Backyard Trails Pilot Project

Part 2: Counting Trail Users

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July 2023

WYNG FOUNDATION

PARKS & TRAILS

TrailWatch

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ABOUT WYNG FOUNDATION

Established in 2011 in Hong Kong, WYNG Foundation is a privately-funded foundation that aspires to enhance the physical, mental, social and cultural well-being of Hong Kong people. Its mission is to design, develop, support and deliver strategic initiatives to increase awareness of and contribute to cohesion, equity, resilience, and diversity of the Hong Kong community. For more information about WYNG Foundation, please visit www.wyng.hk.

ACKNOWLEDGEMENTS

"Part 2: Counting Trail Users" of the Backyard Trails Pilot Project provided the WYNG Foundation and Parks & Trails an unprecedented opportunity to branch out into new research methodologies, when in 2022–23, we deployed custom-built infrared people-counting sensors at a number of backyard trails throughout Hong Kong. This was a complicated undertaking involving many technical challenges and lessons learnt. It could not have been completed without the creativity, know-how, problem-solving skills, and dedication of many people. First, I would like to thank the talented engineers Ambi Yuen, Keith Lam, and Tony Kwok at Peanut King Solution, who designed, tested and improved the people-counting devices as well as provided technical support during the project. But Ho-ming, who served as this project's technical adviser, played an invaluable role in supervising the development of the sensors and in troubleshooting any issues during implementation. My co-author and research assistant Yeung Ha Chi spent countless hours sorting and analysing the data, helping to make coherent sense of a massive amount of information. The research also could not have taken place without the hard work and on-the-spot problem solving of our fieldwork assistants, who installed and collected the sensors in the field. They include Wa Ka Cheong, Jonathan Yip, Michel Lui, Yip Ka Yun, Debby Chan, Van Chan, Jacky Leung and Ng Chi Wan. Thanks must also go to Bill Leverett for editing the manuscript, Yanyan Yip for extensive proofreading and feedback, Agnes Cheng for enriching the findings with her trail-specific insights, and Coco Au for providing the translation of the executive summary. Finally, I would like to thank Sum Kwong, Jason Chui at Parks and Trails for organising the launch of this report and sharing this research with the public.

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Executive Summary

Backyard trails, most of which are located on green belt land, are a valuable recreational and natural asset to the city. However, not much research has been done on how many people use these trails and their typical usage habits. The two-part Backyard Trails Pilot Project was therefore launched to help fill these knowledge gaps. In Part 1 of this project, eleven trails were mapped and photographed to document the diversity of activities taking place on them. Here in Part 2, pedestrian flow statistics were collected on ten of those trails in order to quantify actual trail usage and observe the ways in which trail use changes throughout the day, over the week, and through different seasons. These figures help to demonstrate the value of backyard trails to the community and promote more care and attention to their planning, management, and preservation.

In July–August 2022 and December 2022–February 2023, custom-built battery operated infrared people counting sensors were installed next to walking paths on ten selected trails throughout Hong Kong. These trails included Duckling Hill, Fu Yung Shan, Hammer Hill, Mount Davis, Shum Wan Shan & Ping Shan, Sir Cecil's Ride & Mount Parker Lower Catchwater, To Fung Shan, Tuen Mun Trail, Woh Chai Shan & Garden Hill, and Wu Tip Shan. The sensors were left in place for a period of 6 to 12 days at each location. The sensors counted the number of people ("human presences") passing by and logged whether they were passing from left to right, or right to left. The figures that were collected are presented and analysed in this report, but should be regarded as preliminary due to the logistical and technical challenges encountered. In the future, follow-up studies may be conducted to fill the gaps with better data if the technology can be improved.

KEY FINDINGS

1. The median backyard trail saw roughly 400–500 visitors a day on weekdays and 700–800 visitors on weekends.

Figures varied from trail to trail. The least well-used trail (Mount Davis) saw about 50 visitors per weekday and about 200–300 on weekends. The best-used trail (Wu Tip Shan) saw over 1,200 visitors on weekdays and over 1,500 on weekends. These figures are roughly comparable to attendance at gazetted beaches, which attracted an average of about 700 people per day during lifeguard season in 2021–2022 according to the Leisure and Cultural Services Department (LCSD).

It should be noted that the trail use estimates contained in this report are expected to be on the low side. Most of the trail networks are complicated and the research team lacked the resources to monitor every single trail entrance and exit. It is expected that some trail users were not captured by the sensors.

2. Neighbourhood trail users do not only consist of morning walkers.

Many backyard trails serve mainly neighbourhood users who are often characterised as "morning walkers". However, the data show that neighbouhood trail users do not only visit in the morning. In the summer, most "morning walkers" actually walk in the morning. Trail activity usually begins at around 5:00–6:00 a.m. (sometimes earlier), rises sharply until about 9:00 a.m., and then falls dramatically by lunchtime. However, this is often followed by another slightly smaller peak during the late afternoon. In winter, trail use is more evenly spread out throughout the day. There was a more even balance between the number of people in the morning and in the afternoon. The peaks were gentler and spread out over a longer period, and more people stayed on the trails at noon.

3. Most backyard trails are well-used year-round.

While the conventional wisdom is that Hong Kong's hiking season runs from October to May, we found little evidence that most backyard trails were more heavily used in winter than in summer. While technical problems (detailed in Section 2) meant that the figures collected in summer 2022 and winter 2022–23 were not directly comparable, most backyard trails saw similar numbers of users during both seasons. Instead of avoiding the trails in July and August, people adjusted the time of day of their visits, going early in the morning and late in the afternoon. The few locations that did detect many more visitors during the winter were either well-known tourist attractions (i.e. the path leading to the

10,000 Buddhas monastery at To Fung Shan in Sha Tin), or part of famous hiking trails such as the Wilson Trail or MacLehose Trail.

4. Many backyard trails are used throughout the entire week, and only some attract large numbers of weekend visitors.

While backyard trails had more visitors on the weekends than on weekdays, at many trails, the difference was not large. Woh Chai Shan in Shek Kip Mei, which attracted almost the same number of people on weekdays as on weekends, was the clearest example of this. Altogether, this data points to most backyard trails serving as neighbourhood green spaces with a consistent base of local users. The exceptions to this were backyard trails that were connected to country parks and formed part of longer hiking routes (e.g. Sir Cecil's Ride), those with significant tourist attractions (e.g. To Fung Shan), and those with limited local pedestrian accessibility (e.g. Mount Davis).

5. Visitors seem to spend about 1–2 hours on most backyard trails.

The people-counting sensors had the ability to detect whether people were passing from left to right, or right to left. By installing sensors near trailheads, it was possible to detect when people entered and left the trail network. At most backyard trails, a rise in arrivals was followed 1–2 hours later by a rise in departures. The number of people entering and exiting closely tracked each other throughout the day, which suggests that most people spent about 1 or 2 hours on the trail. However, on backyard trails that were connected to longer, well-known hiking routes, large numbers of people were detected arriving in the late morning, or leaving in the late afternoon.

6. As expected, rain decreases backyard trail usage, but some people still go during amber rainstorm warnings.

During the data collection periods, there were 12 days with significant rainfall (more than 2mm in a day). This enabled a preliminary comparison of trail activity on fine days and rainy days. As expected, trail activity tended to decrease as rainfall increased. Light rain (2–4mm a day) appears to decrease trail use by around 10–15%. Moderate rain (5–15mm) seems to reduce trail use by around 20–30%. In heavy rain (30mm or more), trail use decreases by about 45–55%. However, even during very poor weather conditions—amber rainstorm warnings, thunderstorm warnings, T1 and T3 signals—trail activity was still at around 45% of the normal level. There are some users who are not put off by severe weather, and who might even be attracted by it.

TRAIL SNAPSHOTS

"Typical" backyard trails:

About half of the trails studied had similar usage patterns and could be grouped together into a typical backyard trail profile. These trails were well-used throughout the week and in both summer and winter. While they attracted more visitors on the weekends, the difference was not dramatic. Their hourly foot traffic also fit the "morning walker" activity patterns described above. These usage characteristics are consistent with places that serve mostly local residents rather than weekend hikers or tourists.

Duckling Hill

Location: Tseung Kwan O
Weekday visitors: At least 500–650
Weekend visitors: At least 700–850

Duckling Hill is quite well-used year-round and on both weekdays and weekends. However, one sensor on Lin Yuen Path which lies to the west of Duckling Hill and provides access to the Little Hawaii Falls detected substantially more weekend visitors. Lin Yuen Path was also the only part of the trail where most users were found walking in the same direction, which means it is used as part of a well-known hiking route.

Hammer Hill

Location: Diamond Hill/Ngau Chi Wan
Weekday visitors: At least 450–600
Weekend visitors: At least 600–700

Hammer Hill is quite well-used year-round and attracts moderately more visitors on weekends than on weekdays. It also provides a connection between Choi Hung and Ma On Shan Country Park. Part of the trail network appears to be used as a shortcut between two residential areas on either side of a narrow "bottleneck" in the hill. The part of the trail closest to Tai Mo Shan Country Park attracts comparatively more weekend users and appears to be more subject to seasonal fluctuations in use.

Shum Wan Shan & Ping Shan

Location: Kowloon Bay/Jordan Valley
Weekday visitors: At least 500–600
Weekend visitors: At least 600–750

Shum Wan Shan and Ping Shan are two interconnected hills separated by the now-defunct Jordan Valley Main Dam. It is well-used both year-round and throughout the week. However, Ping Shan appears to attract substantially more weekend visitors than Shum Wan Shan because of its closer proximity to Jordan Valley Park and because it provides a route between Jordan Valley Park and Kowloon Bay.

Wu Tip Shan

Location: Fanling
Weekday visitors: 1,200–1,350
Weekend visitors: 1,500–1,600

Wu Tip Shan is located on the western side of Fanling. The initial section of the trail is relatively gentle and completely concretised, but it also provides a connection towards challenging hikes on Tai To Yan and Kai Kung Leng in Lam Tsuen Country Park. It attracted well over a thousand users on weekdays plus a few hundred additional weekend hikers. Of all the trails measured, it was the mostly heavily and consistently well-used on both weekdays and weekends, summer and winter. In popularity it was rivalled only by Sir Cecil's Ride and Mount Parker, whose trail use estimates are significantly understated due to missing data.

Woh Chai Shan and Garden Hill

Location: Shek Kip Mei
Weekday visitors: At least 800–850
Weekend visitors: at least 900–1,150

Woh Chai Shan and Garden Hill are a pair of small hills located within 500m of each other in the middle of Shek Kip Mei. They are completely surrounded by urban development. Woh Chai Shan, also known as Bishop Hill or Mission Hill, is also the location of a historic early 20th century service reservoir that has become a local attraction since it was rediscovered in 2020. Woh Chai Shan is, apart from the tour groups to the reservoir, very much like a typical backyard trail, attracting very similar numbers of visitors on both weekdays and weekends and year-round. Garden Hill is a different story. It is an Instagram spot well-known for its sunset views, and therefore attracted substantially more visitors on the weekend and during the winter. Due to its extremely urban location, it also had visitors very late at night, sometimes even as late as 1:00 or 2:00 a.m.

"Atypical" backyard trails

Atypical trails did not fit the typical profile for various different reasons. At some, trail use patterns were complicated by mixed land uses including places of worship and village houses, which introduced different categories of users with different behaviour patterns. Others were located along popular hiking routes or near tourist attractions and therefore saw larger swings in visitorship from weekdays to weekends and from summer to winter. Some were poorly used during weekdays due to poorer accessibility.

Fu Yung Shan

Location: Tsuen Wan
Weekday visitors: At least 200–250
Weekend visitors: At least 350–500

Fu Yung Shan is both a backyard trail and part of a longer hiking route that connects urban Tsuen Wan to Tai Mo Shan Country Park. While bad weather and technical difficulties limited the amount of data collected from Fu Yung Shan, the available data suggests that it has a regular morning walker presence, and is fairly well-used year-round. However, based on the limited data available (weather and technical difficulties were encountered), it appears to attract substantially more visitors on weekends than weekdays. A large area of the hillside is occupied by numerous Buddhist temples and village houses, so certain parts of the trail network appear to be used by mainly religious worshippers and villagers who have different daily habits than recreational walkers.

To Fung Shan

Location: Sha Tin
Weekday visitors: At least 400 (July 2022), at least 1,000 (February 2023)
Weekend visitors: At least 750 (July 2022), at least 1,600 (February 2023)

To Fung Shan is a hillside on the north-west side of Sha Tin between Tai Wai and Sha Tin New Town Centre. Its trails provide access to major tourist attractions such as the 10,000 Buddhas Monastery and the Lutheran seminary, and also connect to Shing Mun Country Park. The hillside is also occupied by village houses, high end housing developments and funerary land uses. As a result, To Fung Shan does not display typical morning walker activity patterns. It was one of three trails that showed a very large difference between winter and summer usage, which was driven entirely by visitors to the 10,000 Buddhas Monastery. (A likely contributing factor was that winter usage was measured 2 weeks after Lunar New Year.) The route to the monastery has its own foot traffic patterns, with activity peaking at around noon due to people eating at the vegetarian restaurant. Other parts of the trail network have usage patterns characteristic of weekend hiking routes, with significantly more visitors on weekends and in the afternoon (especially in winter).

Tuen Mun Trail

Location: Tuen Mun
Weekday visitors: At least 200 (July–August 2022), at least 400 (January–February 2023)
Weekend visitors: At least 350 (July–August 2022), at least 750 (January–February 2023)

The above trail usage estimates are a serious underestimate because limited data was collected due to widespread vandalism of sensors. Tuen Mun Trail follows the contour along hills to the east of Tuen Mun, sharing a trailhead with MacLehose Trail Section 10 and leading northwards to Fu Tei. From the limited data gathered, it appears to be fairly well-used by morning walkers, which in the summer were heavily concentrated in the morning with little if any secondary afternoon peak. There were significantly more visitors on weekends. There also appeared to be substantially more visitors during winter, but a likely contributing factor was that data collection took place one week before the Lunar New Year. However, since Tuen Mun Trail is so close to the MacLehose Trail Section 10, larger weekend and seasonal fluctuations would be expected.

Sir Cecil's Ride & Mount Parker Lower Catchwater

Location: Hong Kong Island East
Weekday visitors: At least 750–1,000
Weekend visitors: At least 1,450–1,800

Sir Cecil's Ride and Mount Parker Lower Catchwater are trails that trace the contour of the hills on the northern side of Hong Kong Island from Tai Hang to Shau Kei Wan. They are bisected in the middle by the Quarry Bay extension of Tai Tam Country Park. The trail use estimates above are a major underestimate because it was not possible to monitor the country park entrances for technical and administrative reasons. These trails are connected to an extensive network of hiking trails through the middle of Hong Kong Island and both form part of longer hiking routes, especially Sir Cecil's Ride which is very gentle and easily accessible. Therefore while these trails do have a substantial number of weekday users, a larger proportion of their visitors come on the weekends. Certain parts of the network, i.e. closest to the end of the Wilson Trail Section 2 in Quarry Bay appear to attract several times more users in winter, but further research is needed to confirm whether these figure are reliable. The Mount Parker side is less well-used than Sir Cecil's Ride due to its more challenging terrain and relative lack of good quality access routes from urban Shau Kei Wan.

Mount Davis

Location: Kennedy Town/Pok Fu Lam
Weekday visitors: Around 50
Weekend visitors: Around 250–300

Mount Davis is a knoll located on the western end of Hong Kong Island between Kennedy Town and Pok Fu Lam. It is one of the more unusual trails included in this project because it attracts few users on weekdays due to limited accessibility on the northern side of the hill in Kennedy Town (the most densely populated nearby area), compared to the relative ease of accessing nearby trails on Lung Fu Shan. It is more well-used on weekends as its wartime ruins draw tour groups and wargamers. The barbecue facilities and youth hostel also attract weekend visitors, and it is a known party spot for University of Hong Kong students. Mount Davis also seems to draw similar numbers of visitors year-round.

BACKYARD TRAILS ARE WORTH CAREFUL PLANNING, MANAGEMENT AND CONSERVATION

Part 2 of the Backyard Trails Pilot Project provides preliminary quantitative evidence that backyard trails are well-used by communities, hosting several hundred to well over a thousand visitors a day. Most backyard trails are well-used throughout the week and year-round, and those with lower usage generally had poor accessibility.

Part 1 of the Backyard Trails Pilot Project explored the diverse ways in which people use backyard trails. In addition to routes for walking and running, they serve as venues for group exercise, socialising, drinking tea, growing vegetables, religious worship, and more. They are very important community amenities, especially in urban areas with an inadequate provision of open space. Four of the trails included in this study, Woh Chai Shan and Garden Hill, Mount Davis, Sir Cecil's Ride & Mount Parker, and Hammer Hill served areas where the provision of officially counted recreational open space was below the Planning Department's standard of $2m^2$ per person.

Green belts, where many backyard trails are located, are much more than leftover spaces. Yet, they face a number of threats, from inconsiderate usage and excessive concretisation to intense development pressures. While the lack of cohesive planning and management over them by the government has allowed them to develop their unique character, this also has downsides since green belts are frequently undervalued and overlooked by planners and city administrators.

Backyard trails deserve careful consideration and close involvement of users and community groups in planning and management decisions. A collaborative approach involving non-profits and community volunteers can also help to address management and maintenance issues in a more sustainable way.

It is hoped that the findings and data collected by the Backyard Trails Pilot Project will go some way towards demonstrating the value of green belts in order to raise awareness and promote discussion of how to care for our green spaces in Hong Kong.

行政摘要

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後山小徑大多位於綠化帶土地上，是城市的寶貴休憩和自然資產。然而，使用這些山徑的人數和人們使用這些山徑的典型習慣，卻沒有太多相關研究。研究團隊因此展開了後山小徑試點項目，以填補這方面的數據空缺。這研究項目共分為兩部分：第一部分，研究團隊測繪了十一條山徑，並拍照記下這些山徑上出現的各種活動。第二部分，研究團隊收集了其中十條山徑的人流統計數據，量化其實際使用情況，並觀察這些山徑在一天、一星期和不同季節中的用量變化。這些數字有助呈現後山小徑對社區的價值，令人更加關心和關注其規劃、管理和保養問題。

在2022年7月至8月和2022年12月至2023年2月，研究團隊在全港選出的十條後山小徑旁邊，安裝了訂製的乾電紅外線人流感應器。這些山徑包括鴨仔山、芙蓉山、斧山、摩星嶺、沈雲山與屏山、金督馳馬徑與柏架山下引水道、道風山、屯門徑、窩仔山與嘉頓山，以及蝴蝶山。研究團隊在每個地點放置感應器6至12天，點算經過人次，並記錄他們是從左至右，還是從右至左經過。本報告介紹了研究團隊分析收集到的數據，但由於遇到後勤和技術方面的挑戰，這些數據分析結果應被視為初步的結論。如果將來技術有所改進，或許可以再作後續研究，用更充份的數據來填補空白。

主要結果

1. 到訪後山小徑人數的中位數：平日每天大約有400–500名訪客，周末有700–800名訪客

研究團隊從各條山徑所收集到的數據有所不同。使用率最低的山徑（摩星嶺）平日大約有50人到訪，周末大約為200–300人。使用率最高的山徑（蝴蝶山）在平日有超過1,200人，周末超過1,500人。根據康樂及文化事務署的數據，在2021–2022年度有救生員當值的季節，刊憲泳灘平均每天吸引約700人。到訪後山小徑的人數與到訪刊憲泳灘的人數可謂大致相若。

值得留意的是，本報告所提供的山徑使用估值相信會偏低，因為大多數山徑網絡複雜，研究團隊缺乏資源監察每一個山徑的出入口，因此預計感應器沒有記錄所有山徑使用者。

2. 使用後山小徑的不只是「晨運客」

不少後山小徑主要為當區人士使用，而使用者通常是「晨運客」。然而，研究數據顯示，使用者不只在早上到訪後山小徑。在夏季，大多數「晨運客」在早上晨運，山徑活動通常在早上5–6時左右開始（有時更早），其後人數急升至大約9時，到午餐時段急劇下降，但在下午較後時間又會出現另一個略小的高峰。至於冬季，山徑使用率全日分佈較為平均，上下午人數相對較平衡。峰值比較平坦，分散在較長時間，較多人在中午時分停留在山徑上。

3. 多數後山小徑全年使用率高

人們普遍認為香港的行山季節是10月至5月，但研究團隊並沒發現大多數後山小徑在冬天的使用量比夏天高。雖然技術問題（詳見報告第2章）意味著不能直接比較2022年夏天和2022–23年冬天收集的數據，但顯然大多數後山小徑在這兩個季節的使用量相若。在7月和8月，人們並不會遠離這些山徑，只會調整當天的到訪時間，早上早些出門或下午晚些前往。少數在冬季測出明顯較多訪客的地點，不是著名的旅遊景點（如通往沙田道風山萬佛寺的小徑），就是為人熟悉的行山路線的一部分，如衛奕信徑或麥理浩徑。

4. 許多後山小徑整個星期都有人使用，只有部分吸引大量周末遊客

雖然後山小徑在周末的訪客比平日多，但大多差別不大。石硤尾的窩仔山是最明顯的例子，平日和周末的人數幾乎相同。總的來說，這些數據表明，大多數後山小徑都成為鄰近社區的綠色空間，在區內有穩定的使用群。例外的是，那些與郊野公園相連並構成較長行山路線的後山小徑（如金督馳馬徑）、那些有重要旅遊景點的山徑（如道風山），以及那些區內行人較難前往的山徑（如摩星嶺）。

5. 大多數後山小徑的訪客似乎逗留約1–2小時

人流感應器能探測出人們到底是從左至右，還是從右至左走過。透過在山徑入口附近安裝感應器，便能夠記錄人們何時進出山徑網絡。在大多數後山小徑中，每當抵達人數上升，在1–2小時後，離開的人數亦上升。整天來與去的人數息息相關，顯示大多數人在山徑上逗留大約1–2小

時。然而，在那些與較長和較多人熟悉的行山路線相連的後山小徑中，許多人被探測出在上午較晚時候才到達，或在下午較晚時間才離開。

6. 一如所料，下雨會降低後山小徑的使用率，但一些人在黃色暴雨警告下仍風雨不改

在數據收集期間，當中12天的降雨量很多（一天內超過2毫米），這令研究團隊能夠初步比較晴天和雨天的山徑活動。一如所料，當雨量增加，山徑活動趨少。微雨的日子（一天內2–4毫米）彷彿令山徑使用率減少10–15%，中雨（5–15毫米）令使用率減少20–30%，而在大雨的日子（30毫米或以上），使用率會減少約45–55%。然而，即使在非常惡劣的天氣情況下——黃色暴雨警告、雷暴警告、1號戒備信號和3號強風信號，山徑活動仍然達到平常日子約45%。有些訪客在惡劣天氣下仍然風雨不改，甚至有些反而受吸引前往。

山徑快拍

「典型」後山小徑：

在研究範圍內的山徑中，大約有一半的使用模式相似，因此可歸類為典型的後山小徑。這些山徑在整個星期、無論是夏天或冬天，使用率俱佳。雖然周末吸引較多訪客，但與平日的訪客人數差距並不大，而每小時的人流也與上述的「晨運客」活動模式脗合。這些使用特點，與那些主要為當區居民服務、而非為周末行山客或遊客服務的地方是一致的。

鴨仔山

地點：將軍澳
平日訪客：至少500–650
周末訪客：至少700–850

鴨仔山全年(不論是平日還是周末)都有相當高的使用率。然而，放置在鴨仔山以西、通向小夏威夷瀑布的蓮苑徑的感應器，卻測出周末訪客明顯較高。蓮苑徑也是整條山徑中唯一被測出有大多數使用者朝同一方向行走的小徑，這意味着它是一條為人熟悉的行山路線的一部分。

斧山

地點：鑽石山／牛池灣
平日訪客：至少450–600
周末訪客：至少600–700

斧山全年都有相當高的使用率，周末的訪客比平日多，它還連接彩虹和馬鞍山郊野公園。位處斧山一個狹窄「瓶頸」位置兩旁的兩個住宅區居民，把部分山徑用作捷徑。而最接近大帽山郊野公園的山徑，周末到訪中數相對較多，而使用率似乎也較受季節影響。

沈雲山和屏山

地點：九龍灣／佐敦谷
平日訪客：至少500–600
周末訪客：至少600–750

沈雲山和屏山是兩座相連的山丘，被現已荒廢的佐敦谷水塘主壩分隔。這條山徑全年、平日和周末的使用率俱佳，然而在比例上，屏山似乎比沈雲山吸引更多周末訪客，原因是它較接近佐敦谷公園，也為佐敦谷公園和九龍灣之間提供一條通道。

蝴蝶山

地點：粉嶺
平日訪客： 1,200–1,350
周末訪客： 1,500–1,600

蝴蝶山位於粉嶺西側，山徑的起始路段比較平坦，地面全為石屎覆蓋，是走向林村郊野公園內極具挑戰性的大刀屻和雞公嶺的橋樑。它在平日已吸引過千人使用，而周末的訪客人數較平日還再多出數百人。在一眾被測量的山徑中，不論在平日或周末、夏季或冬季，這條山徑皆為使用率最高和最穩定的。它的受歡迎程度只有金督馳馬徑和柏架山能夠媲美，後者的用量估算由於數據缺失而被大大低估。

窩仔山和嘉頓山

地點：石硤尾
平日訪客：至少800–850
周末訪客：至少900–1,150

窩仔山和嘉頓山是一對位處石硤尾中部的小山，兩山相距不足500米，徹底被城市發展項目包圍。窩仔山亦被稱為主教山或教會山，是一座二十世紀初落成的歷史悠久配水庫的所在地。2020年發現配水庫後，這地點頓時變成一個景點。除了前往配水庫的導賞團外，窩仔山其實很像典型的後山小徑，在平日、周末以至全年的訪客量都非常接近。嘉頓山卻是另一狀況，它是社交媒體Instagram上的熱門景點，以日落景色聞名，因此在周末和冬季明顯吸引較多訪客。由於其位於市區，往往在深夜，有時甚至凌晨一兩點也有人到訪。

「非典型」後山小徑

非典型山徑由於各種原因，無法切合典型出徑的模樣。某些山徑的使用模式因混合土地用途而變得複雜，像一些參拜點和村屋，會帶來不同類別的使用者和不同的行為模式。另有一些山徑位於熱門行山路線上或是靠近旅遊景點，因此在平日和周末、夏天和冬天，訪客量波動較大。還有些山徑由於出入較為不便，平日的使用率很低。

