued oversight and management of the lights. Second, sourcing quality products can be complicated by supply chains. Working with experienced industry partners to assist with quality control and troubleshooting on imported products is vital. Third, prior to the implementation, many stakeholders expressed concerns about theft and vandalism; however, we credit close collaboration with the local leadership and a local maintenance team with the fact that relatively few lights have been stolen or vandalised. Finally, the very aspects of informality that we aimed to account for with this solution raised unexpected challenges. Since informal homes are typically made of temporary materials, residents frequently renovate, which requires the removal of some or all of the solar light system. Without the local maintenance team, many more lights would have been inadvertently damaged by residents trying to replace a leaky roof or expand their homes.

These lessons highlight how an alternate model of public lighting can both necessitate and open up new opportunities for city governments, like Cape Town's, and citizens to interact, build trust, and collaborate in support of resilient solutions that expand accessibility.

6. **Towards Improving *Everynight* Li(ght)fe**

Public lighting is not the only way to improve accessibility in cities with high levels of informality; however, the barriers and opportunities we have identified emphasise the ways in which planning for informal settlements could evolve in order to achieve SDG 11. Learning from our research in Cape Town, even though cities may put enormous effort into providing basic services in informal settlements, achieving SDG 11 requires considering nighttime access to public infrastructure as more than simply the presence of physical infrastructure.

For the CoCT to achieve both its own resilience goals and SDG 11, we recommend that it transitions away from treating public lighting provision in informal settlements as a technocratic problem to be optimized. Such a shift is particularly necessary given that many of the people developing technology and policy solutions for informal settlements are not intimately familiar with the milieus of both everyday and everynight life in these neighbourhoods.

Despite the many barriers to moving beyond high-mast lights and improving accessibility in informal settlements, there are also many opportunities for Cape Town to transition towards a new approach to public lighting. Cape Town's new Resilience Strategy represents a step towards such a re-framing by placing people at the centre of policy and infrastructure planning to build a more inclusive, resilient city for all of Cape Town's residents, informal or not. Such a framework is exactly the sort of organizing structure that can support the investigations into new technology options and create space for the approaches that we recommend here, which specifically address the nighttime needs and challenges faced by residents living in informal settlements.

This work requires various types of expertise, from the highly technical to the very local. Once we understand what the nighttime accessibility needs are in informal settlements, we can design policy to meet these nuanced requirements. By creating a complex ecology of knowledge producers, including technical experts, designers, planners and residents, the purpose of public lighting can be collectively reimaged to foreground the everynight life needs of the beneficiaries. This kind of engagement is time and resource-intensive, which is why we propose that collaborations with universities and NGOs should be an integral part of policy and technology decisions in the city, and in other cities seeking to learn from Cape Town's experiences.

As a return for that investment, innovative technology and policy design ideas could arise out of thoughtful stakeholder engagement, overcoming the technical and legal constraints that currently make high-mast lights seem like a viable public lighting technology for informal settlements. Both in Cape Town and in other cities with many informal settlements, it is clear that there are many issues and opportunities that are yet to be explored and that public lighting alone cannot solve. However, decentralised, grid-independent infrastructure may deal more successfully with the ever-changing conditions and limited access to electricity so common to informal settlements globally. The broader impact that wall-mounted, solar public lighting could have on expanding accessibility and improving everynight life in informal settlements makes it a vital example of what is needed to achieve SDG 11. Such an approach could also create an environment in which it is possible to understand public lighting as part of an interdependent system of accessible, resilient, sustainable infrastructure and services that truly embodies the complete vision of SDG 11.

"You need to walk free at night. We are the new generation". (Anonymous. Workshop. Conducted by Stephanie Briers. 13 July 2019)

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