芙蓉山

地點：荃灣
周日訪客：至少200–250
周末訪客：至少350–500

芙蓉山既是一條後山小徑，也連接了荃灣市區與大帽山郊野公園的一條較長行山路線。雖然惡劣天氣和技術困難限制了從芙蓉山收集到的數據量，但從可得的數據顯示，它有固定的晨運客群，而且全年使用者都頗多。而根據取得的有限數據（遇到天氣和技術上的困難），周末的訪客量明顯比平日多。山坡上的一大片地方可見許多佛寺和村屋林立，因此，參拜者和村民顯然是部分山徑網絡的主要用家，他們的日常習慣與休閒散步者不同。

道風山

地點：沙田
平日訪客：至少400（2002年7月），至少1,000（2003年2月）
周末訪客：至少750（2002年7月），至少1,600（2003年2月）

道風山是沙田西北面的一個山坡，位於大圍和沙田市中心之間。山徑可通往主要的旅遊景點，如萬佛寺和信義宗神學院，並連接城門郊野公園。山坡也被村屋、高尚住宅發展項目和殯葬用地所佔據。因此，道風山並沒有呈現出典型的晨運客活動模式。它是冬夏用量差異極大的三條路徑之一，客量完全取決於萬佛寺的遊客（其中一個可能原因是，冬季的使用量是在農曆新年後兩星期測量的）。通往寺院的路線有其人流模式，由於人們會在齋堂用餐，山徑活動在中午時分達到高峰。至於山徑網絡的其他部分，就出現周末行山路線的使用模式，在周末和下午的訪客明顯較多（尤其在冬季）。

屯門徑

地點：屯門
平日訪客：至少200（2022年7–8月），至少400（2023年1–2月）
周末訪客：至少350（2022年7–8月），至少750（2023年1–2月）

由於大量感應器被人故意破壞，收集到的數據有限，以致上述的山徑使用量估算數字被嚴重低估。屯門徑沿著屯門以東山丘的等高線蜿蜒而行，與麥理浩徑第十段共用一個登山口，向北通往虎地。從收集到的有限數據來看，晨運客的使用率頗高，夏季時主要集中在上午，幾乎沒有下午的次高峰，周末的訪客明顯增加。冬天的訪客也明顯較多，一個可能原因是，數據收集是在農曆新年前的一星期進行。然而，由於屯門徑如此接近麥理浩徑第十段，周末和季節性波動較大是可以預料的。

金督馳馬徑和柏架山下引水道

地點：港島東部
平日訪客：至少750–1,000
周末訪客：至少1,450–1,800

金督馳馬徑和柏架山下引水道，是沿著香港島北面山丘的等高線、從大坑到筲箕灣蜿蜒而行的山徑，在中間被大潭郊野公園的鯽魚涌擴建部分分割。基於技術和行政原因，研究團隊不可能監測郊野公園的各個入口，會嚴重低估上述的山徑使用估算。這兩條山徑與港島中部一個龐大的行山徑網絡相連，並同時是其他較長行山路線的一部分，尤其是非常平坦且容易前往的金督馳馬徑。因此，儘管這些山徑平日確實有相當多訪客，但周末的訪客更多。山徑網絡的某些部分，即在鯽魚涌最接近衛奕信徑第二段終點的路段，在冬季時的訪客數目顯然多出數倍，但仍需要進一步研究以確認這些數字是否可靠。柏架山一側的使用率比金督馳馬徑低，皆因其地形較具挑戰性，而且筲箕灣那端缺乏較好的登山路線。

摩星嶺

地點：堅尼地城／薄扶林
平日訪客：大約50
周末訪客：大約250–300

摩星嶺是位於香港島西端的一個小山丘，位於堅尼地城與薄扶林之間。它是本研究項目中比較特殊的一條小徑，因為它平日吸引的使用者不多，原因是從山丘北側堅尼地城那邊（附近人口最稠密地區）前往的通道有限，反而附近龍虎山的山徑相對容易前往。另外，由於其戰時遺跡吸引旅

行團和野戰玩家，周末的使用率較高。燒烤設施和青年旅舍也能吸引周末訪客，這地亦是眾所周知香港大學學生的一個聚會點。摩星嶺似乎全年，不管冬夏，所吸引的訪客數量相若。

後山小徑值得仔細規劃、管理和保護

後山小徑試點項目的第二部分提供初步的量化數據，證明後山小徑為社區所用，每天吸納數百至過千名訪客。大多數後山小徑，不管在平日或周末，全年的使用率都很高，而那些使用率較低的小徑一般皆較難前往。

後山小徑試點項目的第一部分探討了人們使用後山小徑的各種方式。除了散步和跑步的路線外，它們還是群體運動、社交、喝茶、種菜、參拜的地方，是非常重要的社區康樂設施，對開放空間供應不足的市區來說尤甚。其中四條涵蓋在本研究範圍內的山徑就是一些好例子，即窩仔山與嘉頓山、摩星嶺、金督馳馬徑與柏架山，以及斧山的所在地，區內的官方休憩開放空間低於規劃署所定的人均2平方米標準。

後山小徑所在的綠化帶實有其價值，而絕非只是閒置剩餘的空間，但它們卻面臨着多種威脅，包括無公德心的使用行為、過度石屎化、巨大的發展壓力。政府對綠化帶缺乏統一的規劃和管理，雖可令綠化帶得以發展其獨特性，但弊端是綠化帶的價值經常被規劃者與城市管理者低估和忽視。

後山小徑這個課題應得到周詳探討，並要讓使用者和社區團體參與更多有關的規劃和管理決策。讓非牟利組織和社區義工參與的合作方式，也有助以更可持續發展的方式解決管理和維修問題。

研究團隊希望後山小徑試點項目的研究結果和收集到的數據，能夠在一定程度上證明綠化帶的價值，喚起大家的關注和討論如何管理香港的綠色空間。

1. Introduction

1.1 | BACKGROUND

Backyard trails, defined as trails located within 15 minutes' walking distance of densely populated residential areas, play an important but under-recognised role in Hong Kong's open space system. They provide urban residents with easy access to nature, opportunities to exercise and socialise, and an environment that offers more freedom and flexibility than found in Hong Kong's strictly managed urban parks. Many backyard trails are frequented daily by morning walkers and have become unofficial community gathering spaces. Their popularity among older people means that they play a significant role in supporting the health and well-being of Hong Kong's ageing population.

The first part of this series "Backyard Trails Pilot Project Part 1: Exploring the Urban Fringe"[1] mapped eleven selected backyard trails and documented diverse activities taking place on them including tai chi, ping pong, religious worship, guerilla gardening, and collecting spring water. That report focused on the policy context surrounding green belt land on which most backyard trails are located, and the implications for their planning and management.[2] Green belts have an ambiguous and broad planning purpose, and are treated by the government as leftover space and a potential land bank for the city's development needs. While on paper, they are supposed to play a role in conserving the natural environment on the urban fringes and provide passive recreational outlets,[3] they are not managed holistically as either conservation or recreational spaces. They act as buffer zones that sit between the boundaries of Hong Kong's country parks and the built-up area, and therefore lie outside the jurisdiction of the Agriculture, Fisheries and Conservation Department (AFCD), but also are not managed by the Leisure and Cultural Services Department (LCSD). Since they lack comprehensive management, they fall outside of the criteria that would allow them to be counted towards Hong Kong's planning requirements for recreational open space. Hence, they are seen as ancillary spaces—a bonus, but not required. In actuality, they are an important supplement to counted open space which is in short supply in many parts of Hong Kong.

As the first report discussed in detail, what management they do receive is carried out by the Home Affairs Department, which constructs and maintains trail facilities such as rain shelters, seating, and safety railings on a district-by-district basis using the minor works budget and according to stakeholder demand. Its approach tends to be reactive and maintenance-driven. Other responsibilities, from slope maintenance to tree management to water management, are carried out by a patchwork of government departments on an ad hoc basis.

As a result, green belt land is often undervalued by planners and city administrators. In the New Territories, village house construction has long been a major pressure on green belts, and is usually approved. In recent years, the government has dedicated itself to identifying plots of green belt that can be rezoned for housing development. Between 2013 and 2017, 318ha of Green Belt zoned land was rezoned for other uses,[4] and in 2022, the Chief Executive announced that a further 225ha of

1 Carine Lai and Yeung Ha Chi, "Backyard Trails Pilot Project Part 1: Exploring the Urban Fringe", WYNG Foundation & Parks and Trails, April 2023, https://wyng.hk/wp-content/uploads/2023/04/BYT-report-layout-final_20230331v2.pdf (accessed 16 June 2023).

2 Of the eleven trails studied in Part 1, seven were located almost entirely on Green Belt zoned land, some including small pockets of other zones such as Institution or Community (G/IC) for service reservoirs. These were Duckling Hill, Hammer Hill, Mount Davis, Shum Wan Shan & Ping Shan, Sir Cecil's Ride & Mount Parker, Tuen Mun Trail, and Kam Shan. Three including Fu Yung Shan, To Fung Shan, and Woh Chai Shan consisted of mixed zones including Green Belt, Village Type Development, Open Space, and Other Uses. One (Wu Tip Shan) included a small area of Green Belt but was mainly unzoned. While the government has been gradually incorporating rural areas into the statutory zoning system since the Town Planning (Amendment) Ordinance was enacted in 1991, there remain large pockets of land between urban or New Town areas and country parks that have not yet been zoned.

3 HKSAR Town Planning Board, "Master Schedule of Notes—Green Belt", 23 August 2021, https://www.info.gov.hk/tpb/en/forms/Schedule_Notes/msn_gb_e.pdf (accessed 28 March 2023).

4 HKSAR Government Information Services, "LCQ10 Statistics on and rezoning of Green Belt sites", Press Release, 23 January 2018, https://www.info.gov.hk/gia/general/201801/24/P2018012400288.htm (accessed 12 June 2023).

Green Belt zoned land had been shortlisted for the development of housing.[5] Conservationists have campaigned to save green belts by emphasising their role in buffering more sensitive natural environments from urban encroachment,[6] and by highlighting their ecological and microclimatic value,[7] but their recreational value has played a secondary role in these discussions.

Currently there is little research focusing specifically on the value of green belts as public open spaces in Hong Kong. While there have been numerous studies on the health impacts, environmental impacts, accessibility, and distribution of public open space, they either take into account only managed urban park spaces,[8] or focus broadly on all "green space" as defined by tree cover in satellite images.[9] It is not known how many people make use of informal backyard trails. A survey of 3,600 respondents about public open space conducted by Civic Exchange in 2018 found that 41% of respondents had visited an "unofficial open space" at least once in the past year, but only 5% said that they visited one at least once a month.[10] However, "unofficial open space" was defined very broadly as any open space that was not formally managed such as vacant land, piers such as the former "Instagram Pier" in Sai Wan, and hillsides (the term "backyard trails" was not used). Respondents may have had difficulty answering such a vague question.

In Part 2 of the Backyard Trails Pilot Project, we utilised infrared people-counting devices to record trail use at key locations on 10 of the 11 trail networks documented in Part 1.[11] It is hoped that these figures will not only help to quantify their value to the community, but by revealing detailed daily patterns of usage, provide information that can be used to inform community groups and policymakers on how to better plan, manage, and protect green belts.

1.2 | REPORT OUTLINE

This report is organised as follows.

Section 2 will explain the methodology and technical limitations of this research.

Sections 3–12 will present trail use figures for each of the ten trails.

Section 13 will analyse the impact of rainfall on trail use.

Section 14 will provide a general discussion of the findings along with recommendations.

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5 HKSAR Office of the Chief Executive, "The Chief Executive's 2022 Policy Address: Charting a Brighter Tomorrow for Hong Kong", 19 October 2022, para. 68, https://www.policyaddress.gov.hk/2022/en/p68.html (accessed 28 March 2023).

6 See for example a petition by 16 environmental groups opposing proposed housing developments on green belt land, Ark Eden et. al, "Let Development and Nature be in Harmony—Public Consultation before Introduction of New Policies Detrimental to Green Belts", petition, 21 January 2014, https://hkgreenbelt.weebly.com/1620491298722044522296396363287921512328822 6126.html (accessed 16 June 2023).

7 See Tsing Yi People, "Oppose the Rezoning of Green Belt in Tsing Yi (S/TY/31)", petition, 12 July 2021, https://www.supporthk.org/petition/oppose-the-rezoning-of-green-belt-in-tsing-yi-s-ty-31/?lang=en (accessed 16 June 2023).

8 See for example, Bo-sin Tang, "Is the distribution of public open space in Hong Kong equitable, why not?", *Landscape and Urban Planning,* May 2017, 161 80-89, https://doi.org/10.1016/j.landurbplan.2017.01.004 (accessed 12 June 2023); or Fangying Gong, Zhao-Cheng Zheng and Edward Ng, "Modeling Elderly Accessibility to Urban Green Space in High Density Cities: A Case Study of Hong Kong", *Procedia Environmental Sciences*, 2016, 37 90-97, https://doi.org/10.1016/j.proenv.2016.09.018 (accessed 12 June 2023).

9 John W. M. Yuen et. al, "Influence of Urban Green Space and Facility Accessibility on Exercise and Healthy Diet in Hong Kong", I*nternational Journal of Environmental Research and Public Health*, 2019, 16(9), 1514, https://doi.org/10.3390/ijerph16091514 (accessed 12 June 2023).

10 Carine Lai, "Public Open Space Opinion Survey—Full Report", *Civic Exchange,* October 2018, https://civic-exchange.org/wp-content/uploads/2018/10/Civic-Exchange-Open-Space-Opinion-Survey-FULL-REPORT-updated20181128.pdf (accessed 12 June 2023).

11 A letter of no objection from the HAD was not successfully obtained for the 11th trail at Kam Shan before the research began.

2. Methodology

2.1 | CASE STUDY SELECTION

During Part 1 of the project, eleven backyard trails were selected as case studies based on the following criteria:

Has trailheads located within 15 minutes' walking distance of a substantial residential population, preferably 40,000 people or more.

Includes significant points of interest, such as attractive viewsheds, landscape features, heritage features, or religious sites.

Provides access to a high quality natural environment (i.e. should not consist mainly of shotcreted slopes).

Has an observable level of community use and ownership.

Offers relatively short routes of 2 hours or less, but may offer the option to hike further.

Offers routes suitable for people of all ages, although there may be some challenging segments.

Broad geographical coverage, including trails in Hong Kong Island, Kowloon, and the New Territories.

The locations of the eleven selected trails are shown in Map 1 below.

2.2 | PEOPLE-COUNTING SENSORS

Electronic people-counting sensors were deployed on ten of the eleven backyard trails for which the researchers were able to obtain letters of no objection from the relevant District Offices (see Map 1). On each trail, sensors were placed at several key locations, mostly close to trailheads to count people entering and exiting the network. Data collection was conducted over two periods, first in July-August 2022, and second in December-February 2023 in order to collect data during both the summer and winter months. The second round of data collection also provided an opportunity to address technical challenges encountered during the first round (see Section 2.3).

The custom-built sensors consisted of a radar motion detector (millimetre wave proximity sensor) combined with a low resolution infrared camera.

MAP 1: CASE STUDY LOCATIONS

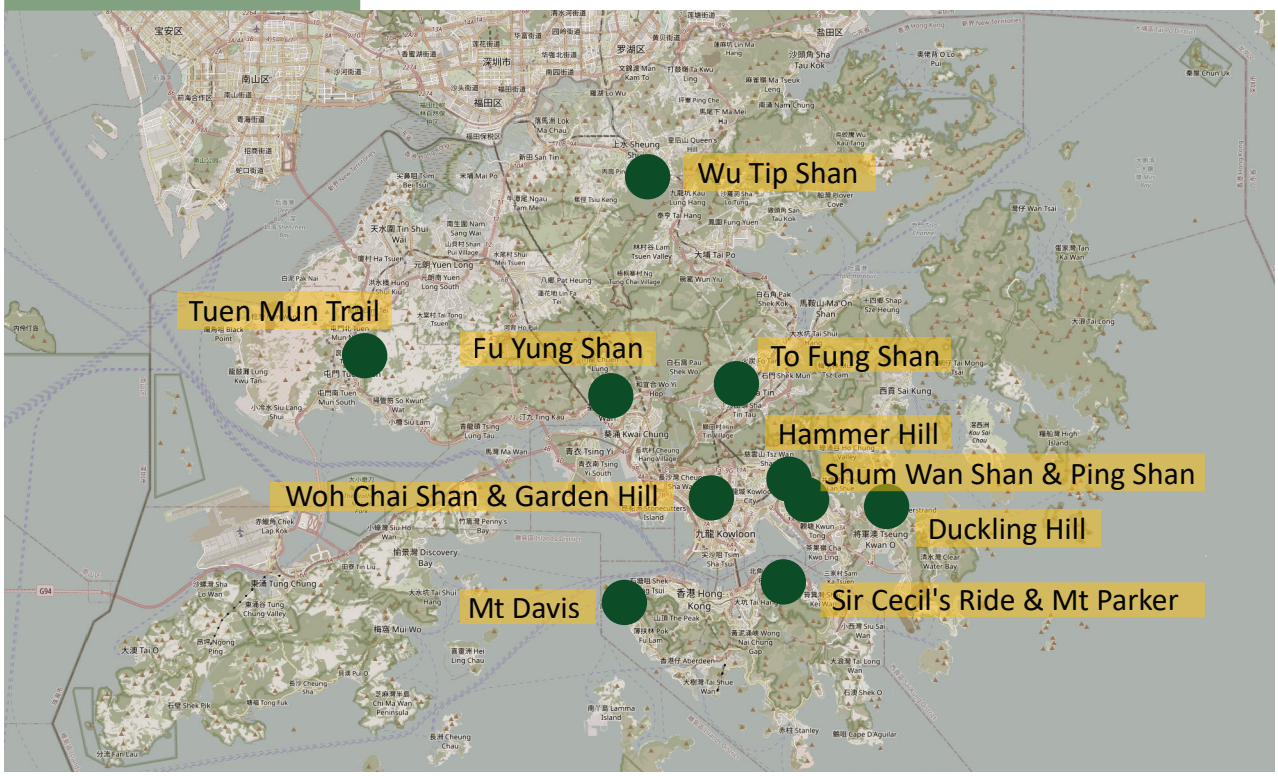


FIGURE 1: PEOPLE-COUNTING SENSORS IN THE FIELD

Source: Peanut King Solution Ltd., 2023

Source: Debby Chan, 2022

The devices were lithium battery operated and housed in a waterproof casing. When an object crosses the path of the sensor, the motion detector activates the infrared camera, which captures a low-resolution heat energy map of the scene in front of it. The pattern recognition software was trained to identify humans, whose bodies are warmer than the surrounding environment, and distinguish them from animals, by identifying the silhouette of a human head and shoulders. The sensors had no visible light cameras and were not capable of capturing distinguishing characteristics of individuals.

The sensors had detection range of between 1m and 2m, a horizontal detection angle of 110°, and a vertical detection angle of 75°. The software was trained to identify up to two people at a time (i.e. two people walking side by side on a narrow path). The software was also trained to identify the direction of travel, i.e. whether a person was crossing from left to right, or right to left. After 72 hours of testing in three locations, the sensors were determined to be accurate to up to a 90% confidence level under ideal conditions. See Appendix 1 for a more in-depth technical explanation of the sensor design and testing process.

Fieldwork staff attached sensors to trees by the side of walking trails in a non-damaging manner using hook-and-loop fastener tape (velcro) and cable ties. The sensors were mounted at approximately shoulder height for optimal functioning. During the first round, the sensors were deployed at each location for a period of 12 days inclusive of installation and removal. Each sensor was replaced after 5–6 days due to battery life limitations. During the second round, the deployment period was shortened to 7 days, with replacement after 3 days, in order to reduce the chances of data loss due to theft and vandalism as six devices were stolen during the first round.

Prior to deployment, letters of no objection were obtained from the relevant District Offices of the Home Affairs Department, which is in charge of building and maintaining backyard trail facilities. Notices were placed near each sensor informing trail users of the project, providing WYNG's contact information, and explaining that the infrared sensors were incapable capturing people's facial features or any other personal information.

2.3 | LIMITATIONS AND CHALLENGES

Firstly, the major limitation of this research is that data was only collected for a brief period at each location due to resource constraints: 10 days exclusive of installation and removal days in summer 2022 and 5 days in winter 2022–23. This means that at most, six complete weekdays and four complete weekend days were sampled during the first round, and three complete weekdays and two complete weekend days were sampled during the second round. (Installation and removal days sometimes yielded additional half-day data.) The data therefore cannot represent typical foot traffic during the entire season. To avoid being affected by

unusual levels of foot traffic, data was not collected during public holidays such as Christmas, New Year, and Lunar New Year. However, extraordinary foot traffic may have taken place beyond the dates of the public holidays due to school holidays and religious occasions. There were also several days of poor weather during both rounds of data collection which affected trail use (see Section 13).

Secondly, due to resource constraints, it was not possible to place as many sensors at each location as would have been necessary to conduct a comprehensive census of all trail users. Many of these trail networks are very complex with many different entrances and exits. Some of the paths may not even be accurately shown on either government or open source maps. A decision was made to focus on the main paths and trailheads. As a result, most of the trail use estimates are certainly lower than the actual figure, and should be regarded as preliminary. However, this limited data yielded meaningful information about seasonal, weekday, weekend, and daily variances in usage that can be used as a basis to form hypotheses for further study.

In addition to sampling limitations, numerous technical challenges were encountered. To achieve the best accuracy, the sensors should ideally be placed on well-shaded paths that are narrow enough to allow only one or two people to pass simultaneously. Accuracy decreases in strong sunlight, especially during the summer when ambient temperatures are high, as this reduces the contrast between human body temperature and the surroundings. High albedo surfaces which reflect more heat and light, such as concrete, exacerbate the problem. Wider paths, which allow people to pass beyond the sensor's ideal range, and which can allow more than 2 people to walk abreast, also result in decreased accuracy. While ideal conditions were sought as much as possible, in some cases site limitations forced the research team to depart from the ideal.

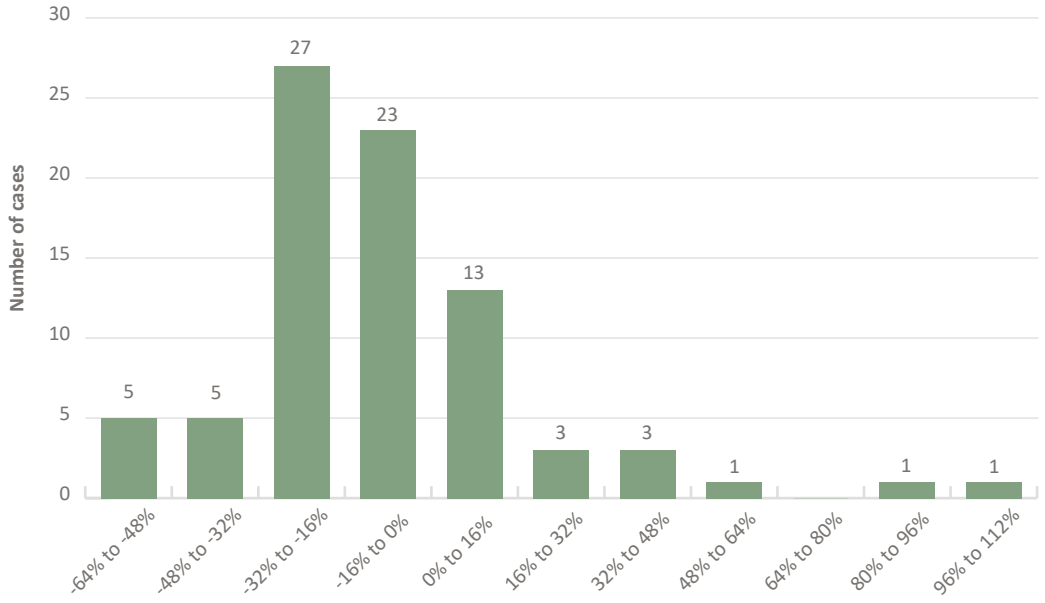
Some technical problems only became apparent during and after the first round of data gathering. A software glitch occasionally caused the devices to stop logging pedestrians after two or three days in the field, resulting in missing data. In some cases, pedestrian counts could be reconstructed from raw thermal image files, which had been retained, but in other cases this was not possible because the raw files had not been retained. A software update was able to ameliorate this problem in time for the second round.

During the first round it was found that the sensors' directional detection was only reliable when was positioned at exactly 90° to the path. In cases where the fieldwork team had inadvertently installed the sensors at an acute angle, or where the sensors had sagged to one side from their own weight, the directional data was found to be inaccurate. These problems were addressed during the second round through additional training and using cable ties to secure the sensors more firmly to trees. Therefore, while reasonably accurate pedestrian counts were gathered during both rounds, only the second round produced sufficiently accurate directional data.

Additional challenges occurred due to human behaviour. There was a tendency for curious trail users to stand directly in front of the sensors to examine them for extended periods of time. These were even cases where apparently well-meaning trail users relocated the informational notices from nearby trees to the trees on which the sensors were mounted, which encouraged even more people to linger directly in front of the sensors while reading them.

This confused the pattern recognition software and produced excessive counts (the majority of them logged as rightwards travel due to a bias in the algorithm). During the second round, a post-processing software algorithm was created to reanalyse the raw data. This new algorithm was better able to interpret the more unpredictable changes in the human silhouette that occurred when people lingered in front of the sensor. This helped to flag suspicious movements so that the technical team could manually remove spurious rightwards movements and add back missed leftwards movements. Unfortunately, the post-processing could only be applied to data from the second round as most of the raw data from the first round was not retained. The first round figures

CHART 1: FREQUENCY CHART OF PERCENTAGE CHANGE IN PEDESTRIAN COUNTS AFTER POST-PROCESSING



were left as-is, except where there were clearly anomalous spikes in pedestrian counts, which were adjusted by hand.[12]

To obtain an idea of the degree to which the sensors overcounted due to curiosity-induced movements, the pre- and post-adjustment second round data was compared (see Chart 1). After adjusting the second round data, the total presence count decreased by a mean of -9%. The median adjustment was -11% and the modal adjustment was -15%. The variance was large. The interquartile range was 26 percentage points, with 50% of cases lying between -25% and +1%. 80% of cases lie between -33% and +20%. In 26% of cases, the sensors actually undercounted. The wide variance showed that cases were too individual to apply a standard adjustment to the first round data. This limits the ability to make direct seasonal comparisons. Essentially, if an (adjusted) winter figure is less than 33% lower or less than 20% higher than an (unadjusted) summer figure, there is less than a 20% chance that it was not due to sensor error.

There were also some cases of deliberate tampering by trail users, which resulted in more missing data. In some cases, sensors were stolen, or damaged and left on the ground. These incidents were concentrated in certain locations, mainly Tuen Mun.

2.4 | TRAIL USE FIGURES

For each sensor location, the following statistics were calculated:

a) **Daily presences detected.** This is the number of presences detected at a location within a 24 hour period from 12:00 a.m. to 11:59 p.m. Daily totals show changes in foot traffic throughout the week.

b) **Weekday and weekend average presences.** Averages were calculated to obtain an estimate of typical daily usage during a weekday and a weekend during the data gathering period. Due to daytime sensor installation and removal times as well as sensor malfunctions, only half-day data was available at certain locations on certain days. For example, if a sensor was installed at 10:15 a.m., then half-day data collected from 12:00 p.m. was included. If a sensor started to malfunction at 3:10 p.m., then the data collected up to 12:00 p.m. was included. Therefore, separate averages were calculated for a.m. (12:00 a.m. –11:59 a.m.) and p.m. (12:00 p.m.–11:59 p.m.) sessions. The whole day average was derived by adding these two together.

12 Anomalous spikes in pedestrian counts over a period of one hour were reexamined. Clusters of four or more presences registered within a few seconds of each other were interpreted as indicative of persons standing still directly in front of the sensors. These clusters were conservatively reduced to two, the maximum number of people the sensor is able to detect at the same time.

c) **Hourly presences.** The number of presences detected per hour was charted for each sensor location. These figures show how the flow of foot traffic changes throughout the day. Since the peaks in daily foot traffic tended to be similar across several locations on the same trail, to avoid excessive repetition, this report will only present hourly figures from selected sensor locations. Usually, this will include most highly trafficked spots on each trail network plus any locations that differed from the norm.

d) **Directional data.** Directional data from the second round of data collection will be examined at both daily and hourly scales to obtain a better understanding of patterns of movement and preferred routes.

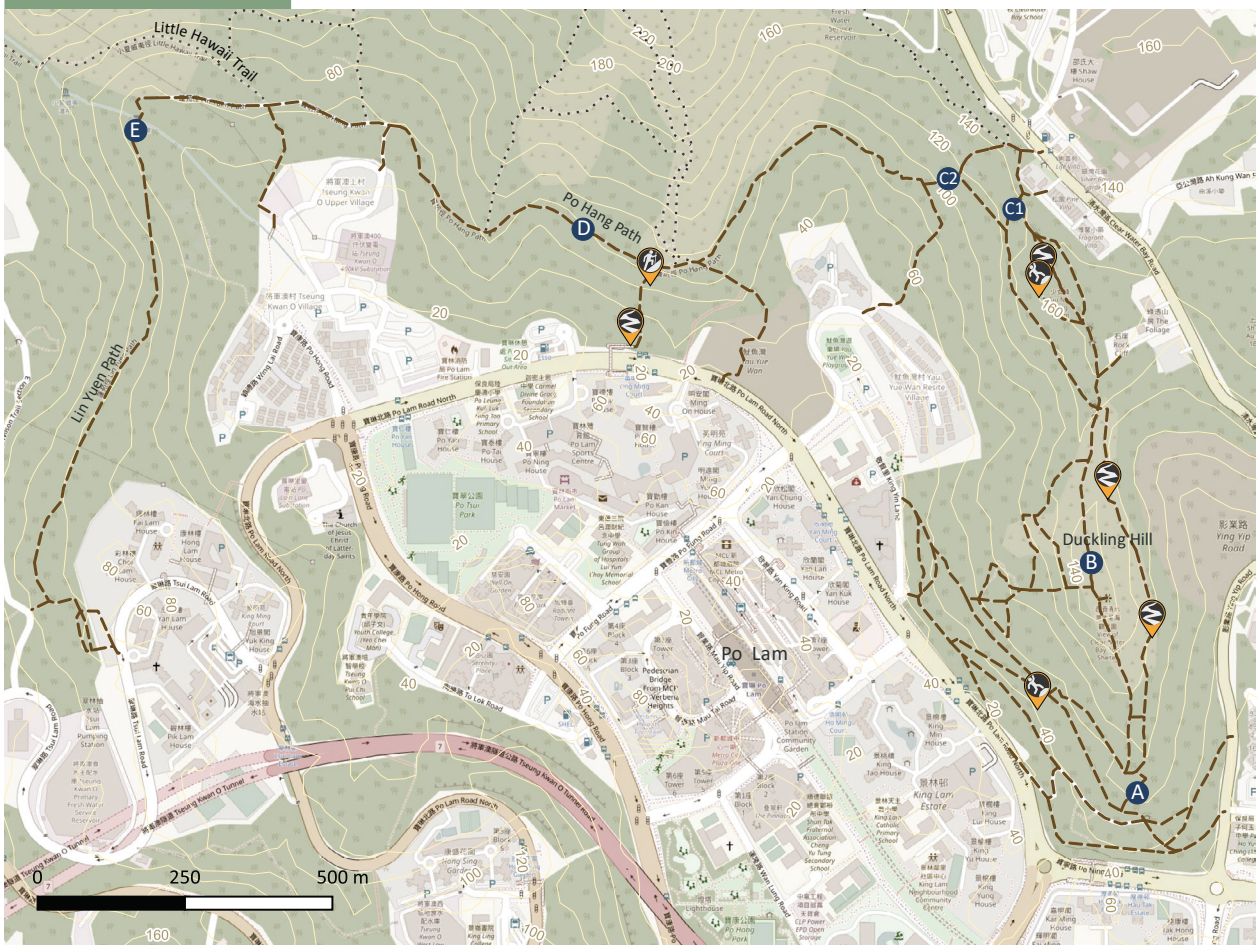
e) **Estimate of overall usage.** To obtain an estimate of overall usage for each trail network, the average daily number for each sensor covering a trail entrance/exit was added up, then divided by two, assuming that each person triggers a sensor upon entering the network and exiting. This is an imperfect method since not all trail entrances/exits could be covered due to limited resources and the complexity of some of the trail networks. Assuming that some people entered or exited through unmonitored paths, the estimates produced should be on the low side. However, it is also possible that some trail users walked back and forth, triggering a sensor multiple times during the same trip. As the sensors only register human presences and cannot distinguish between individuals, this behaviour would produce an overestimate. Hence the overall trail usage estimates should be treated as approximate.

Subsections 3 to 12 will present and discuss in detail the above statistics for each of the trails in alphabetical order:

1. Duckling Hill
2. Fu Yung Shan
3. Hammer Hill
4. Mount Davis
5. Shum Wan Shan & Ping Shan
6. Sir Cecil's Ride & Mount Parker
7. To Fung Shan
8. Tuen Mun Trail
9. Woh Chai Shan and Garden Hill
10. Wu Tip Shan

3. Duckling Hill

MAP 2: DUCKLING HILL



Explored paths

Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- (A) Main uphill/downhill link to Ying Yip Road
- (B) Summit ridge of Duckling Hill
- (D) Po Hang Path
- (E) Lin Yuen Path (connection to Little Hawaii Trail)

Round 1 only

- (C1) Connection to Po Hang Path

Round 2 only

- (C2) Entrance/exit to Clear Water Bay Road

As shown on Map 2, Duckling Hill lies between Po Lam and the former Shaw Brothers film studio to the north-east. There are several trailheads allowing access, mostly located on the south side of the hill near position A. The most well-used of these is on Ying Yip Road on the south-east side of the hill. The summit of Duckling Hill is at position B, while C1 and C2 are located near another trailhead on Clear Water Bay Road opposite the defunct film studio and the University of Science and Technology. Positions D and E lie along Po Hang Path and Lin Yuen Path, a flat trail that hugs the contours of the hills north of Po Lam and provides access to the Little Hawaii Falls. As the trail network at Duckling Hill is very complex, only the main routes and trailheads were covered.

3.1 | DAILY PRESENCES AT DUCKLING HILL

TABLE 1A: DAILY PRESENCES AT DUCKLING HILL, JUL 2022

Round 1			Daily presences detected				
Rain (mm)	Date	Day	A	B	C1	D	E
0	14/7/2022	Thu	*(p.m. only) 292*	*(p.m. only) 133*	*(p.m. only) 14*	*(p.m. only) 67*	*(p.m. only) 88*
0.2	7/15/7/2022	Fri	*(a.m. only) 284*	515	34	114	160
↯ 1.5	7/16/7/2022	Sat	-	508	61	-	205
1.2	7/17/7/2022	Sun	-	571	98	-	-
2.7	7/18/7/2022	Mon	-	417	28	-	-
Trace	7/19/7/2022	Tue	*(p.m. only) 398*	218	72	*(p.m. only) 17*	*(p.m. only) 73*
0.6	7/20/7/2022	Wed	571	116	36	42	178
0.3	7/21/7/2022	Thu	705	143	43	24	191
0	7/22/7/2022	Fri	-	181	20	71	219
0	7/23/7/2022	Sat	-	92	86	82	291
0	7/24/7/2022	Sun	-	122	92	86	355
0	7/25/7/2022	Mon	-	(a.m. only) 132	(a.m. only) 77	-	-

TABLE 1B: DAILY PRESENCES AT DUCKLING HILL, FEB 2023

Round 2			Daily presences detected				
Rain (mm)	Date	Day	A	B	C2*	D	E
0.4	4/2/2023	Sat	585	272	297	73	156
Trace	5/2/2023	Sun	1,038	482	485	177	250
0.1	6/2/2023	Mon	666	304	305	73	61
Trace	7/2/2023	Tue	653	329	344	66	119
Trace	8/2/2023	Wed	582	334	309	118	119
0.1	9/2/2023	Thu	*(a.m. only) 327*	*(a.m. only) 167*	*(a.m. only) 9*	*(a.m. only) 46*	*(a.m. only) 40*

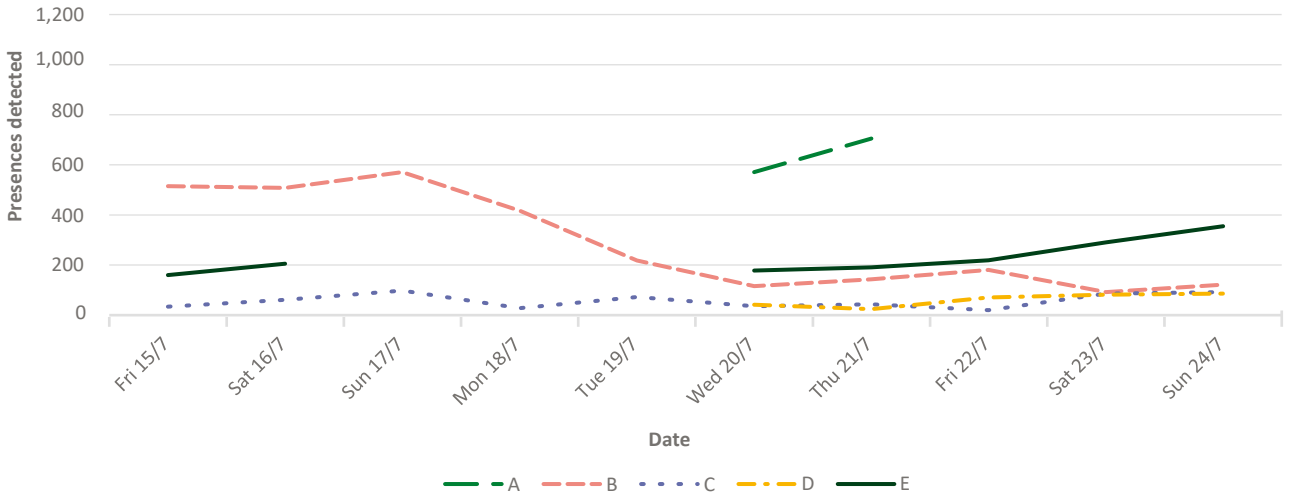
"-" No data
* Sensor relocated
↯ Thunderstorm warning

Tables 1a and 1b show the number of presences detected every day at each of the sensor locations at Duckling Hill. Technical failures during round 1 resulted in missing data in sensor A, and to a lesser extent D and E, limiting the usefulness of the figures. However, the two days of valid data indicate that foot traffic at location A is significantly higher than at other locations. This was confirmed during round 2, with sensor A detecting around 600–1,000 presences a day, about twice the number of presences as sensors B and C2, and about 5–6 times as many as D and E. Point A is a paved path connecting the southern base of Duckling Hill to the top of the hill, and is the main route used by trail users. (An alternative path leading up the western slope of Duckling Hill is a steeper, informal route created by local residents.)

Sensor B is located along the flat ridge at the top of Duckling Hill. Its lower presence count indicates that many trail users who pass A do not go all the way to the top of the hill. During round 1, sensor B detected over 500 presences a day for the first three days (Friday 15 July to Sunday 17 July) before gradually dropping off to below 200 presences a day. The cause of this decline is unclear since it is not mirrored in data from the other sensors, nor did it reoccur during round 2. A possible explanation is that the top of Duckling Hill is a space where people gather to recreate—there is a small outdoor gym and flower garden—so the elevated count during the first three days may indicate people strolling back and forth repeatedly in front of the sensor. While there was no significant change in temperature or rainfall over the data gathering period, there was more cloud cover during the first few days, which may have encouraged people to stay at the summit for longer.

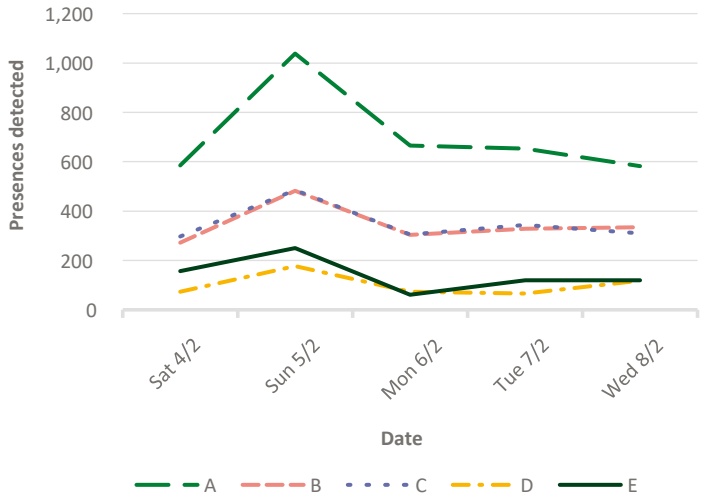
Sensor C is located to the north of Duckling Hill at a crossroads which exits to Clear Water Bay Road to the east, Razor Hill to the north, and to Po

CHART OF TABLE 1A: DUCKLING HILL, DAILY PRESENCES, JUL 2022



Full day data only

CHART OF TABLE 1B: DUCKLING HILL, DAILY PRESENCES, FEB 2023



Hang Path to the west. The sensor was relocated between rounds 1 and 2. During round 1, sensor C1 monitored the link between Duckling Hill and Po Hang Path. However, it recorded few trail users and was located too close to a crossroads to obtain accurate directional readings, so during round 2 it was relocated to position C2 where it monitored an entrance/exit linking the north side of Duckling Hill to Clear Water Bay Road. C2 showed much more traffic than C1, indicating that most people who visit Duckling Hill do not also visit Po Hang Path.

Sensors D and E were located along Po Hang Path and Lin Yuen Path to the north and west of Po Lam. These sensors showed much less activity than those on Duckling Hill, indicating that this is a less popular route.

The data from both July and February indicate that Sunday rather than Saturday is the busier day of the weekend, especially on the weekend of 4–5 February, when there were about twice as many presences registered on Sunday as on Saturday. However, the difference between Saturday and Sunday was much less dramatic during the two weekends in July and the missing data from sensors A, D and E make it difficult to verify if this was a consistent pattern across the entire trail.

3.2 | AVERAGE WEEKDAY AND WEEKEND PRESENCES AT DUCKLING HILL

TABLE 2: AVERAGE PRESENCES AT DUCKLING HILL

Summer 2022: 14–25 Jul 2022					
	A	**B**	**C1**	**D**	**E**
M-F a.m.	464	183	35	34	121
M-F p.m.	289	79	11	33	71
Total M-F daily	**754**	**263**	**46**	**67**	**192**
Weekend a.m.	-	199	44	57	153
Weekend p.m.	-	125	41	27	131
Total weekend daily	**-**	**323**	**84**	**84**	**284**
Winter 2022–23: 4–9 Feb 2023					
	A	**B**	**C2**	**D**	**E**
M-F a.m.	368	173	193	41	56
M-F p.m.	252	147	127	46	50
Total M-F daily	**620**	**320**	**319**	**87**	**106**
Weekend a.m.	462	194	234	48	91
Weekend p.m.	350	183	157	77	112
Total weekend daily	**812**	**377**	**391**	**125**	**203**

Totals sometimes do not add up due to rounding
"-" No data

Average presence counts for weekdays and weekends (see Table 2) show that there were similar numbers of users across both seasons, showing that the trails are quite well-used year-round. (Note: C1 and C2 should not be compared since the sensor was relocated).

The a.m. and p.m. averages show that the majority of activity (approx. 60%) occurred before noon on Duckling Hill (sensors A to C), reflecting its use by local morning walkers. However, activity was more evenly distributed throughout the day on Po Hang Path and Lin Yuen Path (D and E), with just over 50% of overall activity occurring during the mornings. Sensor E in particular saw larger increases in the number of weekend trail users, which makes sense given its proximity to Little Hawaii Falls.

3.3 | HOURLY PRESENCES AT DUCKLING HILL

This subsection will present hourly data from sensor A, which had the most foot traffic on Duckling Hill, and from sensor E ,which showed a different pattern of foot traffic.

Despite the missing data, the three days for which valid data was collected by sensor A in July 2022 showed a clear dual peak pattern (Chart 2). The first peak in foot traffic occurred in the morning at around 8:00–9:00 a.m. with approximately 100 presences per hour, followed by a smaller secondary spike in the late afternoon around 5:00–7:00 p.m. with around 50–80 presences per hour. Foot traffic fell dramatically around midday to around 10–30 presences per hour, indicating trail users avoiding the hottest part of the day.

The winter 2023 data (Chart 3) followed a similar pattern, however the first peak was more spread out between 8:00–10:00 a.m. with around 80–100 presences per hour, and the second spike peaked earlier at 4:00–5:00 p.m. with around 40–60 presences per hour. The midday slump was also smaller, with the number of presences staying at around 20–40 per hour. Sunday (5 February) showed a different pattern than the rest of the days of the week, with the first peak occurring between 9:00 a.m. and 10:00 a.m., with a second one at between 11:00 a.m. and noon. Foot traffic then stayed relatively high until 3:00 p.m. when it dropped off steeply. People also stayed later in the evening in the summer than in winter, with the sensor registering a few presences as late as 8:00–9:00 p.m. in the summer, but only until 6:00–7:00 p.m. in winter.

In contrast to sensor A, sensor E (see Charts 4 and 5) did not have a consistent peak time every day. At times, the highest peak occurred in the afternoon instead of the morning. An early afternoon slump was seen on most days during the summer, but was mostly absent during the winter.

CHART 2: DUCKLING HILL A, HOURLY PRESENCES, JULY 2022

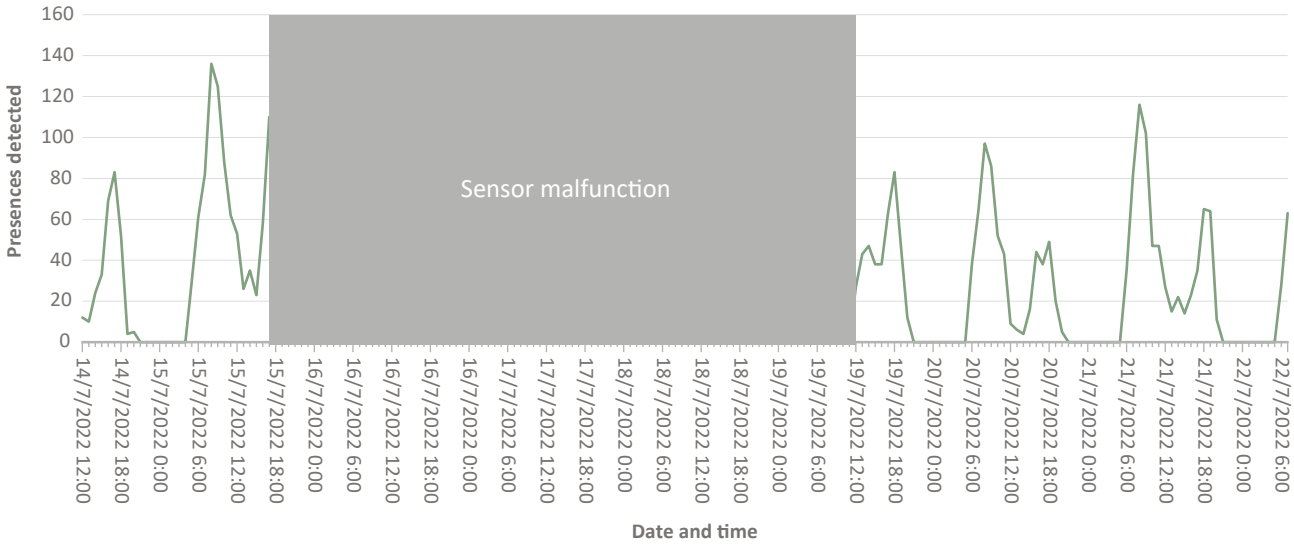


CHART 3: DUCKLING HILL A, HOURLY PRESENCES, FEB 2023

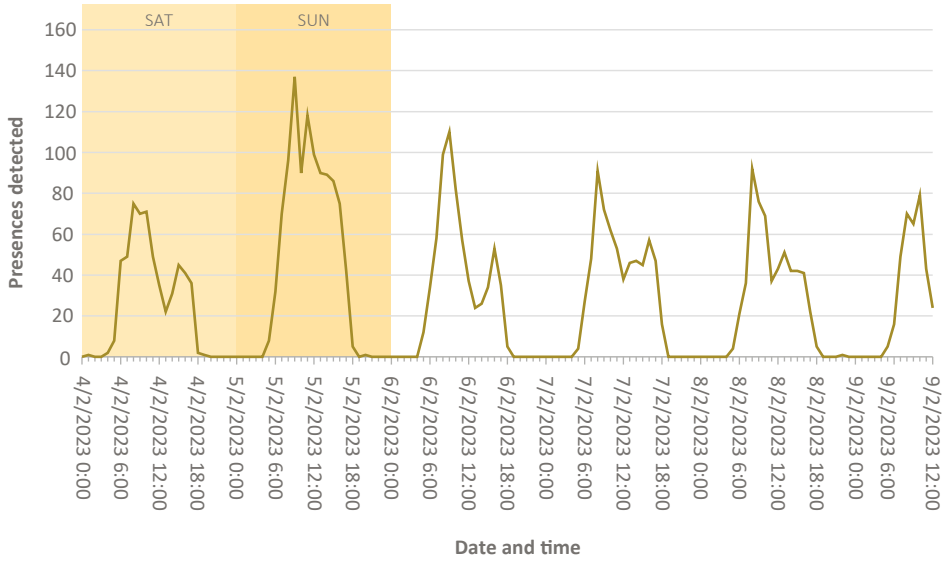


CHART 4: DUCKLING HILL E, HOURLY PRESENCES, JUL 2022

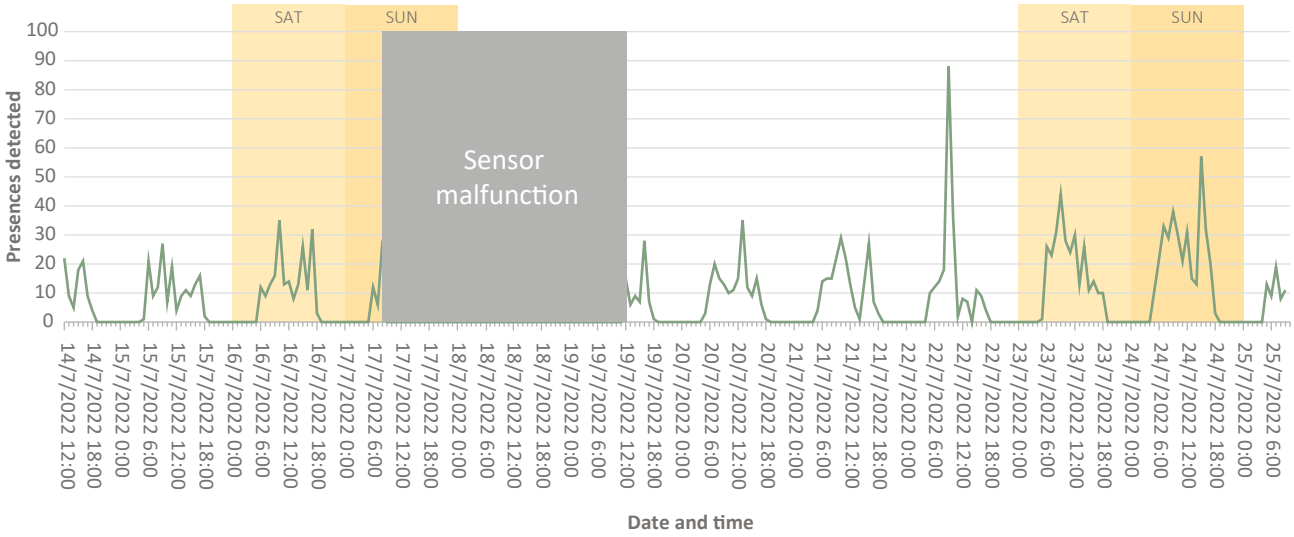
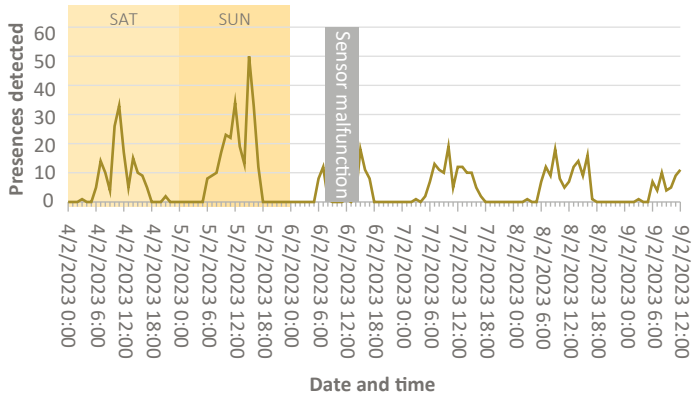


CHART 5: DUCKLING HILL E, HOURLY PRESENCES, FEB 2023



3.4 | DIRECTIONAL PRESENCE DATA AT DUCKLING HILL

TABLE 3: DIRECTIONAL DAILY PRESENCES AT DUCKLING HILL, FEB 2023

Feb 2023	A		B		C2		D		E	
Direction	Downhill (R)	Uphill (L)	North (L)	South (R)	Downhill (R)	Uphill (L)	East (L)	West (R)	North-east (L)	South-west (R)
Sat 4 Feb	282	303	155	117	145	152	32	41	125	31
Sun 5 Feb	456	582	285	197	219	266	92	85	210	40
Mon 6 Feb	307	359	154	150	135	170	38	35	45	16
Tue 7 Feb	317	336	175	154	162	182	31	35	82	37
Wed 8 Feb	288	294	184	150	137	172	85	33	88	31

Most sensor locations registered fairly balanced directional traffic over the course of a day, which indicated that trail users did not follow the same routes with broadly preferred starting and finishing points. However, there seemed to be a slight preference for ascending Duckling Hill via sensor A then travelling in a northward direction past sensor B. However, at sensor E at Lin Yuen Path, many more people travelled towards the north-east than the south-west (see Map 2 excerpt). Since this directional imbalance was mostly not seen further to the east at sensor D, people were likely entering the trail network at Tsui Lam Estate, passing sensor E, then turning left onto the path towards the Little Hawaii Falls or exiting the trail network at Tseung Kwan O Village. Most of them did not return along the same route.

MAP 2 EXCERPT

CHART 6: DUCKLING HILL A, DIRECTIONAL HOURLY PRESENCES, FEB 2023

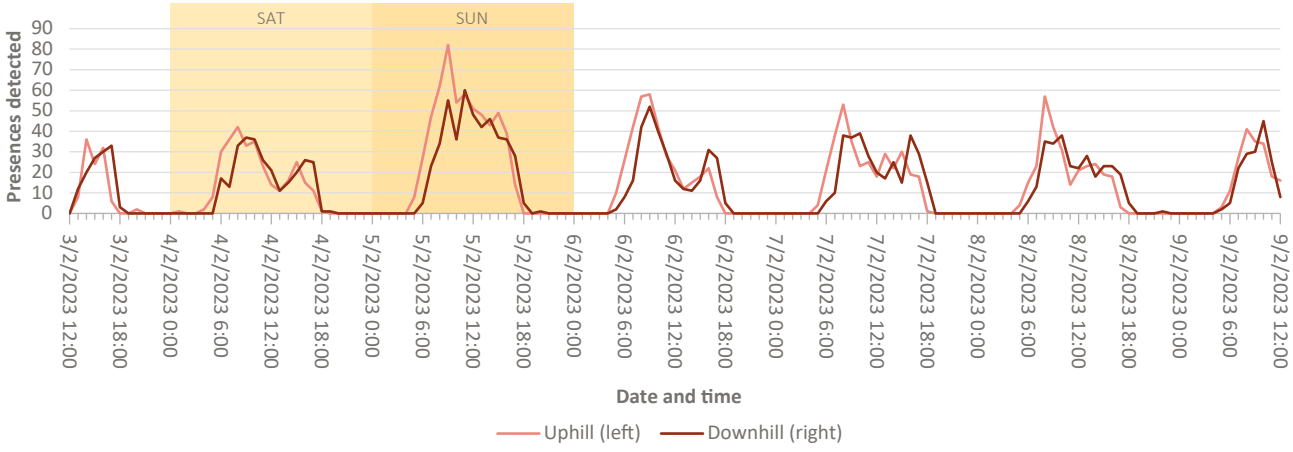
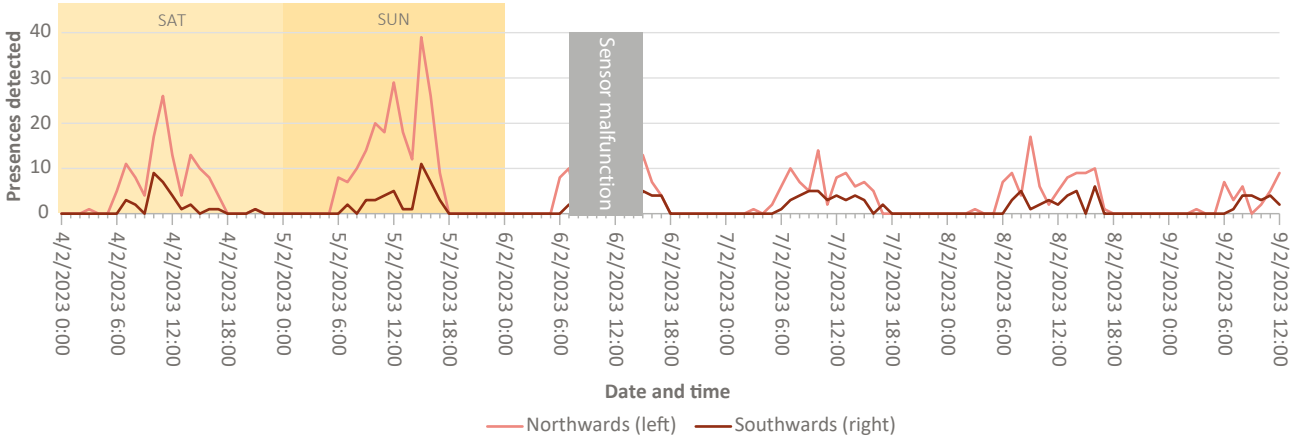


CHART 7: DUCKLING HILL E, DIRECTIONAL HOURLY PRESENCES, FEB 2023



Directional hourly data at Duckling Hill sensor A shows a pattern that is consistent with local residents making relatively short visits. Presences travelling uphill begin to be detected as early as 5:00 a.m. An hour later, presences travelling downhill are detected. The number of downhill presences closely track the number of uphill ones with about an hour's delay.

In contrast, sensor E showed a strong preference for one-way travel in the north-east direction. There was only a loose correlation with those returning in the opposite direction as the peaks do not always co-occur. There was also a much larger difference between weekend and weekday use, confirming that this segment of the route is not as well-used by local residents on a daily basis.

3.5 | OVERALL VISITOR ESTIMATES FOR DUCKLING HILL

To obtain a rough estimate of the typical number of daily visitors to Duckling Hill on weekdays and weekends, the number of presences detected at each sensor covering an entrance/exit to a trailhead was added up, then divided in half. The sensors that covered entrances or exits to the entire network including Po Hang and Lin Yuen Paths included sensors A, C2, and E. It was necessary to make some estimates to compensate for missing data, described below.

Firstly, due to sensor failures, there was no weekend data for sensor A during July 2022. Combining the figures from the other four sensors, the number of presences detected over the weekend was 136% of that detected during weekdays. Therefore, the weekday figure of 754 presences was multiplied by 1.36 to arrive at an estimate of 1,029 weekend presences.

Sensor C was relocated and position C2 was only monitored during the winter. Since overall the number of presences detected at the other sensors, B, D, and E during both seasons were very similar, the winter C2 figures were used as a proxy estimate for the summer figures.

One can say that Duckling Hill sees roughly 500–650 visitors during weekdays and 700–850 visitors during the weekends. This is almost certainly an underestimate because there are entrances and exits to Duckling Hill that were not covered by the sensors, including several less well-used trailheads along Po Lam Road, one that connects to Yau Yue Wan Village, and an alternative trailhead on Clear Water Bay Road south of C2.

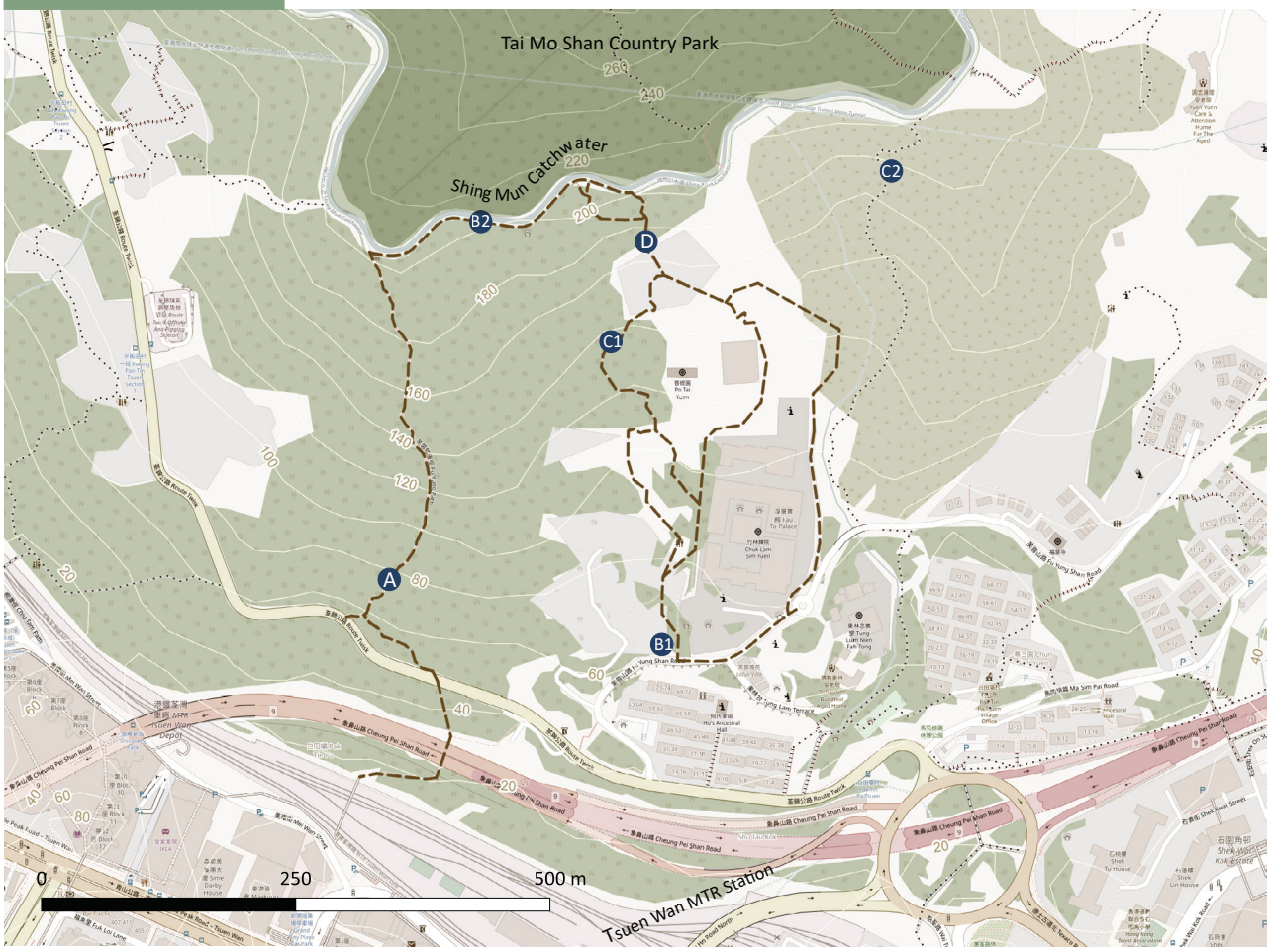
TABLE 4: OVERALL VISITOR CALCULATION FOR DUCKLING HILL

		A	C2	E	Total/2
	Monday-Friday average	754	319**	192	**633**
Jul 2022	Weekend average	1,029*	391**	284	**852**
	Monday-Friday average	620	319	106	**523**
Jan 2023	Weekend average	812	391	203	**703**

*Reconstructed estimate
**Proxy figures taken from winter 2023
All figures rounded to the nearest whole number

4. Fu Yung Shan

MAP 3: FU YUNG SHAN



Explored paths

Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- A Fu Yung Path linking Route Twisk with catchwater
- D Entrance/exit from catchwater to temple area

Round 1 only

- B1 Entrance/exit from Fu Yung Shan Sun Tsuen to Fu Yung Shan Rd
- C1 Route through temple area

Round 2 only

- B2 Along catchwater. Note: path wider than 2m
- C2 Route connecting catchwater with Fu Yung Shan Rd through wooded area

Fu Yung Shan lies to the north of Tsuen Wan MTR station, separated from the built-up area by MTR tracks and Cheung Pei Shan Road, a four lane highway. At Fu Yung Shan, a series of backyard trails traverse a strip of green belt land linking the urban area with the catchwater (see sensor position B2) which forms the main recreational walking trail and delineates the boundary of Tai Mo Shan Country Park to the north.

Position A is located on a staircase that provides the most direct link via an underpass below Cheung Pei Shan Road to Tsuen Wan MTR station. Positions B1, C1, and D are located at various points in a network of paths leading through an area occupied by numerous Buddhist temples and some village houses.

During the second round, it was decided to widen the geographical scope instead of focusing heavily

on the temple district, which saw a moderate number of trail users. Sensor B1 was relocated to position B2 along the water catchment's main trail. However, it is expected that this data is less accurate as the trail is wider than 2m. Sensor C1 (which was stolen) was also relocated outside of the area covered in the Part 1 trail exploration phase to C2, a staircase through a wooded area connecting Fu Yung Shan Road to the water catchment to the east of the temple district.

4.1 | DAILY PRESENCES AT FU YUNG SHAN

Unfortunately, data collection from Fu Yung Shan encountered several problems, limiting the scope of analysis. During July 2022, a typhoon and heavy rain reduced the data collection period from the planned 12 days to six. Sensor C1 was stolen, and sensor A malfunctioned after 2 days in the field due to a software bug. During round 2 in January 2023, sensor B also failed, capturing only 2.5 days' worth of valid data.

What can be seen from the daily presence data is that sensor A was located on by far the most well-used route, registering 200–500 presences during the weekday and close to 600 during weekends (see Tables 5A and 5B). This route provides the most direct connection between Tsuen Wan MTR station and the catchwater. Sensors B1 and D, which are located at the bottom and top of the temple district respectively, detected moderate foot traffic with around 50–200 presences a day. B1 detected more presences from a combination of worshippers and villagers whereas D was likely traversed primarily by recreational walkers. B2, along the catchwater, detected roughly 280 presences a day during the two days it functioned. C2 was on the least well-used route, with 10 or fewer presences detected on weekdays and around 60 on Sunday, the busiest day at that location.

There was too much missing data to establish whether Saturday or Sunday was the busiest day. In July 2022, sensors B1 and D showed fairly consistent levels of foot traffic throughout the week, but data from the most popular location, A was missing. In January, data from sensor A showed about twice as much activity on the weekend as opposed to weekdays, with Saturday and Sunday logging similar presence counts.

TABLE 5A: DAILY PRESENCES AT FU YUNG SHAN, JUL 2022

Round 1			Daily Presences Detected		
Rain (mm)	**Date**	**Day**	**A**	**B1**	**D**
🗲 13.1	7/7/2022	Thu	386	143	72
Trace	8/7/2022	Fri	486	227	86
Trace	9/7/2022	Sat	-	187	158
Trace	10/7/2022	Sun	-	223	132
0	11/7/2022	Mon	-	178	91
0	12/7/2022	Tue	-	-	*(a.m. only) 58*

TABLE 5B: DAILY PRESENCES AT FU YUNG SHAN, JAN 2023

Round 2			Daily Presences Detected			
Rain (mm)	**Date**	**Day**	**A**	**B2***	**C2**	**D**
0	7/1/2023	Sat	572	-	24	110
Trace	8/1/2023	Sun	594	-	63	125
0.1	9/1/2023	Mon	389	-	5	82
5.5	10/1/2023	Tue	235	287	10	52
3.2	11/1/2023	Wed	207	281	6	52
0.5	12/1/2023	Thu	*(a.m. only) 185*	*(a.m. only) 206*	*(a.m. only) 1*	*(a.m. only) 35*

*Sensor relocated

"-" No data

🗲 Thunderstorm warning

CHART OF TABLE 5A: FU YUNG SHAN, DAILY PRESENCES, JUL 2022

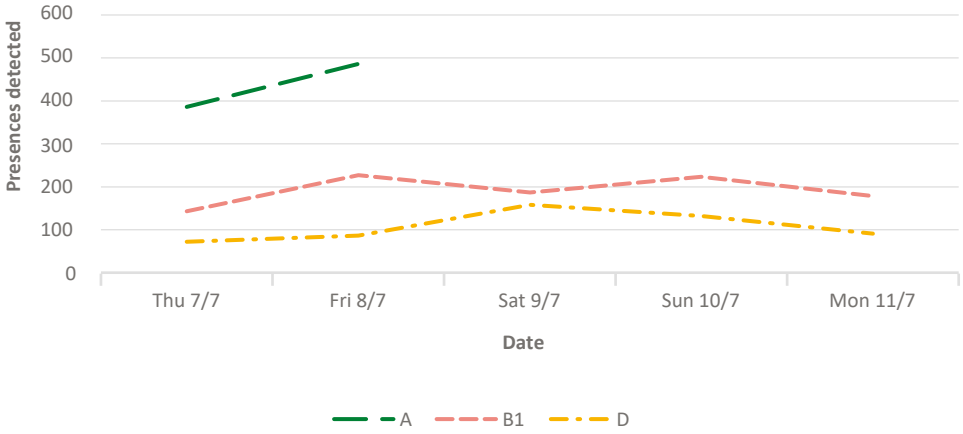
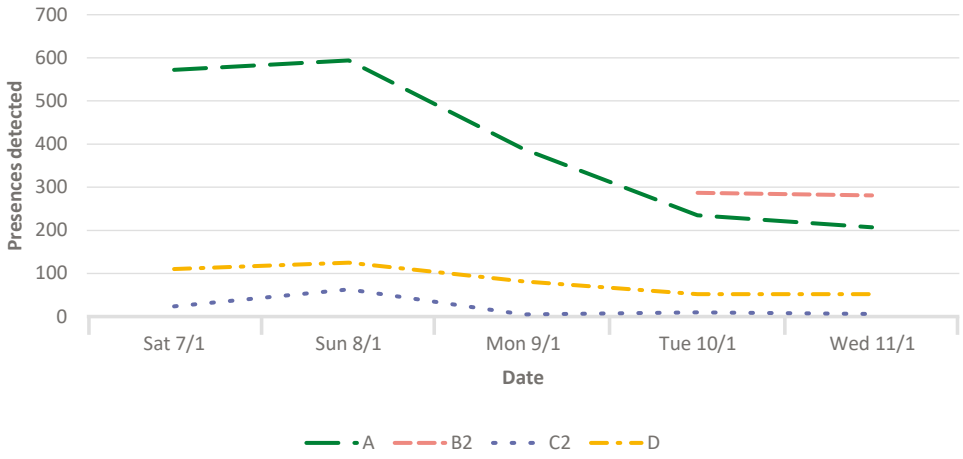


CHART OF TABLE 5B: FU YUNG SHAN, DAILY PRESENCES, JAN 2023



Full day data only

4.2 | AVERAGE WEEKDAY AND WEEKEND PRESENCES AT FU YUNG SHAN

TABLE 6: AVERAGE PRESENCES AT FU YUNG SHAN

Summer 2022: 7–12 Jul 2022

	A	B1	D
M-F a.m.	331	78	63
M-F p.m.	106	104	18
Total M-F daily	**436**	**183**	**81**
Weekend a.m.	-	99	76
Weekend p.m.	-	106	69
Total weekend daily	**-**	**205**	**145**

Winter 2022–23: 7–12 Jan 2023

	A	B2	C2	D
M-F a.m.	171	190	3	45
M-F p.m.	111	102	4	14
Total M-F daily	**282**	**292**	**6**	**59**
Weekend a.m.	351	-	25	79
Weekend p.m.	233	-	19	39
Total weekend daily	**583**	**-**	**44**	**118**

Totals sometimes do not add up due to rounding

"-" No data

A comparison of the average weekday and weekend figures from sensors A and D (the two that remained in the same location) finds that comparable numbers of people visit Fu Yung Shan in both the summer and the winter (see Table 6). In fact, the July figures appear to be higher than the January figures, although the first round figures are likely to be somewhat inflated as discussed in Section 2. Regardless, the trail appears to be well-used year-round.

Weekend foot traffic was roughly 80% to 100% more than weekday foot traffic at sensor A (winter) and sensor D (both seasons). Sensor B1 showed a smaller contrast (12% more on weekends), probably because trail users in this area consisted more of village residents and temple-goers rather than hikers. C2 showed an even more marked contrast percentage-wise (633% more on weekends) but the actual number was small to begin with.

Positions A, B2, and D detected more foot traffic in the morning than in the afternoon, however position B1 saw the reverse, especially on weekdays, confirming that this part of the trail served a different group of users.

4.3 | HOURLY PRESENCES AT FU YUNG SHAN

The subsection below presents hourly presence data from position A, the most highly-trafficked position; and B1, located at the bottom of the temple district, which had a markedly different pattern of foot traffic.

At sensor A, only two valid weekdays' worth of data (Thursday 7 July 2022 and Friday 8 July 2022) were collected during the summer (Chart 8). These two days had a similar hourly pattern of use as the weekday data from January 2023 (see Chart 9).

There was an extended morning peak that began at around 7:00 a.m., peaked at around 9:00 a.m. and started to fall at around 10:00 a.m. down to a low point at around 1:00–2:00 p.m. There was a slight rise in activity in the late afternoon at 3:00–5:00 p.m., but there was no pronounced afternoon peak. The weekend (7 and 8 January 2023) saw a much larger morning peak, especially on the Sunday. A few presences were detected as late as 8:00–9:00 p.m. each day.

Position B1 at the lower entrance to the temple district and village also had a morning peak, but with a more spread out pattern of foot traffic throughout the rest of the day. (There was an anomalous spike on 8 July at 4:00–5:00 p.m. It was probably caused by people lingering in front

CHART 8: FU YUNG SHAN A, HOURLY PRESENCES, JUL 2022

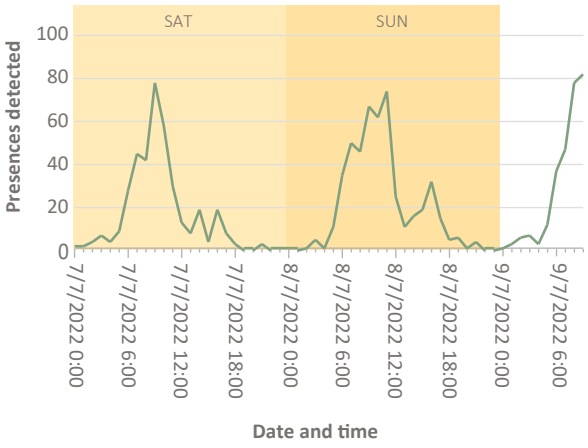
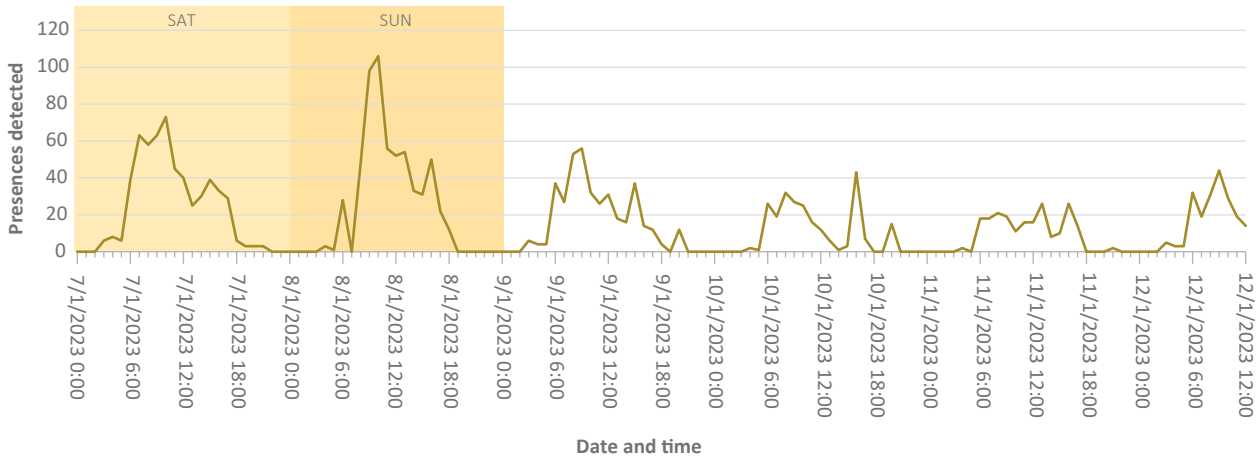
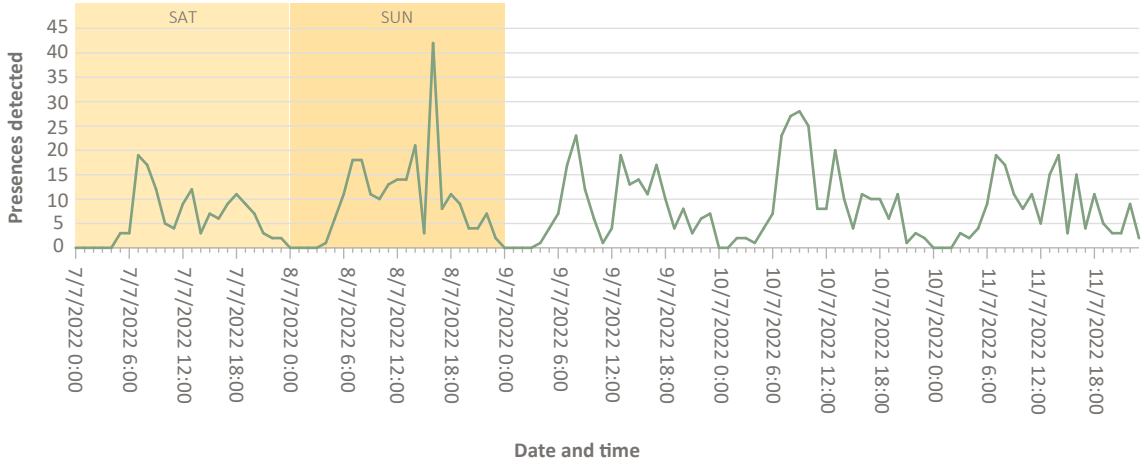


CHART 9: FU YUNG SHAN A, HOURLY PRESENCES, JAN 2023



of the sensor as no equivalent spike appeared at sensor D further uphill shortly before or afterwards). The sensor also detected some people late in the evening from 10:00 p.m.–12:00 a.m., who may have been villagers returning home.

CHART 10: FU YUNG SHAN B1, HOURLY PRESENCES, JUL 2022



4.4 | DIRECTIONAL PRESENCE DATA AT FU YUNG SHAN

TABLE 7: DIRECTIONAL DAILY PRESENCES AT FU YUNG SHAN, JAN 2023

Jan 2023	A		B2		C2		D	
Direction	Downhill (R)	Uphill (L)	East (L)	West (R)	Downhill (L)	Uphill (R)	Downhill (R)	Uphill (L)
Sat 7 Jan	267	305	-	-	11	13	71	39
Sun 8 Jan	322	272	-	-	23	40	73	52
Mon 9 Jan	188	201	-	-	3	2	58	24
Tue 10 Jan	101	134	154	133	5	5	38	14
Wed 11 Jan	86	121	143	138	4	2	37	15
	(a.m. only)	*(a.m. only)*	*(a.m. only)*	*(a.m. only)*	*(a.m. only)*	*(a.m. only)*	*(a.m. only)*	*(a.m. only)*
Thu 12 Jan	*62*	*123*	*125*	*81*	*1*	*0*	*23*	*12*

As shown in Table 7, Sensor A showed a slight bias towards uphill travel, while sensor B2 showed a slight bias towards eastwards travel along the water catchment. However, this latter data may not be very accurate due to the width of the path. If walkers systematically favoured one side of the path, then the side further away would be undercounted. Sensor D, however, showed a consistent and strong bias towards downhill travel. 66% of the presences detected were heading in the downhill direction, showing that this route was used mainly to leave the water catchment towards urban Tsuen Wan.

Directional presence data collected in January 2023 showed a clear pattern. Early in the morning at sensor A, uphill travel started being detected about 2 hours (4:00–6:00 a.m.) before a commensurate rise in downhill travel (6:00–7:00 a.m.). On the downswing of the morning peak after around 11:00 a.m., one can see that people generally left the trail about 2 hours after arriving. Throughout the week, the number of people walking uphill slightly exceeded the number walking downhill, indicating that some trail users found other exit points.

CHART 11: FU YUNG SHAN A, DIRECTIONAL HOURLY PRESENCES, JAN 2023

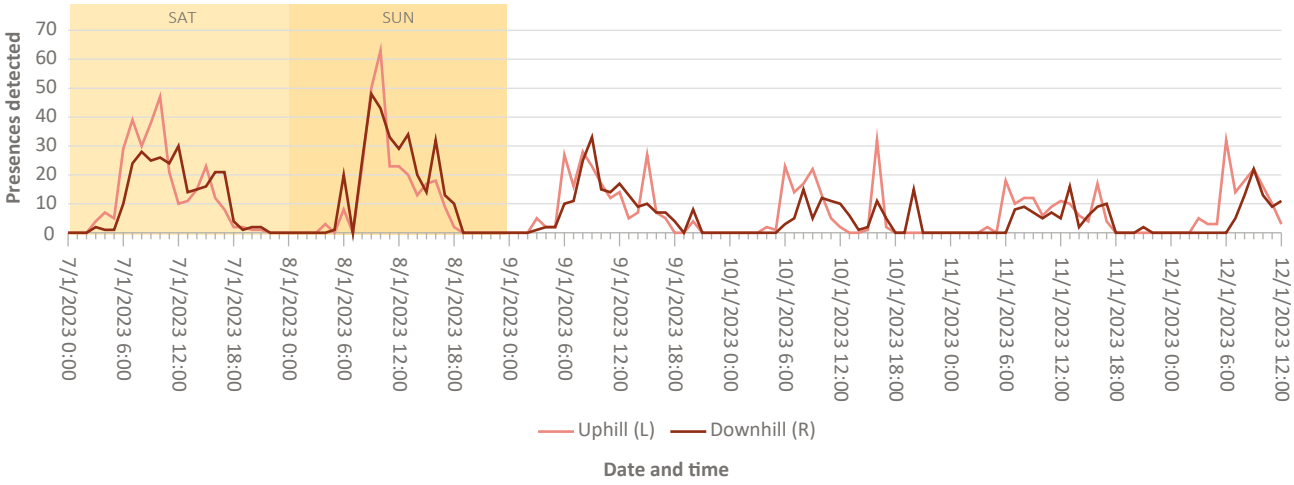


CHART 12: FU YUNG SHAN B2, DIRECTIONAL HOURLY PRESENCES, JAN 2023

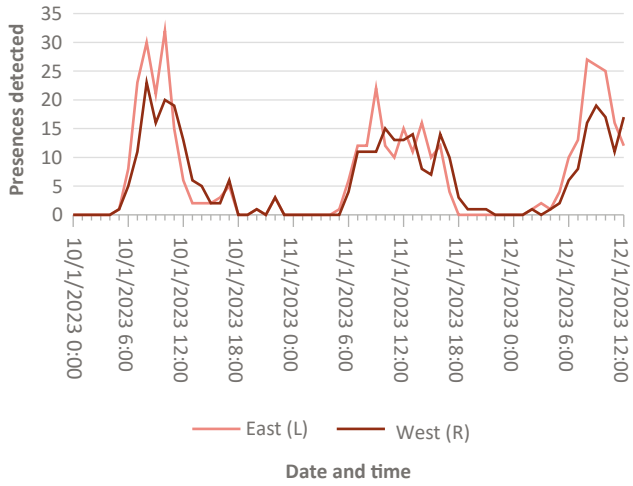
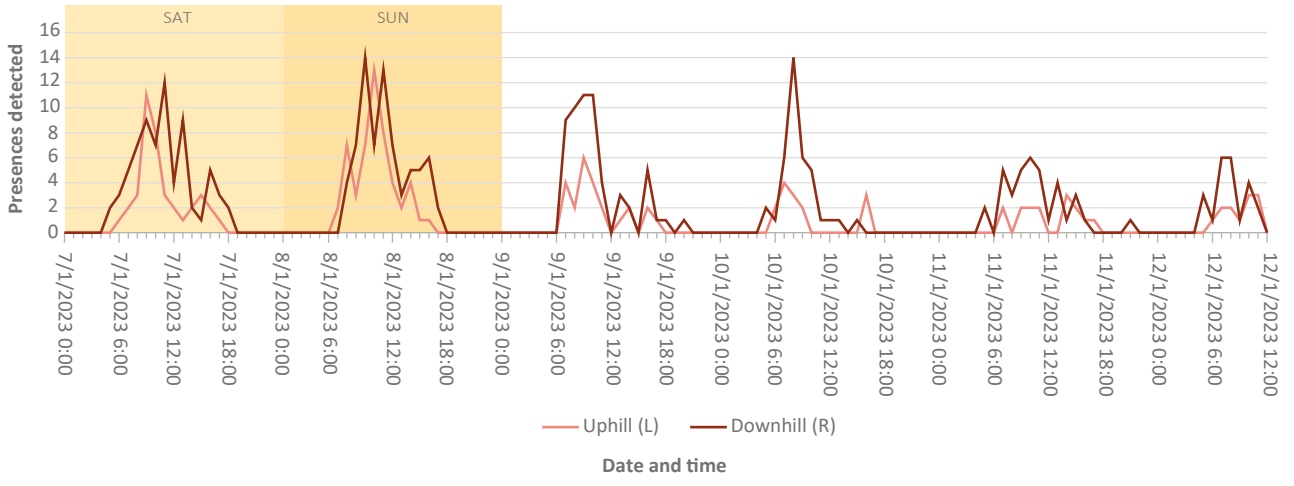
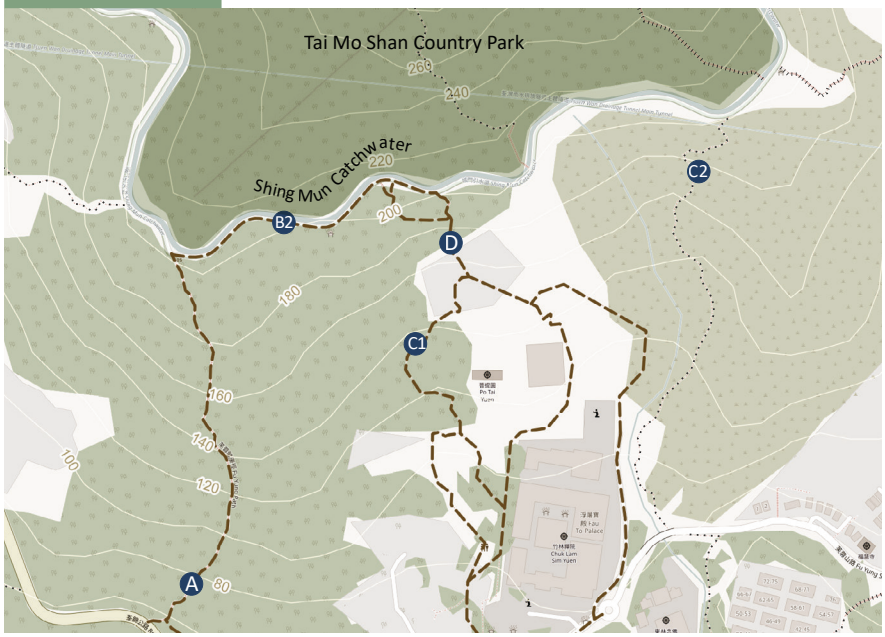


CHART 13: FU YUNG SHAN D, DIRECTIONAL HOURLY PRESENCES, JAN 2023



MAP 3 EXCERPT



Although only 2.5 days of data were collected at sensor B2 (Chart 12), a similar pattern was observed, with eastwards travel preceding westwards travel by about an hour. A possible reason is that there is an entrance to Tai Mo Shan Country Park to the east of sensor B2. People appeared to walk uphill past sensor A, then eastwards along the catchwater to towards the country park entrance (see Map 3 excerpt) Sometime later, a somewhat smaller number of people returned walking westwards.

Sensor D (Chart 13) shows a markedly different pattern with downhill travel generally exceeding uphill travel, especially on weekdays (9–12 January). Unusually, downhill travel also preceded uphill travel in the morning, except for on Sunday 8 January. Presences started to be registered around 5:00–7:00 a.m., which is slightly later than when uphill presences start to be detected at sensor A. The numbers of presences detected are also much lower than at sensor A or B. This confirms that this route is used by a smaller number of people mainly to exit the trail network through the temple district. Perhaps some morning walkers stopped by temples to worship on their way home.

4.5 OVERALL VISITOR ESTIMATE FOR FU YUNG SHAN

To obtain a rough estimate of the typical number of daily visitors to Fu Yung Shan on weekdays and weekends, the average number of presences detected at each sensor covering an entrance/exit to a trailhead are added up then divided in half, assuming each visitor entered and exited once. Three routes monitored by sensors A, D, and C2 provided access between urban Tsuen Wan and the catchwater which was assumed to be the main trail. As position C2 was not monitored during the first round, the second round figures were substituted as a proxy as the July and January figures at other locations were broadly similar.

Additionally, since there was no weekend data for July 2022 due to the sensor malfunction at position A, an estimate was generated by calculating the average difference between weekday and weekend figures at the other two functioning sensors (B1 and D) and applying this proportionally to sensor A.

Based on the calculations in Table 8, it is estimated that around 200–250 people visit Fu Yung Shan on weekdays and around 350–550 people visit per day on weekends. This is a conservative estimate because it only covers entrances/exits towards Tsuen Wan. Longer distance hikers may hike along the catchwater, entering and exiting through Tai Mo Shan Country Park to the north or Shing Mun Country Park to the east.

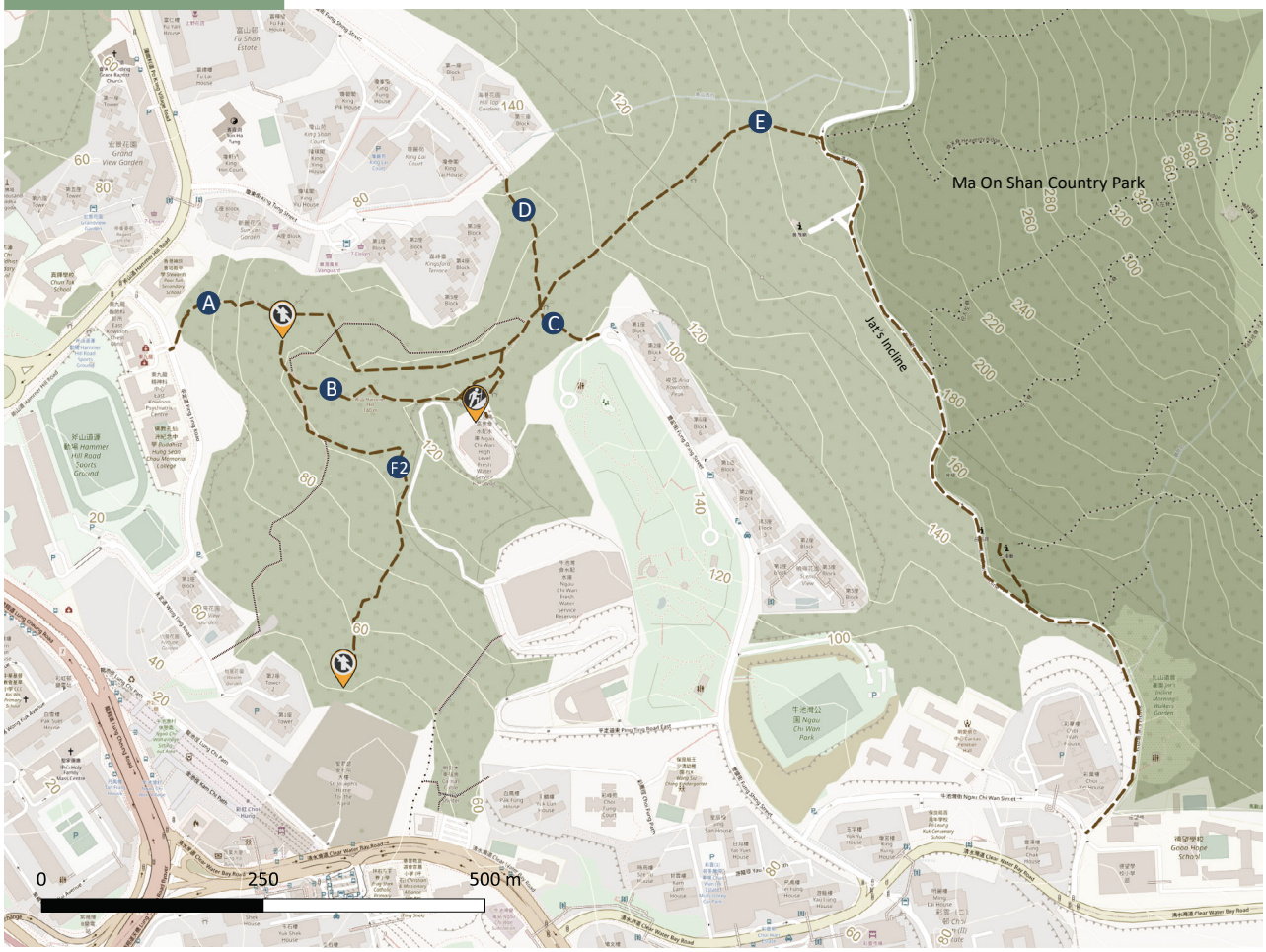
TABLE 8: OVERALL VISITOR CALCULATION FOR FU YUNG SHAN

		A	C2	D	Total/2
Jul–Aug 2022	Monday-Friday average	436	6**	81	**262**
	Weekend average	947*	44**	145	**568**
Jan 2023	Monday-Friday average	282	6	59	**174**
	Weekend average	583	44	118	**373**

*Reconstructed estimate
**Proxy figures taken from winter 2023
All figures rounded to the nearest whole number

5. Hammer Hill

MAP 4: HAMMER HILL



Explored paths

Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- A Entrance/exit to Ping Ting Road
- B Southern trail branch with informal recreational facilities
- C Entrance/exit to Fung Shing Street (south) and Ngau Chi Wan Park
- D Entrance/exit to Fung Shing Street (north)
- E Entrance/exit to Jat's Incline and Ma On Shan Country Park

Round 2 only

- F2 Dead-end path with informal rain shelter

Hammer Hill sits between Diamond Hill/Ngau Chi Wan and Ma On Shan Country Park, with Jat's Incline, a narrow mountain road, delineating the boundary of the country park. Sensors A, C, and D covered different entrance/exit points to the trail network from Ping Ting Road near Hammer Hill Road Sports Ground, Fung Shing Road near Ngau Chi Wan Park, and Fung Shing Road near King Lai Court respectively. Sensor B lay along a branch that leads to the top of Hammer Hill, where there is an informal exercise area and gathering spot. Sensor F2, which was only installed during the second round of data collection, monitored a dead-end informal trail where residents have built various recreational facilities including gardening plots and a rain shelter. Sensor E was located further uphill and monitored the entry/exit point to Jat's Incline.

5.1 | DAILY PRESENCES AT HAMMER HILL

TABLE 9A: DAILY PRESENCES AT HAMMER HILL, JUL 2022

Round 1			Daily presences detected				
Rain (mm)	**Date**	**Day**	**A**	**B**	**C**	**D**	**E**
0.2	15/7/2022	Fri	127	107	431	190	89
↯ 1.5	16/7/2022	Sat	153	112	385	252	92
1.2	17/7/2022	Sun	254	163	*(a.m. only) 261*	301	181
2.7	18/7/2022	Mon	88	113	-	300	46
Trace	19/7/2022	Tue	104	111	-	-	144
0.6	20/7/2022	Wed	171	83	243	-	316
0.3	21/7/2022	Thu	170	93	204	-	317
0	22/7/2022	Fri	160	83	206	-	405
0	23/7/2022	Sat	209	73	226	-	648
0	24/7/2022	Sun	176	74	263	-	693
0	25/7/2022	Mon	*(a.m. only) 81*	-	*(a.m. only) 124*	-	*(a.m. only) 220*

TABLE 9B: DAILY PRESENCES AT HAMMER HILL, DEC 2022

Round 2			Daily presences detected					
Rain (mm)	**Date**	**Day**	**A**	**B**	**C**	**D**	**E**	**F2**
↯ 9.1	17/12/2022	Sat	119	126	242	352	215	26
Trace	18/12/2022	Sun	309	314	435	503	520	57
0	19/12/2022	Mon	125	121	322	472	317	56
0	20/12/2022	Tue	121	-	359	404	344	23
Trace	21/12/2022	Wed	128	-	281	377	299	37
0	22/12/2022	Thu	*(a.m. only) 42*	-	*(a.m. only) 152*	*(a.m. only) 213*	*(a.m. only) 165*	*(a.m. only) 14*

"-" No data
↯ Thunderstorm warning

In July 2022, sensors failed at locations C and D, resulting in partial data being collected. Sensor B also failed during the second half of the data collection period in December 2022.

Of the sensors covering entrances and exits from the built-up area, D and C saw the highest level of foot traffic (see Tables 9A and 9B). D is located on the northern side of the hill on Fung Shing Road directly opposite several large housing complexes including Fu Shan Estate, King Shan Court, King Lai Court, Sun Lai Garden, and Kingsford Terrace), while C is located on the southern side next to Ngau Chi Wan Park with Choi Wan Estate located further down the road. A is somewhat less well-used. This may be because this trailhead is separated from the major residential estates of Choi Hung by Clear Water Bay Road, which has few crossing points and acts as a barrier to pedestrians (see Part 1 report for further discussion). While Sunday saw the highest amount of foot traffic during the weekends of 16–17 July and 17–18 December, this was probably influenced by the weather—there were thunderstorms on both preceding Saturdays. The weekend of 23–24 July, when it did not rain, saw more similar numbers of people on Saturday and Sunday.

F observed consistently low usage with around 25–60 presences a day, which translates to 12–30 people. This is to be expected on a dead-end path, but it gives some insight into the number of people who visit the informal recreational facilities along this path.

Sensor E, which overlooks the connection between Hammer Hill and Ma On Shan Country Park, observed the biggest changes in foot traffic over time. From Wednesday 20 July to Sunday 24 July, there was a steady increase in foot traffic from 300 presences to nearly 700 presences daily. Sensors A, B, and C did not pick up a commensurate increase in activity, but sensor D had failed by this time. The reason for this increase is unclear. A sensor malfunction was ruled out after a reexamination of the raw data, which happened to be one of the

CHART OF TABLE 9A: HAMMER HILL, DAILY PRESENCES, JUL 2022

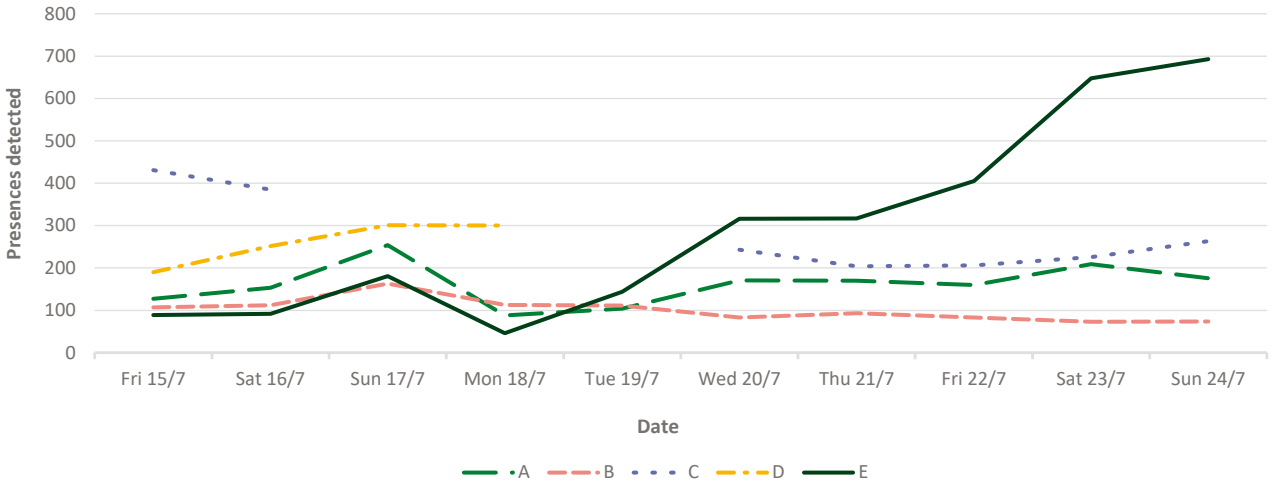
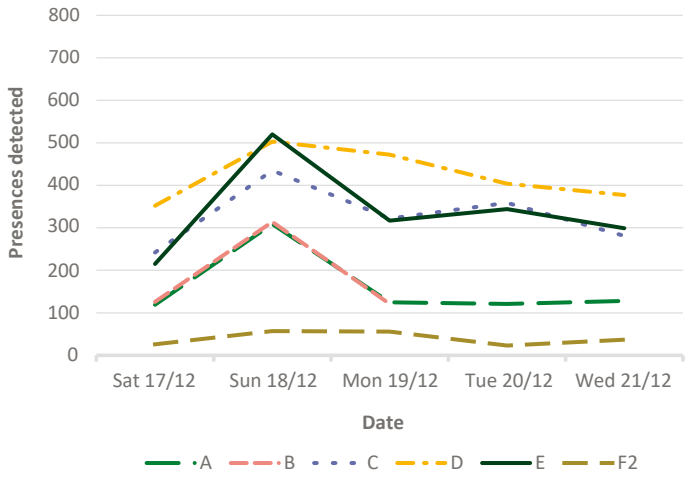


CHART OF TABLE 9B: HAMMER HILL, DAILY PRESENCES, DEC 2022



Full day data only

few datasets retained from the first round. It was not a public holiday and school holidays had not yet begun. That year, the summer holidays had been rescheduled to March/April due to the fifth wave of the COVID-19 pandemic, and students were only given a two-week summer break starting on 2 August at the earliest.

At the time, the government was in the process of gradually relaxing hotel quarantine requirements for inbound travellers,[13] but it is not clear whether and how this affected hiking activity. There were otherwise no changes in social distancing restrictions and no major hiking competitions took place over this time, although this does not rule out the possibility of an unofficial private event. Weather did not seen to be a factor either. There was little to no rainfall over the entire data collection period, while cloud cover decreased and average temperatures rose from 30.4°C to 31.2°C[14] over the days that foot traffic increased. In December 2022, sensor E did not register any unusual changes over the week.

13 HKSAR Information Services Department, "Government announces adjustments to quarantine arrangements for inbound persons", press release, 8 August 2022, https://www.info.gov.hk/gia/general/202208/08/P2022080800803.htm (accessed 16 June 2023)

14 HKSAR Hong Kong Observatory, "Daily Extract of Meteorological Observations , July 2022", July 2022, https://www.hko.gov.hk/en/cis/dailyExtract.htm?y=2022&m=7 (accessed 15 June 2023).

5.2 | AVERAGE WEEKDAY AND WEEKEND PRESENCES AT HAMMER HILL

TABLE 10: AVERAGE PRESENCES AT HAMMER HILL

Summer 2022: 7–12 Jul 2022					
	A	**B**	**C**	**D**	**E**
M-F a.m.	80	66	149	152	145
M-F p.m.	57	33	116	94	88
Total M-F daily	**137**	**98**	**265**	**246**	**232**
Weekend a.m.	116	68	193	176	247
Weekend p.m.	82	37	121	101	157
Total weekend daily	**198**	**106**	**314**	**277**	**404**

Winter 2022–23: 17–22 Dec 2022						
	A	**B**	**C**	**D**	**E**	**F2**
M-F a.m.	62	71	169	236	163	13
M-F p.m.	43	50	146	174	157	26
Total M-F daily	**105**	**121**	**315**	**410**	**321**	**39**
Weekend a.m.	74	115	124	181	131	18
Weekend p.m.	140	105	215	247	237	24
Total weekend daily	**214**	**220**	**339**	**428**	**368**	**42**

Totals sometimes do not add up due to rounding
"-" No data

In general, weekends saw more foot traffic than weekdays, but not across all sensor points (see Table 10). Sensor A registered about 140% to 200% as many presences on the weekend as on weekdays in July and December 2022, respectively, whereas sensors C and D registered smaller differences ranging from 104% to 118% as many on weekends. Point A may be a more attractive entry/exit point to weekend visitors from out-of-district because it is closer to Choi Hung MTR station, whereas C and D are not as accessible by public transport.

A large weekday/weekend difference was observed at E in July but not in December, but as discussed above, this is a result of the unexplained increase in foot traffic up to the weekend of 23 and 24 July 2022. It is uncertain how often this might occur.

Sensor B, which is located on the trail branch leading to the summit of Hammer Hill, recorded inconsistent results. Weekend foot traffic was heavier than weekday traffic in December 2022 but not in July for unclear reasons. Sensor F2 detected almost no difference between weekdays and weekends since it is only used by a small number of local residents, likely retirees, whose habits do not change very much throughout the week.

Most of the sensors detected more presences during the morning hours than in the afternoon. However, this pattern is reversed for sensors A, C, D, and E on the weekend of 17–18 December, which saw 140% to 190% as much foot traffic during the afternoon.

5.3 | HOURLY PRESENCES AT HAMMER HILL

This subsection will focus on sensor C, which monitored the trailhead behind Ngau Chi Wan Park, and sensor E which monitored the trailhead closest to Ma On Shan Country Park. The former appears to be used more by neighbourhood residents and the latter by weekend visitors.

For the most part, sensor C (see Chart 14) detected a two-peak pattern consisting of a larger peak in the morning with 30–60 presences an hour at around 9:00 or 10:00 a.m., followed by a smaller and briefer peak in the afternoon with around 15–30 presences an hour between 4:00 p.m. and 6:00 p.m.

The data from December (see Chart 15) found foot traffic more spread out throughout the day than in the summer. On weekdays (19–21 December), the morning peak was less pronounced and foot traffic tapered off throughout the afternoon without an obvious secondary peak, except on Monday 19 December. The data from the weekend of 17–18 December showed a markedly different pattern, with more foot traffic spread out quite evenly through the day on Saturday and rising towards the afternoon on Sunday. Heavier afternoon traffic was detected by several sensors during that weekend, including sensor E shown in Chart 17.

CHART 14: HAMMER HILL C, HOURLY PRESENCES, JUL 2022

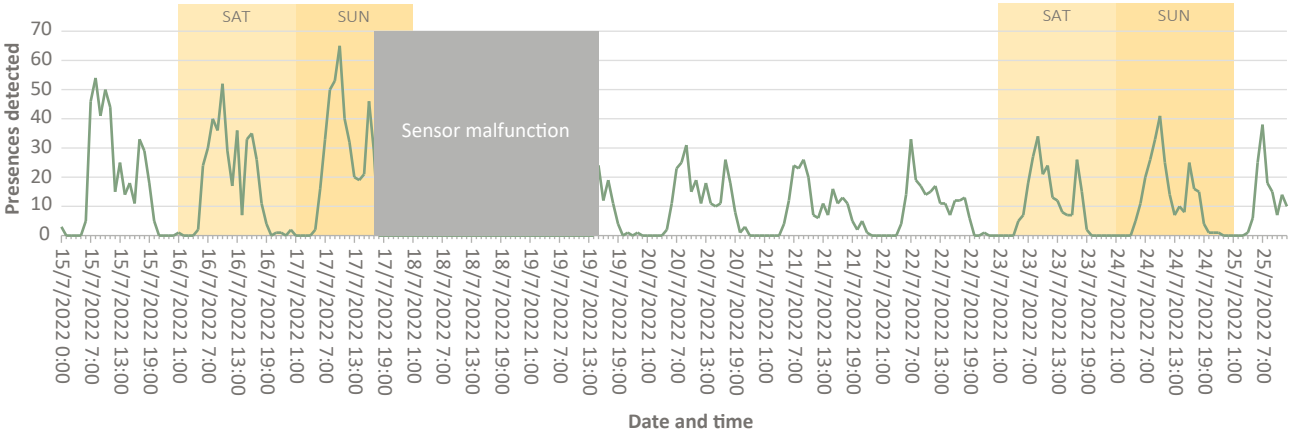


CHART 15: HAMMER HILL C, HOURLY PRESENCES, DEC 2022

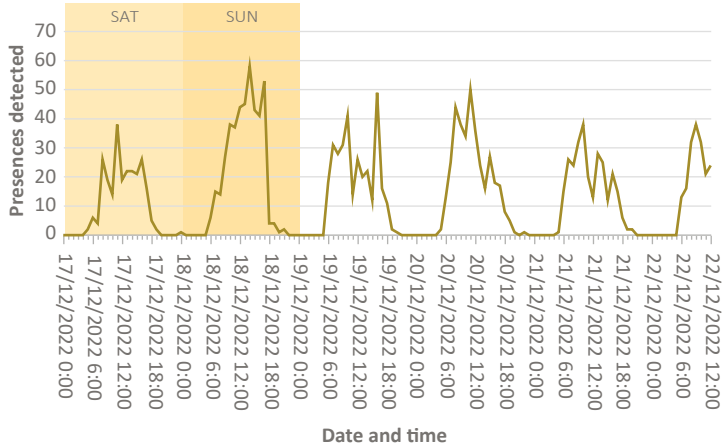


CHART 16: HAMMER HILL E, HOURLY PRESENCES, JUL 2022

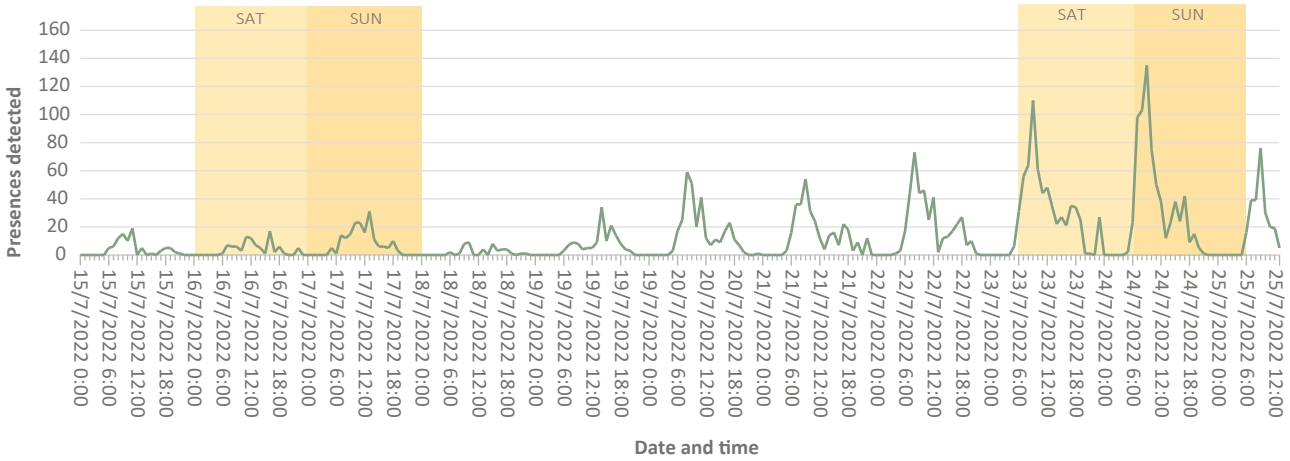
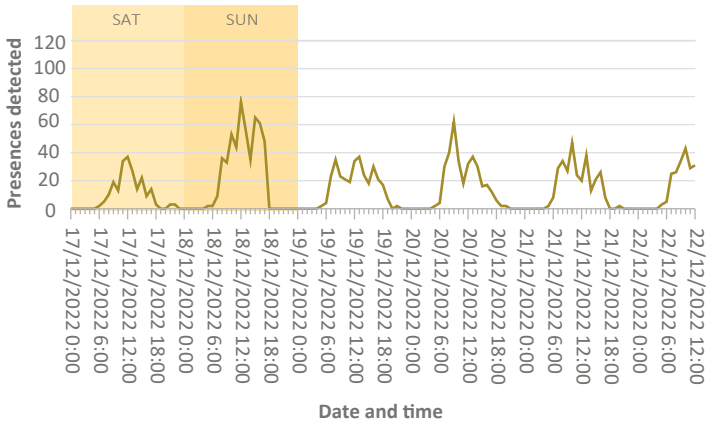


CHART 17: HAMMER HILL E, HOURLY PRESENCES, DEC 2022



Sensor E detected more unpredictable patterns of foot traffic. From 15–19 July, sensor E detected few trail users with no more than 35 presences an hour at any point. There was no consistent peak time during those days. From 20 July onwards, there was a clear morning peak at around 8:00–9:00 a.m. that grew successively larger each day. As discussed in Section 5.1, the reason for this influx of trail users is unknown. In December 2022, trail users are distributed quite evenly throughout the day with no consistent peak time.

5.4 | DIRECTIONAL PRESENCE DATA AT HAMMER HILL

TABLE 11: DIRECTIONAL DAILY PRESENCES AT HAMMER HILL

Dec 2022	A		B		C		D		E		F	
Direction	Downhill (L)	Uphill (R)	Downhill (L)	Uphill (R)	Downhill (R)	Uphill (L)	Downhill (R)	Uphill (L)	Downhill (L)	Uphill (R)	South (L)	North (R)
Sat 17 Dec	57	62	72	54	114	128	190	162	101	114	8	18
Sun 18 Dec	163	146	163	151	237	198	245	258	233	287	32	25
Mon 19 Dec	63	62	61	60	154	168	235	237	137	180	24	32
Tue 20 Dec	62	59	-	-	176	183	197	207	165	179	10	13
Wed 21 Dec	57	71	-	-	147	134	179	198	160	139	16	21
Thu 22 Dec	*(a.m. only) 15*	*(a.m. only) 27*	-	-	*(a.m. only) 78*	*(a.m. only) 74*	*(a.m. only) 100*	*(a.m. only) 113*	*(a.m. only) 78*	*(a.m. only) 87*	*(a.m. only) 9*	*(a.m. only) 5*

"-" No data

As shown in Table 11, the number of people travelling uphill and downhill on a daily basis at each sensor point was relatively balanced. There was not any trailhead that was primarily used by one-directional traffic.

Directional hourly presence data for sensors C, D, and E are plotted in Charts 18 to 20. Surprisingly, at sensor C, uphill directional travel does not consistently precede downhill travel early in the morning. On 19 and 21 December, almost equal numbers of presences travelling both uphill and downhill started being detected simultaneously at around 6:00–7:00 a.m. On the morning of 22 December, downhill presences were registered first. The likely origin point of those people is point D as the two trailheads are located close to each other on the opposite sides of the main trail. The directional hourly data from sensor D appears to confirm this as it shows a very similar pattern with little to no delay between uphill and downhill travellers being detected in the morning. This indicates that people are using this route as a shortcut between the two halves of Fung Shing Street which is interrupted in the middle by the green belt area.

Sensor E, on the other hand, shows a more typical pattern of uphill presences preceding downhill presences by about an hour. On certain days, e.g. Sunday 18 December, Monday 19 December and Wednesday 21 December, there was a significant delay between the peaks in uphill and downhill movements— i.e. the peak in uphill travel occurred in the morning to early afternoon, while the peak in downhill travel occurred in the mid-to-late afternoon. This is indicative of people spending longer periods of time on the trail such as by hiking into the country park.

CHART 18: HAMMER HILL C, DIRECTIONAL HOURLY PRESENCES, DEC 2022

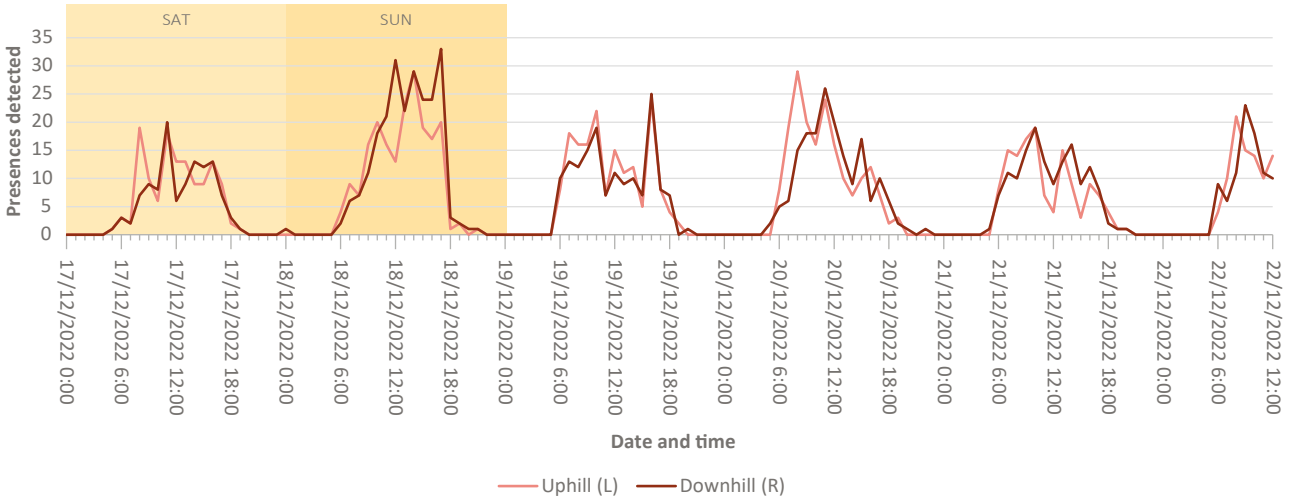


CHART 19: HAMMER HILL D, DIRECTIONAL HOURLY PRESENCES, DEC 2022

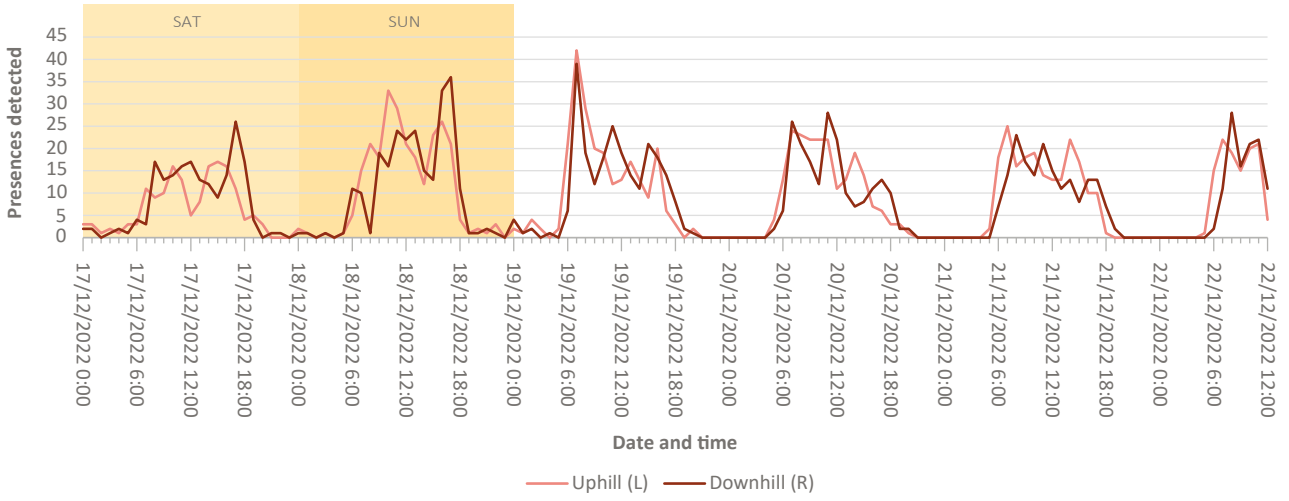
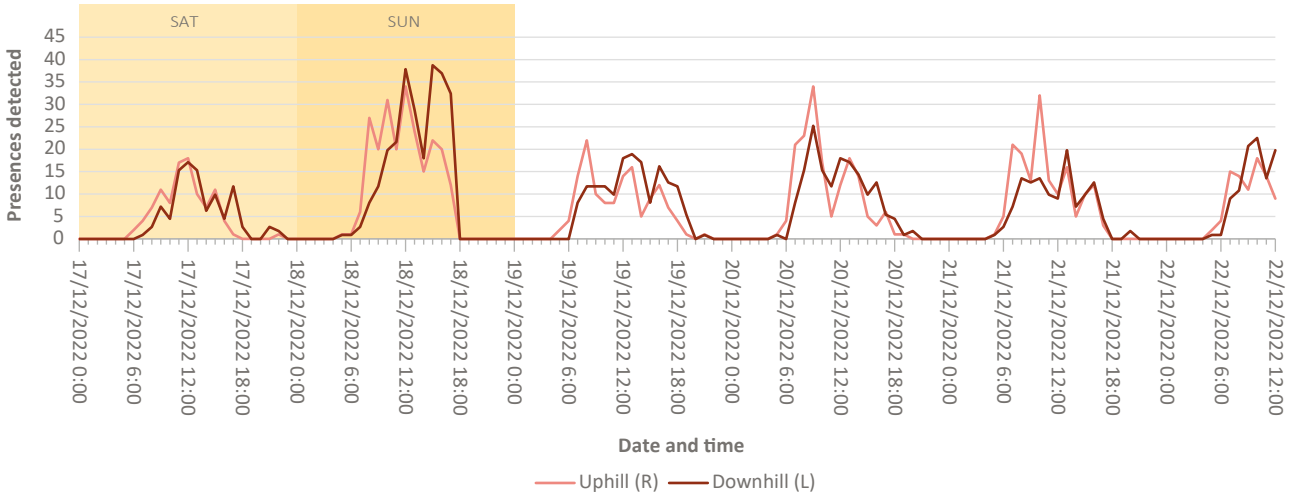


CHART 20: HAMMER HILL E, DIRECTIONAL HOURLY PRESENCES, DEC 2022



5.5 | OVERALL TRAIL USER ESTIMATE FOR HAMMER HILL

To estimate overall visitor numbers, the average weekday and weekend presence figures from sensors A, C, D and E, which cover trail entrances/exits, are added up then divided by two. These figures are expected to be a slight underestimate because there is one trail entrance from Wing Tung Road next to Bayview Garden that the researchers were unaware of as it did not appear on the TrailWatch map at the time the initial trail exploration research was carried out.

Based on the estimates in Table 12, Hammer Hill appears to be quite well-used year-round. In general, it can be estimated that around 450–600 people visited on weekdays, and 600–700 on weekends.

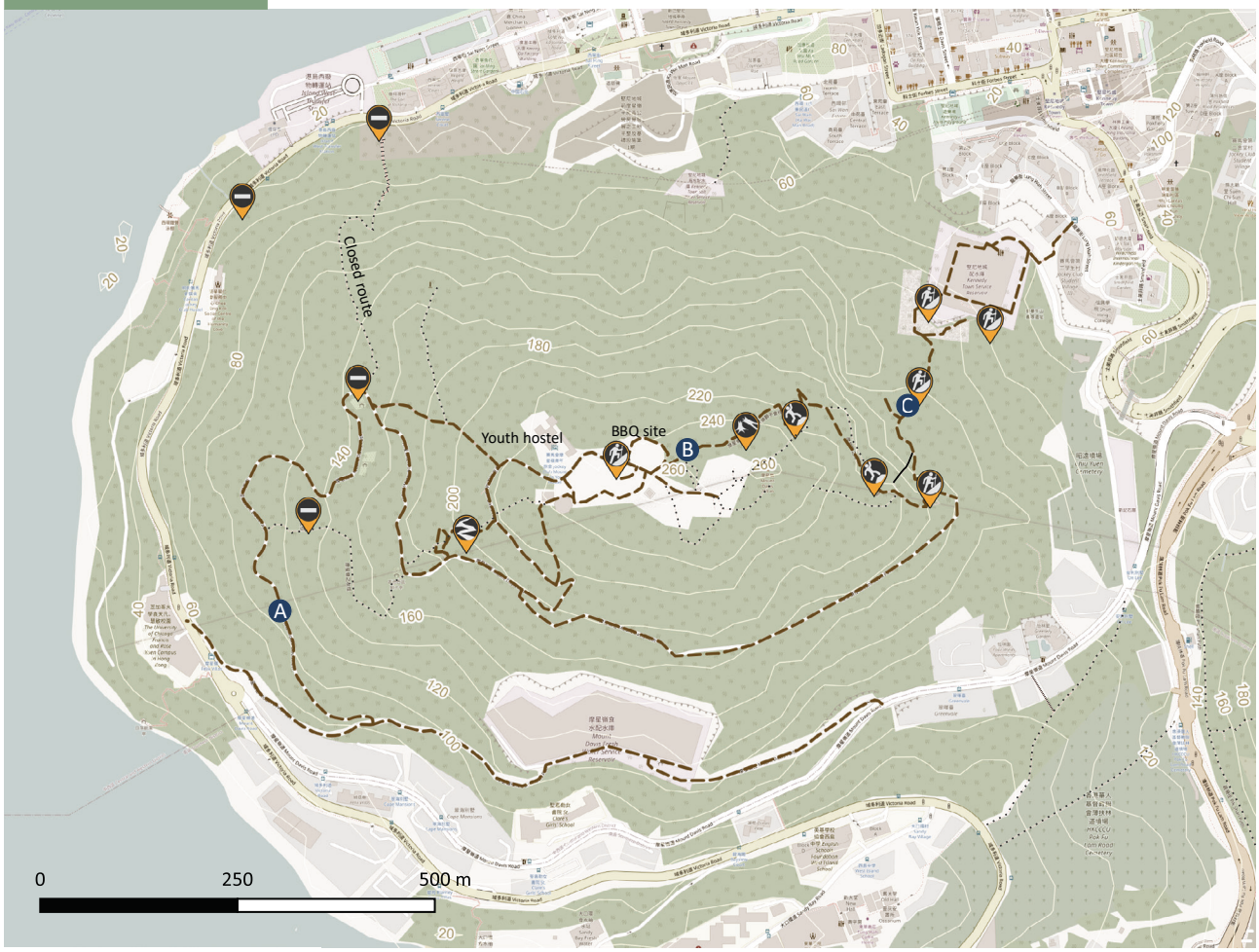
TABLE 12: OVERALL VISITOR CALCULATION FOR HAMMER HILL

		A	C	D	E	Total/2
Jul 2022	Monday-Friday average	137	265	246	232	**440**
	Weekend average	198	314	277	404	**596**
Jan 2023	Monday-Friday average	105	315	410	321	**576**
	Weekend average	214	339	428	368	**675**

Rounded to the nearest whole number

6. Mount Davis

MAP 5: MOUNT DAVIS



Explored paths

Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- A Mount Davis Path, main pedestrian & vehicular access route from Mount Davis Road. Note: Path wider than 2m
- B Entrance/exit to Friends of Mount Davis Path at summit of hill
- C Informal route connecting Kennedy Town with summit

Mount Davis is a hill located on the far western side of Hong Kong Island between Kennedy Town and Pok Fu Lam. It currently only has one official access route via Mount Davis Path (sensor A), which exits onto Mount Davis Road and Victoria Road to the south-east and south-west of the hill, respectively. A staircase on the north side of the hill connecting to Victoria Road near the Island West Transfer Station in Kennedy Town is currently closed off due to the redevelopment of the former Kung Man Village resettlement area into public housing (see Part 1 report). The one remaining access route is a steep informal path on the north-eastern side of hill (sensor C), connecting the Kennedy Town Service Reservoir to the top of the hill (sensor B) via the Friends of Mount Davis Trail.

6.1 | DAILY PRESENCES AT MOUNT DAVIS

TABLE 13A: DAILY PRESENCES AT MOUNT DAVIS, AUG 2022

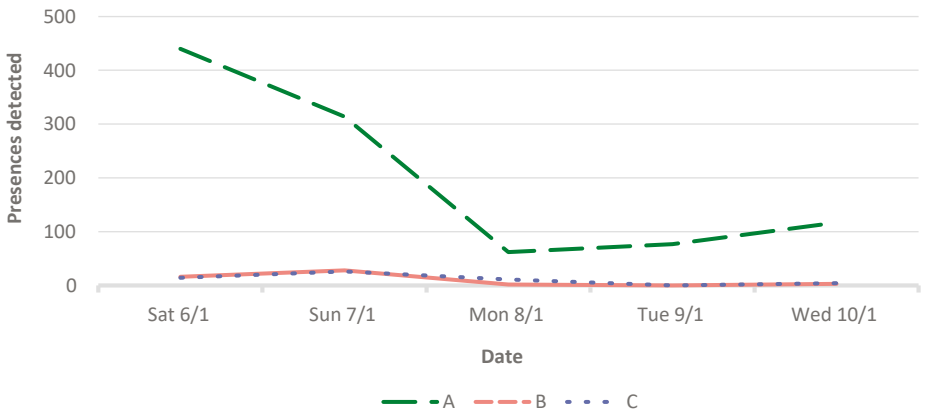
Round 1			Daily Presences Detected		
Rain (mm)	Date	Day	A	B	C
🗲 0	13/8/2022	Sat	381	872	18
0	14/8/2022	Sun	229	1,332	47
0	15/8/2022	Mon	*(a.m. only) 111*	*(a.m. only) 154*	*(a.m. only) 0*

TABLE 13B: DAILY PRESENCES AT MOUNT DAVIS, JAN 2023

Round 2			Daily Presences Detected		
Rain (mm)	Date	Day	A	B	C
0	6/1/2023	Fri	*(p.m. only) 80*	*(p.m. only) 13*	*(p.m. only) 0*
0	7/1/2023	Sat	440	16	14
Trace	8/1/2023	Sun	314	28	26
0.1	9/1/2023	Mon	62	2	11
5.5	10/1/2023	Tue	77	0	0
3.2	11/1/2023	Wed	117	3	4
0.5	12/1/2023	Thu	*(a.m. only) 54*	-	-

"-" No data
🗲 Thunderstorm warning

CHART OF TABLE 13B: MOUNT PARKER, DAILY PRESENCES, JAN 2023



Due to a combination of bad weather and a software bug that affected several sensors, only 2.5 days' worth of valid data was collected on Mount Davis during the first round. This covers one weekend and half a weekday. During the second round, 5.5 to 6 days' worth of valid data was collected.

The data in Tables 13A and 13B show that sensor A, which is located on the main official route, consistently detected the most foot traffic. However, the path where sensor A was located is wider than 2m as it was built to accommodate the transport of heavy wartime equipment, so the data will not be as accurate.

Sensor C, located on the steep informal route, only detected a few presences a day. As denoted by the hazard icons on the map, this route is very steep and includes two makeshift bridges which are marked as fall risks. The lack of a safe direct route from the most densely populated part of Kennedy Town to the top of Duckling Hill limits the number of visitors.

Sensor B, which is located at the top of the hill, recorded wildly different figures during August 2022 and January 2023. However, as it was located on the flat plateau at the top of the hill where people can wander around a cluster of wartime historic sites and recreational areas including a Home Affairs Department-run barbecue site and youth hostel, these figures are not a good indicator of the number of individual visitors. The number of presences detected at B on the weekend of 13–14 August

exceeds the number of presences recorded entering and exiting the trail network, so it must represent people moving back and forth multiple times across the sensor's path. On the other hand, during the January 2023 data collection period, only a handful of people triggered sensor B.

Overall, the sensors show that compared to other backyard trails, the number of presences detected on weekends is much greater than the number detected on weekdays. On weekends in August 2022 and January 2023, the number of presences detected by sensor A was in the 200–400+ range, whereas on weekdays (January 2023 data only), the number of presences was only around 60–120.

The lack of a direct route from Kennedy Town to the top of Mount Davis is a likely explanation for the relatively low number of trail users during weekdays. People living in the area have more accessible backyard trail alternatives on nearby Lung Fu Shan. Mount Davis's user base therefore differs from that of many other backyard trails.

6.2 | AVERAGE WEEKDAY AND WEEKEND PRESENCES AT MOUNT DAVIS

A comparison between weekday and weekend average daily presences for 6–12 January 2023 finds that weekends saw almost 4 times as many presences than during weekdays (see Table 14). It also showed a relatively balanced distribution between morning and afternoon foot traffic. For August 2022, no weekday averages could be calculated but the number of weekend users at sensors A and C was similar to the January figures. Sensor B picked up an unusually large amount of activity over the weekend of 13–14 August, the vast majority (86%) of which occurred after 12:00 p.m. While the precise nature of these activities is unclear, Mount Davis is known to be a wargaming site as well as a party spot for University of Hong Kong students. The data collection likely coincided with student orientation activities at the university.

Although weekday data is absent, it appears that similar numbers of presences were detected by sensors A and C during the weekend in both summer and winter.

TABLE 14: AVERAGE PRESENCES AT MOUNT DAVIS

Summer 2022: 13–14 Aug 2022			
	A	**B**	**C**
M-F a.m.	-	-	-
M-F p.m.	-	-	-
Total M-F daily	**-**	**-**	**-**
Weekend a.m.	127	158	33
Weekend p.m.	178	944	0
Total weekend daily	**305**	**1,102**	**33**
Winter 2022–23: 6–12 Jan 2023			
	A	**B**	**C**
M-F a.m.	48	1	0
M-F p.m.	50	4	4
Total M-F daily	**98**	**5**	**4**
Weekend a.m.	189	6	2
Weekend p.m.	189	17	19
Total weekend daily	**377**	**22**	**20**

"-" No data

Totals may not add up due to rounding

6.3 | HOURLY PRESENCES AT MOUNT DAVIS

Since sensor A was the only one that consistently detected a large amount of foot traffic, this subsection will focus primarily on this data. It will also look at hourly data from sensor B in August 2022 to further investigate the unusual activity.

Looking at weekend data in Charts 21 and 22 (13–14 August and 7–8 January), the overall pattern of foot traffic looks quite different than most other backyard trails. Instead of a large morning peak followed by a smaller afternoon peak, there is a much more erratic pattern with several spikes throughout the day. The presence of large, brief spikes suggests large groups of people walking together, perhaps members of tour groups visiting the World War II ruins.

Activity began as early as 5:00–6:00 a.m., building to a peak at around 11:00 a.m.–12:00 p.m. but this was not always the highest peak of the day. Interestingly, while activity on other backyard trails tends to die down after 7:00 p.m., some activity was detected late at night on Mount Davis. On August 13–15 2022, the sensor continued to detect a few presences as late as 3:00 a.m. In January 2023, a small handful of presences were detected as late as 9:00–11:00 p.m., and on one occasion at 1:00–2:00 a.m.

During weekdays in January 2023, there was a much smaller number of presences detected than on weekends. There tended to a be a small peak at 8:00–9:00 a.m. but otherwise, presences were distributed fairly evenly throughout the daylight hours.

The unusual data from sensor B on 13–14 August 2022 (Chart 23) showed that the peak of activity on both days occurred at around 1:00 p.m. in the afternoon, with second increase in activity in the evening starting at around 7:00 p.m. and lasting until around 10:00–11:00 p.m. This suggests that people were gathering around lunch and dinner time. At a separate site visit to Mount Davis in October 2022, there were visible remains of a bonfire on the concrete platform of one of the historic

CHART 21: MOUNT DAVIS A, HOURLY PRESENCES, AUG 2022

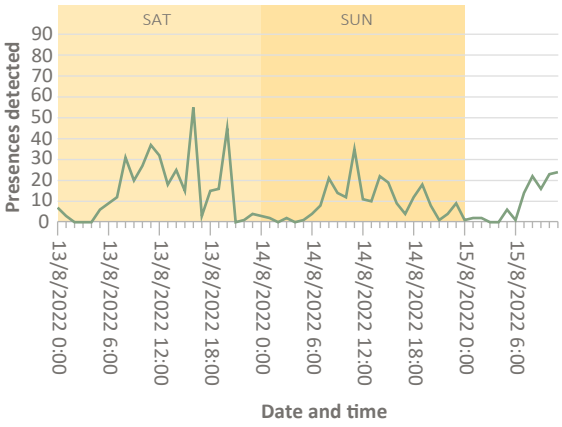


CHART 22: MOUNT DAVIS A, HOURLY PRESENCES, JAN 2023

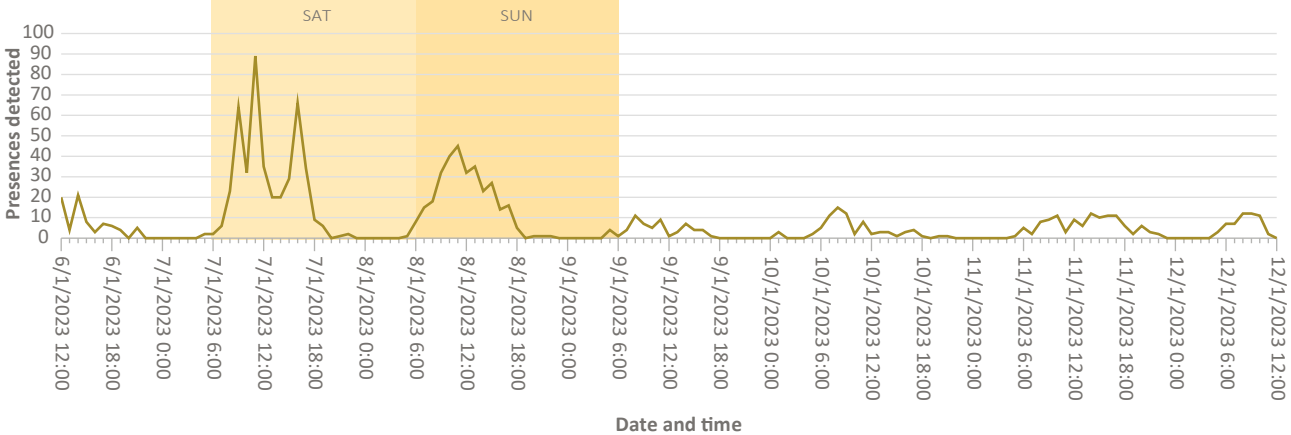
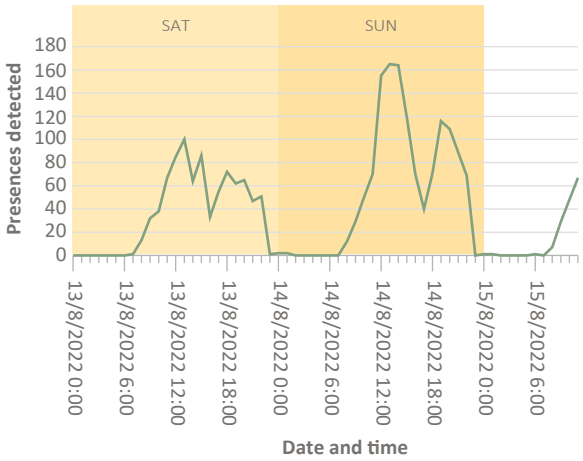


CHART 23: MOUNT DAVIS B, HOURLY PRESENCES, AUG 2022



wartime batteries, which suggests that unauthorised barbecues were taking place while the government-run barbecue site was closed due to the pandemic until October 2022.

6.4 | DIRECTIONAL PRESENCE DATA AT MOUNT DAVIS

Directional presence data on Mount Davis from January 2023 show that at sensor A, about three quarters of all presences detected were travelling in a downhill direction on Friday 6 January (afternoon), Saturday 7 January, and Sunday 8 January. 64% of presences were travelling downhill on Monday 9 January. Figures were relatively balanced on the remaining days.

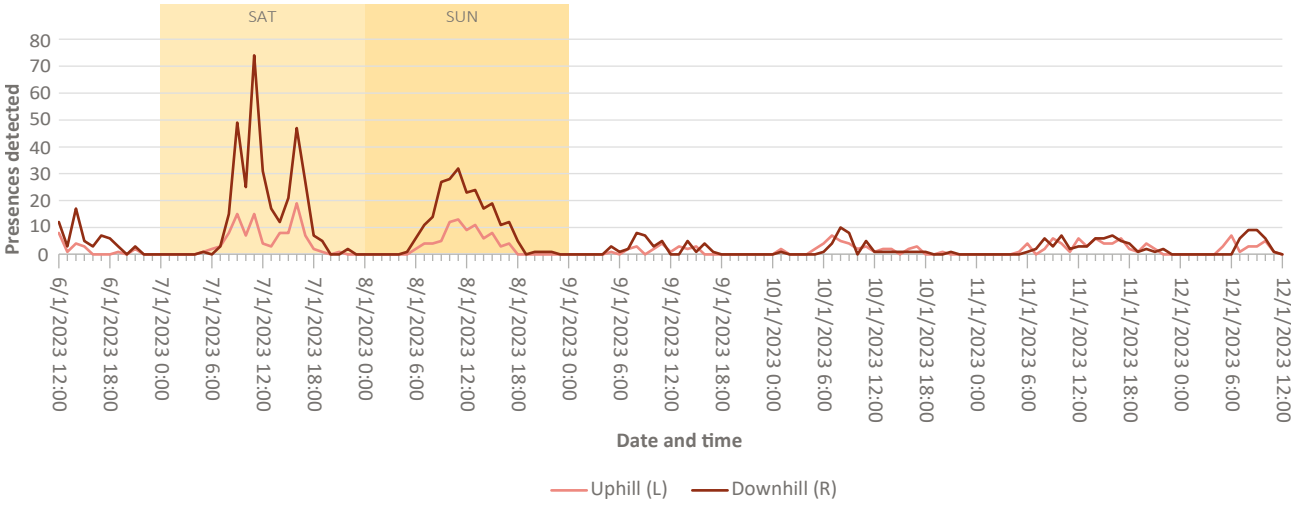
Given the lack of other entrances and exits besides C, which had very little foot traffic, there are two possible explanations for this large imbalance. The first is that the sensor failed to detect the majority of uphill movements because it was installed at a poor angle, or the path it was located on was too wide. Mount Davis Path was built to accommodate the transport of heavy military equipment to the top of the hill and is at no point narrower than 2m. If the majority of trail users habitually walk on one side of the path, then those walking on the far side would not be detected.

The second explanation is that many people travel to the top of Mount Davis by vehicle (tour buses or private car)—which do not trigger the sensors—and then walk back downhill on foot. The hourly breakdown of the directional data in Chart 24 may provide further insight. If the directional imbalance was caused primarily by tour bus passengers, then one would expect to see sporadic spikes in downhill movements as large groups of people walk together. However, this pattern could only be seen on Saturday 7 January. In general, the downhill movements correlate closely with the uphill movements, which would not be caused by tour groups. It probably was not caused by private car passengers either, since there would not necessarily be a close correlation between uphill foot traffic and uphill vehicle movements. Therefore, the most likely explanation is suboptimal sensor conditions.

TABLE 15: DIRECTIONAL DAILY PRESENCES AT MOUNT DAVIS

Jan 2023	A		B		C	
Direction	**Downhill (R)**	**Uphill (L)**	**East (R)**	**West (L)**	**Downhill (L)**	**Uphill (R)**
Fri 6 Jan	*(p.m. only) 61*	*(p.m. only) 19*	*(p.m. only) 8*	*(p.m. only) 5*	*(p.m. only) 0*	*(p.m. only) 0*
Sat 7 Jan	336	104	10	6	10	4
Sun 8 Jan	233	81	15	13	13	13
Mon 9 Jan	40	22	1	1	6	5
Tue 10 Jan	37	40	0	0	0	0
Wed 11 Jan	61	56	3	0	2	2
Thu 12 Jan	*(a.m. only) 31*	*(a.m. only) 23*	-	-	-	-

CHART 24: MOUNT DAVIS A, DIRECTIONAL HOURLY PRESENCES, JAN 2023



6.5 OVERALL TRAIL USER ESTIMATE FOR MOUNT DAVIS

To estimate the number of trail users, data from sensors A and C will be utilised. B is excluded because it does not cover a trail entrance/exit. However, given the above-mentioned problems with sensor A, dividing the number of presences by half would produce an inaccurate estimate. Therefore, only the downhill presences from sensor A in January 2023 will be counted.

Since there is no reliable directional data from August 2022, it will be assumed that sensor A, which was located at the same spot, undercounted uphill travellers by about the same proportion. In January, downhill presences made up 69.8% of the total. Therefore, the August daily average for sensor A will be multiplied by 0.698 to estimate the number of downhill presences, which shall be the proxy for the number of visitors.

Average presence counts from sensor C are divided by 2 as usual.

Based on the calculations in Table 16, it is estimated that on weekdays, about 60 people visited Mount Davis. This is based only on January data due to data collection failures in August. On weekends, approximately 250–300 people visited Mount Davis per day.

TABLE 16: OVERALL VISITOR CALCULATIONS FOR MOUNT DAVIS

Aug 2022	A	C	
Weekend average	305	33	
Adjustment	305*0.698	33/2	**Total**
Estimated no. of daily visitors (weekend)	213	17	**229**

Jan 2023	A	C	
Monday-Friday average	98	4	
Adjustment	Downhill only	4/2	**Total**
Estimated no. of daily visitors (weekday)	58	2	**60**
Weekend average	377	20	
Adjustment	Downhill only	20/2	**Total**
	285	10	**295**

"-" No data
Totals may not add up due to rounding

7. Shum Wan Shan and Ping Shan

MAP 6: SHUM WAN SHAN AND PING SHAN

Explored paths

Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- A Entrance/exit to Chun Wah Rd opposite Lok Wah South Estate
- B Unofficial route from top of Shum Wan Shan to main dam
- C Route connecting Choi Ha Rd opposite Amoy Gardens to Jordan Valley Park via Ping Shan
- D Along ridge of Ping Shan
- E Entrance/exit to New Clear Water Bay Road

Shum Wan Shan and Ping Shan are two interconnected hills located in Kowloon Bay/Jordan Valley. Located between them is the now-defunct main dam of the former Jordan Valley Reservoir. Jordan Valley Park, a rehabilitated landfill site, lies to the north of the dam at the base of Ping Shan. Sensor A is located on the path connected to the trailhead at Chun Wah Road, which is just opposite Lok Wah South Estate. It is a paved path and identified by signage as the Chun Wah Road Morning Trail. At the top of Shum Wan Shan is the Kwun Tong High Level Service Reservoir, which is open to the public as a grassy open space. Sensor B is on an informal trail that leads down the north side of Shum Wan Shan towards the dam. It is a fairly steep path built by nearby residents out of stones, concrete risers, steel rebar and other improvised materials. Sensor C is located on the

entrance/exit to Jordan Valley Playground on the south-west side of Ping Shan. This trail connects both to Ping Shan and to Jordan Valley Park to the north-east. Sensor D is located on the main slope up the southern side of Ping Shan. Sensor E is located on the north slope of Ping Shan before the path splits into two trailheads on Clear Water Bay Road. Two entrances/exits to this trail network were not covered. The first is the vehicular access road to the service reservoir on the north-east side of Shum Wan Shan as it was too wide for an accurate sensor reading. The second is the path connecting to Choi Hing Road on the western side of Ping Shan as this area was shotcreted and lacked any vegetation to shade the sensor from harsh sunlight.

7.1 | DAILY PRESENCES AT SHUM WAN SHAN & PING SHAN

Sensor A was stolen during round 2 of the data collection period, so only the July data from round 1 is available. Sensor B also malfunctioned for about 2 days between 25 July and 27 July.

As Table 17A and 17B show, Positions A and C had the heaviest foot traffic, typically registering several hundred presences per day. C in particular reached almost 1,000 presences on the weekend in July 2022. It seems that most of the people who pass the sensor at point C do not climb Ping Shan (sensor D), but use the route to travel back and forth between Kowloon Bay and Jordan Valley Park. Sensor D detected roughly 100–200 people on weekdays and roughly 200–500 on weekends. Sensor B, located on the steep informal route on the north side of Shum Wan Shan, and sensor E, which connects to a less accessible trailhead on Clear Water Bay Road, saw less foot traffic but their numbers could still reach 100 presences on the weekend.

TABLE 17A: DAILY PRESENCES AT SHUM WAN SHAN & PING SHAN, JUL 2022

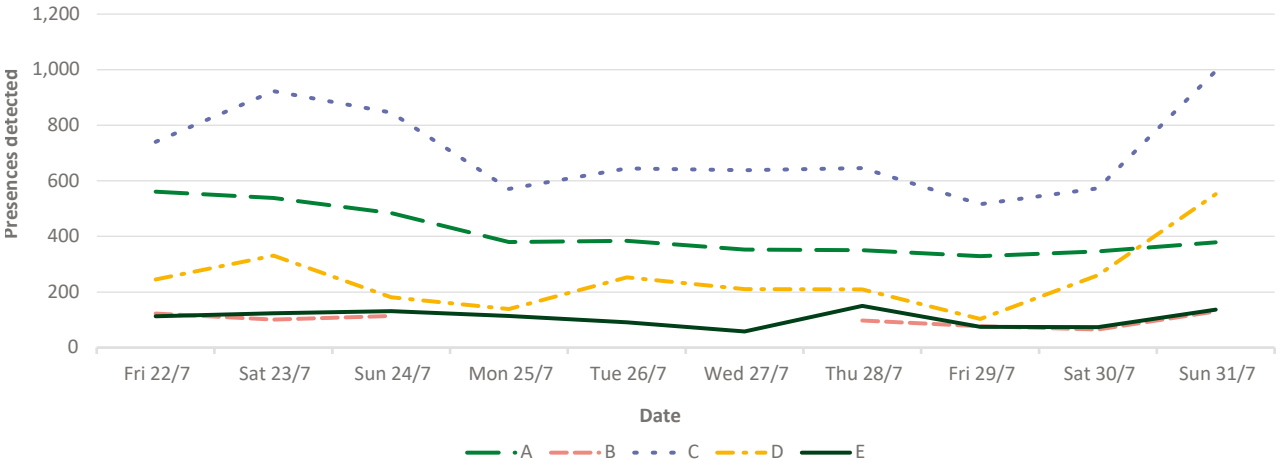
Round 1			Daily presences detected				
Rain (mm)	**Date**	**Day**	**A**	**B**	**C**	**D**	**E**
0.3	21/7/2022	Thu	*(p.m. only) 194*	*(p.m. only) 22*	-	-	-
0	22/7/2022	Fri	561	122	740	245	113
0	23/7/2022	Sat	538	101	923	331	123
0	24/7/2022	Sun	484	114	846	181	131
0	25/7/2022	Mon	380	*(a.m. only) 110*	571	139	114
0	26/7/2022	Tue	384	-	645	253	91
0	27/7/2022	Wed	353	*(p.m. only) 2*	638	210	58
0	28/7/2022	Thu	351	97	646	209	150
⚡ 0	29/7/2022	Fri	329	77	516	103	75
⛈ ⚡ 2.4	30/7/2022	Sat	346	65	573	260	73
⚡ 0	31/7/2022	Sun	379	130	995	552	136

TABLE 17B: DAILY PRESENCES AT SHUM WAN SHAN & PING SHAN, JAN 2023

Round 2			Daily presences detected				
Rain (mm)	**Date**	**Day**	**A**	**B**	**C**	**D**	**E**
0.5	12/1/2023	Fri	-	*(p.m. only) 0*	*(p.m. only) 81*	*(p.m. only) 9*	*(p.m. only) 4*
4.5	13/1/2023	Sat	-	61	538	177	83
3.4	14/1/2023	Sun	-	89	634	250	95
Trace	15/1/2023	Mon	-	26	205	59	34
0	16/1/2023	Tue	-	31	415	128	53
0	18/1/2023	Wed	-	18	530	171	59
0	19/1/2023	Thu	-	-	*(a.m. only) 218*	*(a.m. only) 68*	*(a.m. only) 41*

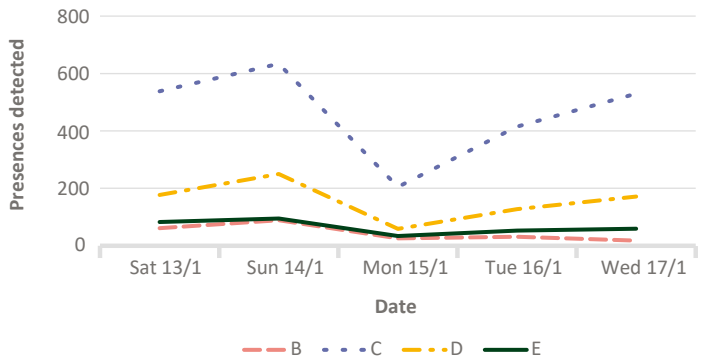
"-" No data
⚡ Thunderstorm warning
⛈ Amber rainstorm warning

CHART OF TABLE 17A: SHUM WAN SHAN & PING SHAN, DAILY PRESENCES, JUL 2022



Full day data only

CHART OF TABLE 17B: SHUM WAN SHAN & PING SHAN, DAILY PRESENCES, JAN 2023



Full day data only

7.2 | AVERAGE WEEKDAY AND WEEKEND PRESENCES AT SHUM WAN SHAN & PING SHAN

TABLE 18: AVERAGE PRESENCES AT SHUM WAN SHAN & PING SHAN

Summer 2022: 21–31 Jul 2022

	A	B	C	D	E
M-F a.m.	251	86	376	169	62
M-F p.m.	137	21	251	25	39
Total M-F daily	**389**	**107**	**626**	**193**	**100**
Weekend a.m.	284	67	422	207	69
Weekend p.m.	153	36	412	124	47
Total weekend daily	**437**	**103**	**834**	**331**	**116**

Winter 2022–23: 6–12 Jan 2023

	A	B	C	D	E
M-F a.m.	-	21	217	70	34
M-F p.m.	-	15	196	55	20
Total M-F daily	**-**	**36**	**413**	**125**	**54**
Weekend a.m.	-	29	296	103	43
Weekend p.m.	-	47	290	111	47
Total weekend daily	**-**	**75**	**586**	**214**	**89**

"-" No data

Totals may not add up due to rounding

The averaged figures in Table 18 show that sensors A and B, which are located on Shum Wan Shan, detected fairly similar numbers of presences on weekdays and weekends. On the other hand, sensors C and D on Ping Shan found the largest differences between weekday and weekend foot traffic. These two locations are closer to Jordan Valley Park, which attracts many users on weekends. Weekends also saw a more even balance between morning and afternoon foot traffic compared to weekdays when the majority of foot traffic occurred in the morning. Sensor E on the northern side of Ping Shan also detected similar numbers of presences on weekdays and weekends. It appears that weekend visitors did not tend to use this route.

All four sensors that managed to collect valid data during both rounds detected more presences in summer than in winter: 63% more on weekdays and 44% more on weekends, which is a large enough difference to be unlikely to be due to sensor error. In any case, the trail appears to be well-used year-round.

7.3 | HOURLY PRESENCES AT SHUM WAN SHAN AND PING SHAN

This subsection will present hourly data from sensors A (summer only), C, and D because they detected the most foot traffic.

This subsection will present hourly data from sensors A (summer only), C, and D because they detected the most foot traffic.

Sensor A (Chart 25), located on the south side of Shum Wan Shan on the Chun Wah Road Morning Trail shows a very typical morning walkers' pattern, with a large peak in the morning between 7:00 a.m. and 9:00 a.m., and a smaller peak in the afternoon between 4:00 p.m. and 6:00 p.m. While there were slightly more presences detected on the weekends (23–24 July and 30–31 July), there was little difference from weekdays in the a.m./p.m. balance of foot traffic. Shum Wan Shan appears to be a very local neighbourhood trail whose user base consists mainly of morning walkers. Since the sensor was stolen during round 2, it is not known how their habits shifted during the cooler months.

CHART 25: PING SHAN A, HOURLY PRESENCES, JUL–AUG 2022

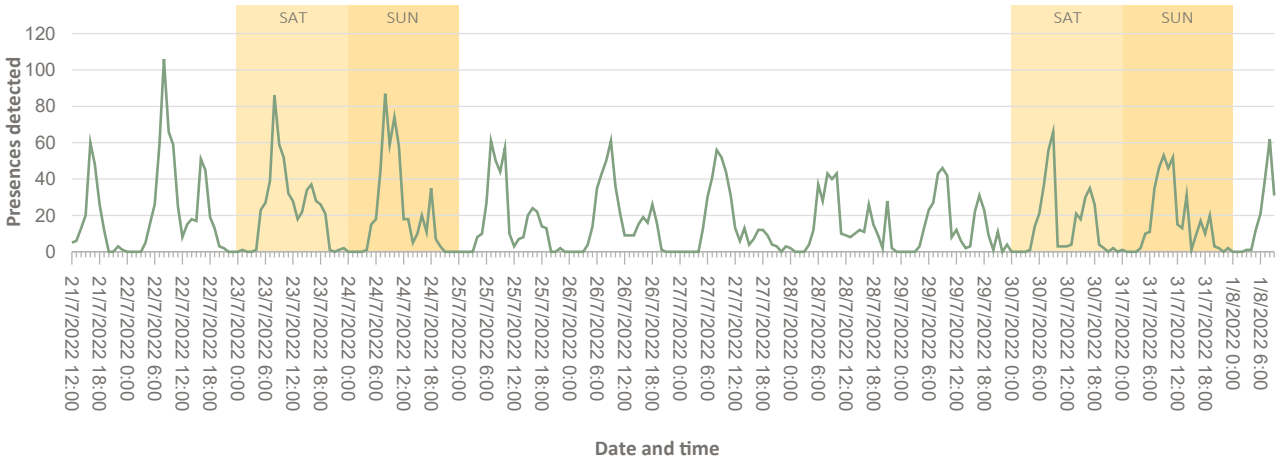


CHART 26: SHUM WAN SHAN & PING SHAN C, HOURLY PRESENCES, JUL–AUG 2022

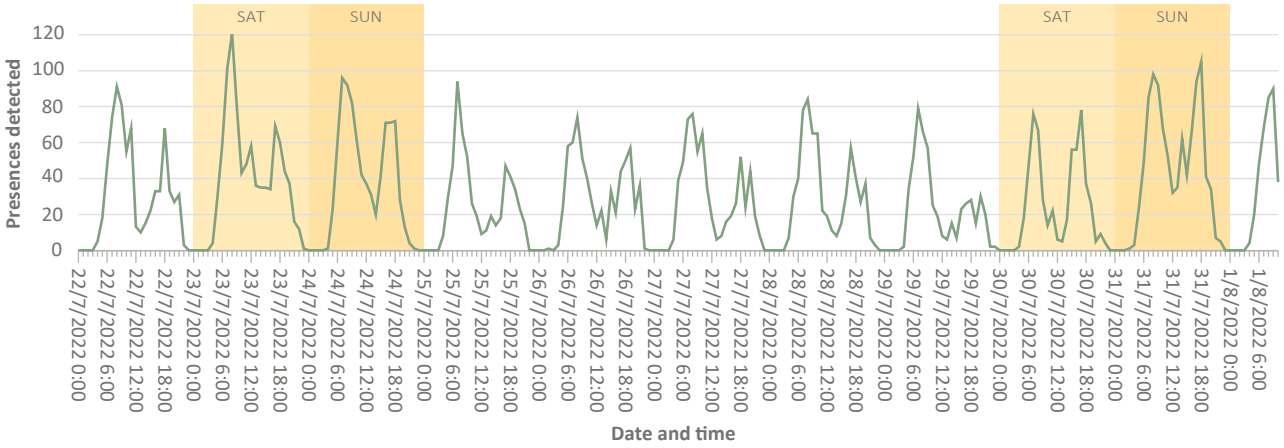
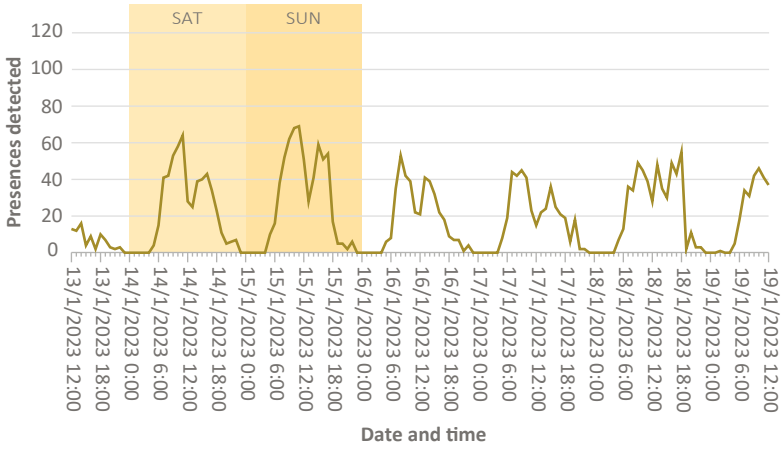


CHART 27: SHUM WAN SHAN & PING SHAN C, HOURLY PRESENCES, JAN 2023



On the other hand, sensor C found a more even balance between the morning and afternoon foot traffic (see Charts 26 and 27). The afternoon spike was particularly pronounced on the weekends, especially 24 July, 30 July, 31 July and 15 January. Sensor D, which is further uphill on Ping Shan (Charts 28 and 29), also found larger increases in weekend traffic than sensor A. In July–August 2022, foot traffic was heavily concentrated in the morning, whereas in January 2023 it was more spread out throughout the day.

Ping Shan appeared to be a bigger draw for weekend visitors than Shum Wan Shan. This is probably due to its greater accessibility and proximity to Jordan Valley Park. The back entrance of the park leads to Ping Shan and the trail (on which sensor C is located) connects the hill to the urban centre of Kowloon Bay. In contrast, Shum Wan Shan's main trailheads are located on the southern and eastern sides of the hill, linking to Ngau Tau Kok, Sau Mau Ping and Shun Lee. These more heavily residential neighbourhoods are on hilly terrain and are less accessible by MTR. Meanwhile, the trail on the north side of Shum Wan Shan closest to Ping Sha is an informal, steep, somewhat hidden route. (In July/August 2022, sensor B detected roughly a quarter of the presences of sensor A.) Therefore, even though Shum Wan Shan and Ping Shan are next to each other, they appear to have somewhat different user bases.

CHART 28: SHUM WAN SHAN & PING SHAN D, HOURLY PRESENCES, JUL–AUG 2022

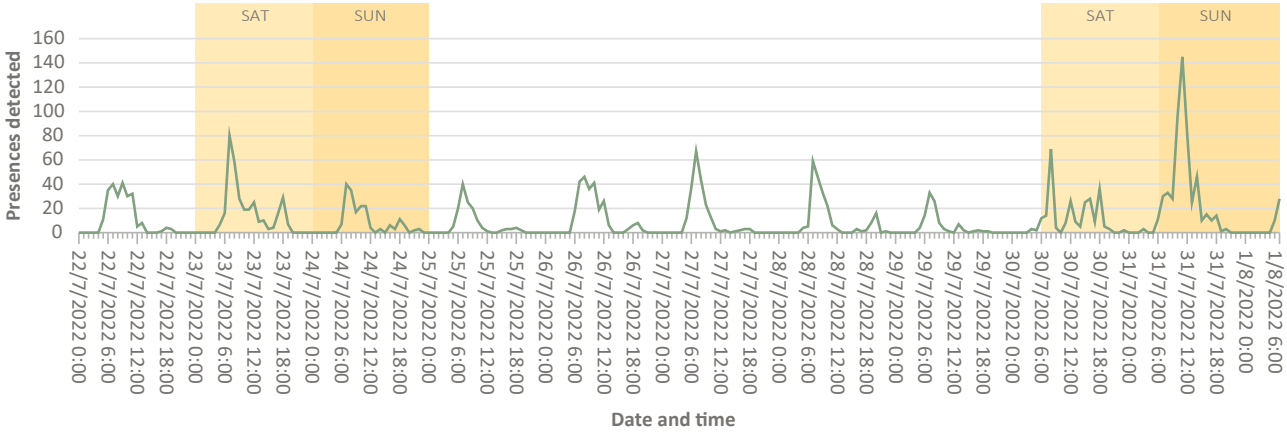
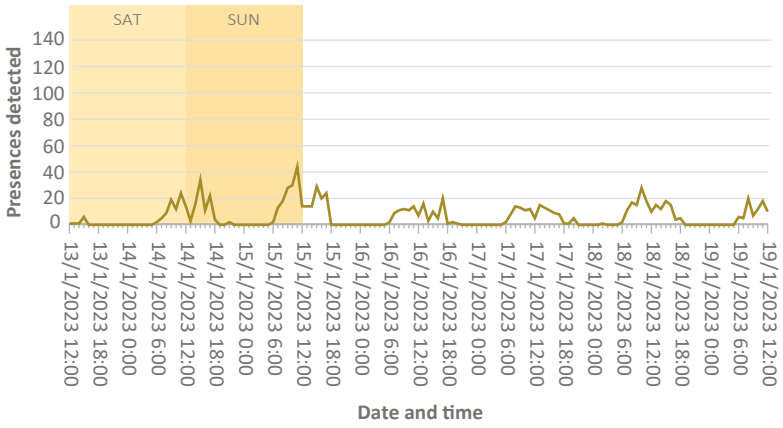


CHART 28: SHUM WAN SHAN & PING SHAN D, HOURLY PRESENCES, JAN 2023



7.4 | DIRECTIONAL PRESENCE DATA ON SHUM WAN SHAN & PING SHAN

TABLE 19: DIRECTIONAL DAILY PRESENCES AT SHUM WAN SHAN & PING SHAN

Jan 2023	B		C		D		E	
Direction	**Downhill (R)**	**Uphill (L)**	**Downhill (R)**	**Uphill (L)**	**Downhill (R)**	**Uphill (L)**	**Downhill (L)**	**Uphill (R)**
Fri 13 Jan	*(p.m. only) 0*	*(p.m. only) 0*	*(p.m. only) 50*	*(p.m. only) 31*	*(p.m. only) 3*	*(p.m. only) 6*	*(p.m. only) 2*	*(p.m. only) 2*
Sat 14 Jan	29	32	272	266	99	78	46	37
Sun 15 Jan	43	46	348	286	137	113	53	42
Mon 16 Jan	11	15	96	109	29	30	19	15
Tue 17 Jan	17	14	216	199	68	60	24	29
Wed 18 Jan	9	9	302	228	89	82	33	26
Thu 19 Jan	-	-	*(a.m. only) 115*	*(a.m. only) 103*	*(a.m. only) 33*	*(a.m. only) 35*	18	23

The directional daily presence data showed relatively balanced travel in both directions, meaning that most people were not following popular, established routes (see Table 19). Additionally, the concentration of foot traffic on just a few trail segments (C and to a lesser extent D) suggests that most people double back the same way that they came.

Directional hourly data from sensor C showed a characteristic delay between the start of uphill travel and downhill travel in the morning. Presences travelling uphill started being detected at around 5:00–6:00 a.m., followed about an hour later by presences detected travelling downhill. For the most part, the line for downhill travel closely tracked that

for uphill travel (see Chart 30). However, on some days there was a late afternoon spike in presences travelling downhill, i.e. on Sunday 15 January, Tuesday 17 January and Wednesday 19 January. This indicates that people who arrived at Jordan Valley Park by some other means used the trail to walk downhill to Kowloon Bay in the late afternoon.

Further uphill on Ping Shan, sensor D found an even smaller delay between uphill and downhill presences being registered in the morning. The two lines track each other very closely. Ping Shan is a small hill with a height of only 189m and a short trail that can be completed in under an hour, so trail users who climb it do not necessarily spend very much time there.

CHART 30: SHUM WAN SHAN & PING SHAN C, DIRECTIONAL HOURLY PRESENCES, JAN 2023

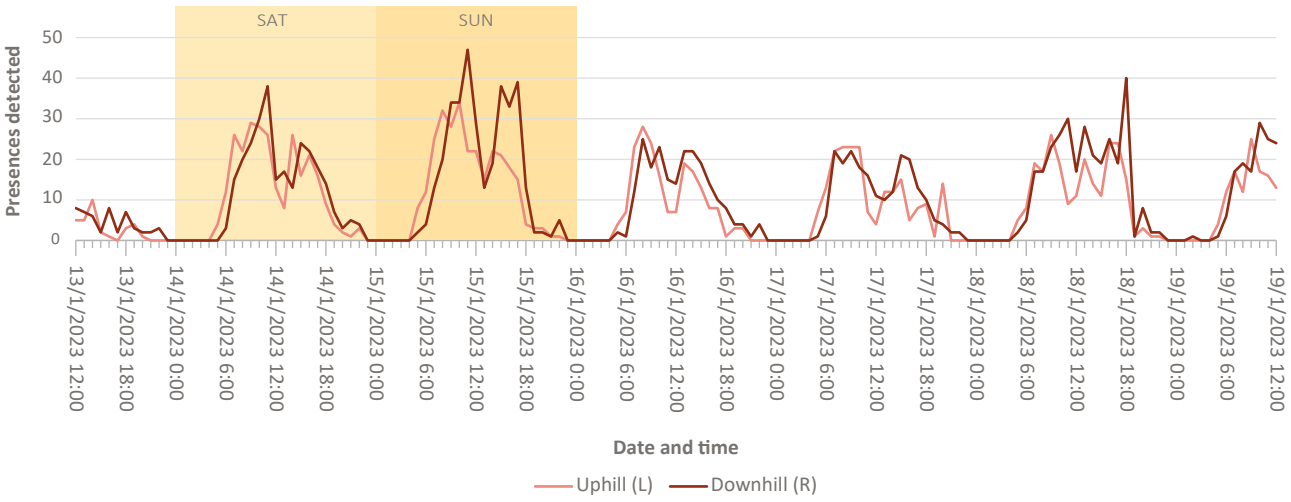
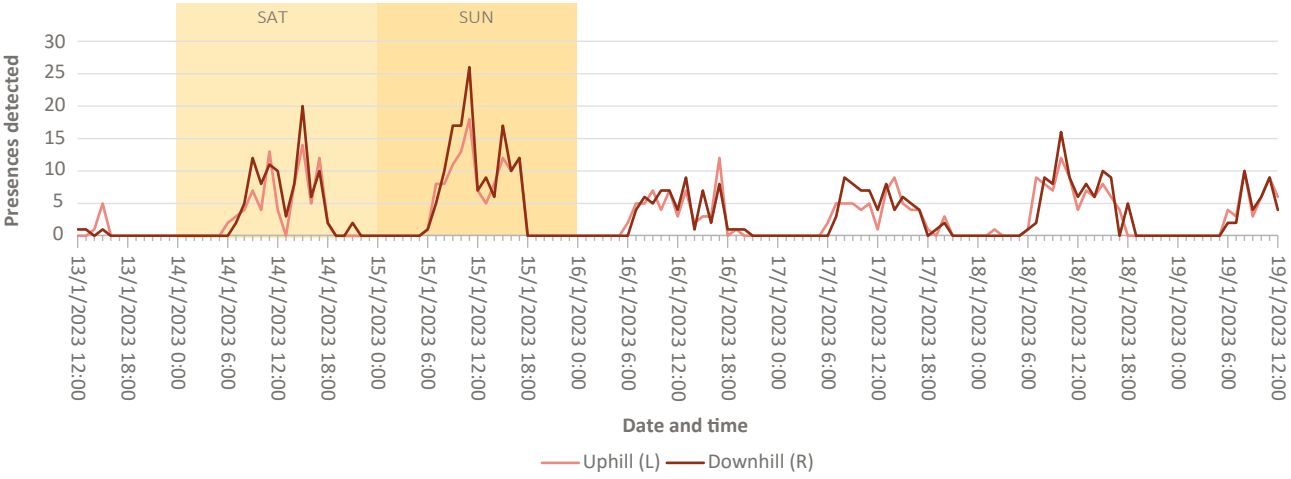


CHART 31: SHUM WAN SHAN & PING SHAN D, DIRECTIONAL HOURLY PRESENCES, JAN 2023



7.5 | OVERALL TRAIL USER ESTIMATE FOR SHUM WAN SHAN & PING SHAN

This section calculates separate visitor estimates for Shum Wan Shan and Ping Shan. Due to missing data, the Shum Wan Shan figures will only be valid for the July 2022 data collection round.

At Shum Wan Shan, two entrances/exit points were covered by sensors A and B. As noted above, the vehicular access route on the east side of the hill connecting to Shun Lee Tsuen Road was not covered as it was too wide and lacked suitable places to attach a sensor. Therefore, this estimate will be too low. Based on the calculation in Table 20, at least 250 people visit Shum Wan Shan per day on both weekdays and weekends.

At Ping Shan, C and E will be counted as entrance/exit points to the trail network. As noted above, a trail entrance on the north-west side of the hill connecting to Choi Wing Lane was not monitored due to a lack of trees to provide a suitable place to attach a sensor. Therefore, it is conservatively estimated that on weekdays, at least 250 to 350 people visited per day. On weekends, at least 350 to 500 people visited per day (see Table 20).

However, if one only counts the upper portion of Ping Shan (above Jordan Valley Park) using sensor D instead of C (see Table 21), then visitor numbers are significantly smaller. Upper Ping Shan sees roughly 100–150 visitors on weekdays and 150–200 visitors per day on weekends.

Put together, the entire trail network saw approximately 600 visitors a day on weekdays and 750 visitors per day on weekends during the July data collection period.

While it was not possible to calculate the winter estimate due to missing data, the four remaining sensors added up registered about 60% of the summer figure on weekdays and 70% on weekends. It can be conjectured that the overall winter figures would be around 370 people per day on weekdays and 520 on weekends.

TABLE 20: OVERALL VISITOR CALCULATION FOR SHUM WAN SHAN & PING SHAN

		A	B	Shum Wan Shan Subtotal/2	C	E	Ping Shan Subtotal/2	Total/2
Jul–Aug 2022	Monday-Friday average	389	107	**248**	626	100	**363**	**611**
	Weekend average	437	103	**270**	834	116	**475**	**745**
Jan 2023	Monday-Friday average	-	36	**-**	413	54	**234**	**-**
	Weekend average	-	75	**-**	586	89	**338**	**-**

Rounded to the nearest whole number

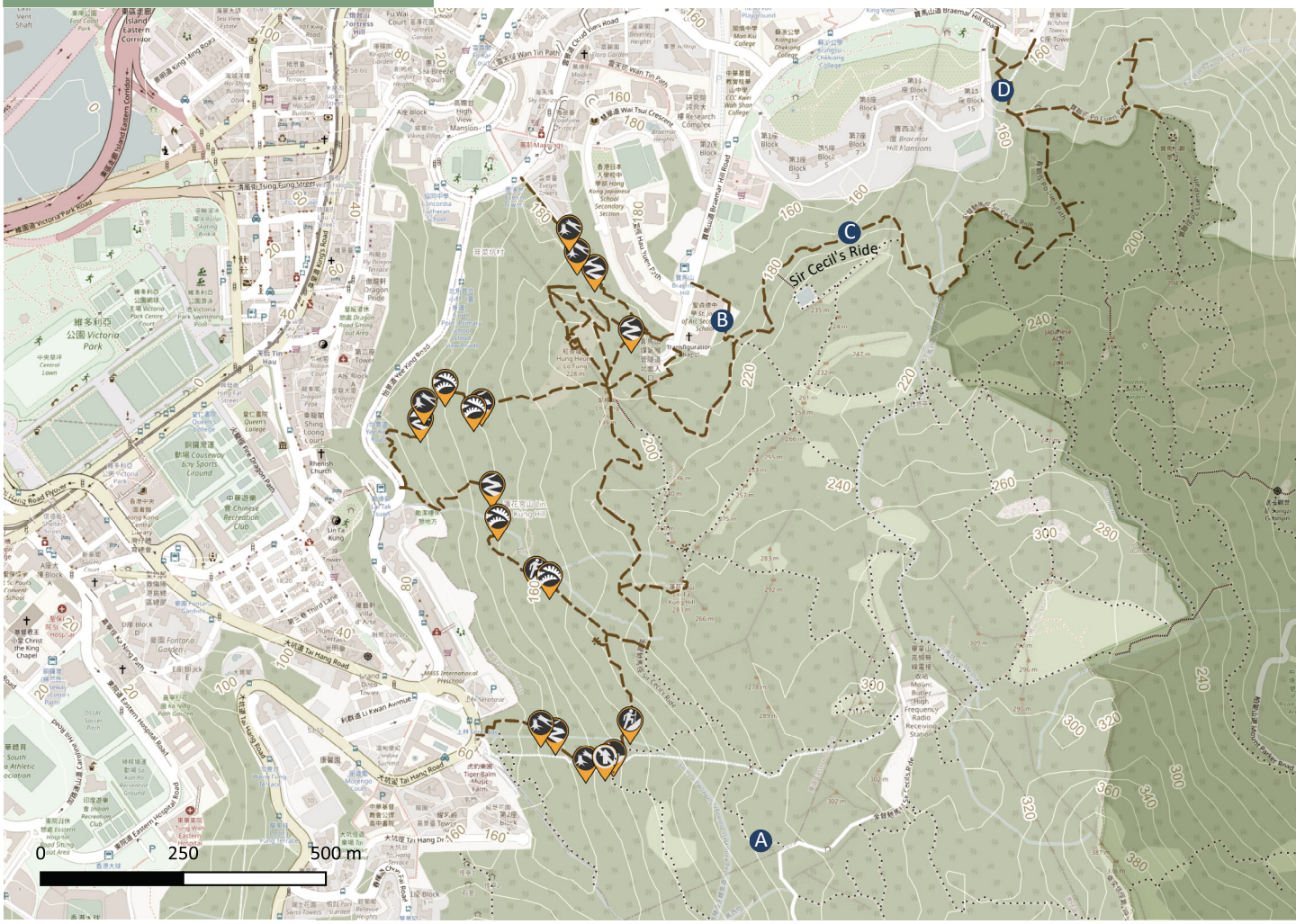
TABLE 21: VISITOR CALCULATION FOR UPPER PING SHAN

		D	E	Total/2
Jul–Aug 2022	Monday-Friday average	193	100	**147**
	Weekend average	331	116	**224**
Jan 2023	Monday-Friday average	125	54	**90**
	Weekend average	214	89	**152**

Rounded to the nearest whole number

8. Sir Cecil's Ride and Mount Parker

MAP 7: SIR CECIL'S RIDE & MOUNT PARKER



Explored paths

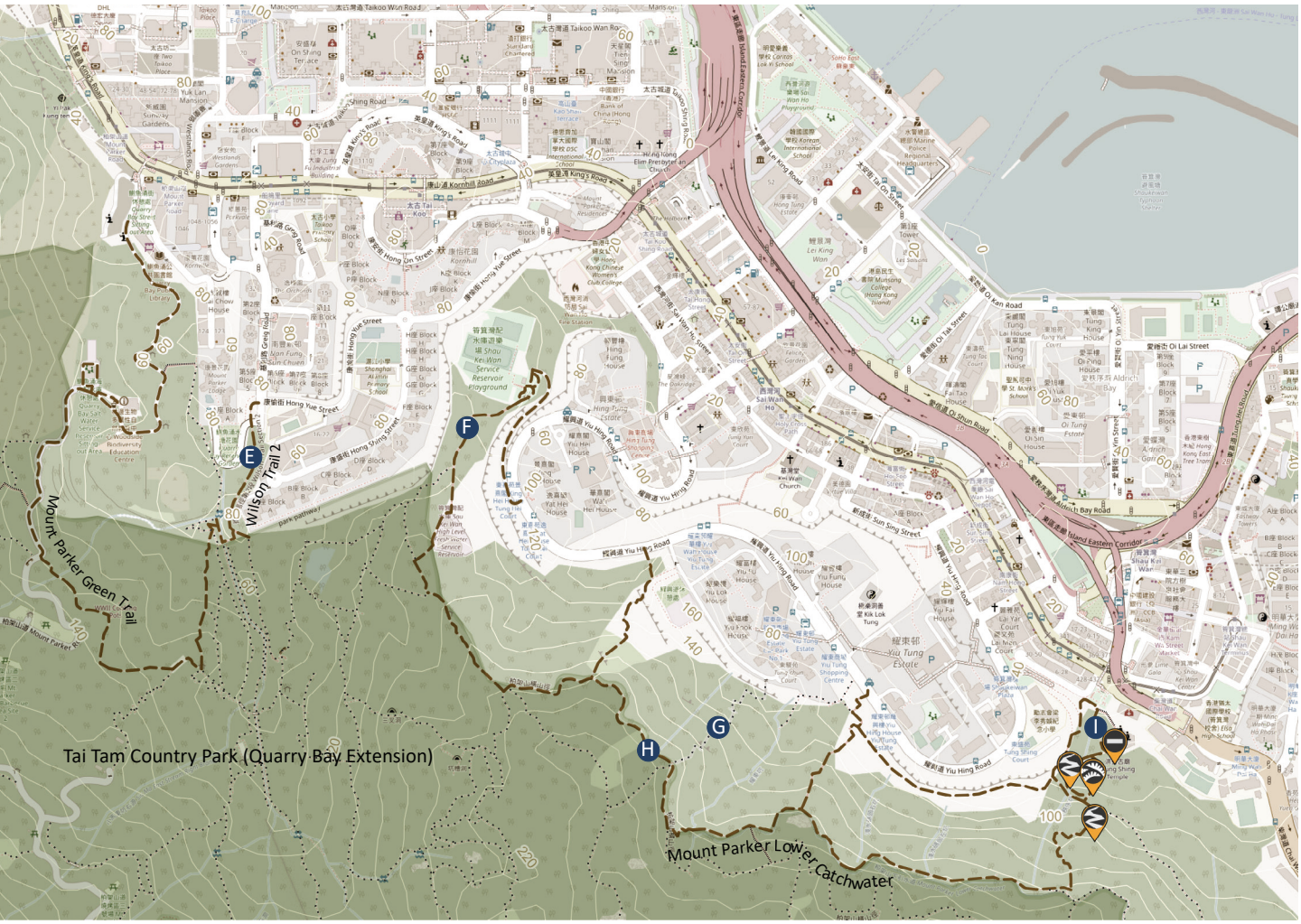
Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- A Entrance/exit to Sir Cecil's Ride from Mount Butler Rd
- B Entrance/exit to Braemar Hill Rd behind St. Joan of Arc School
- C Along Sir Cecil's Ride above Braemar Hill Mansions
- D Entrance/exit to Braemar Hill Rd opposite Pui Kiu Middle School

Sir Cecil's Ride and Mount Parker form an extensive network of trails across the north side of Hong Kong Island, stretching from Tai Hang to Shau Kei Wan. Sir Cecil's Ride, named after Cecil Clementi who was governor of Hong Kong from 1925 to 1930, follows the contour of the hills above North Point from Mount Butler (sensor point A) to Braemar Hill. Sensors B and D monitored two trailheads in Braemar Hill near Chinese International School and Pui Kiu Middle School respectively, while sensor C was located along the main trail. The trail then passes through Tai Tam Country Park (Quarry Bay Extension) (sensor point E), before connecting to the Mount Parker Lower Catchwater which extends across Shau Kei Wan



Sensor locations

- E Entrance/exit to Wilson Trail Section 2/Tai Tam Country Park from Hong Yue Street opposite Nan Fung Sun Chuen
- F Entrance/exit to Mt Parker/Tai Tam Country Park via Shau Kei Wan Service Reservoir Playground
- G Slope maintenance stairs connecting Mt Parker Lower Catchwater to Yiu Hing Rd behind Yiu Tung Estate
- H Along Mt Parker Lower Catchwater
- I Entrance/exit to Shau Kei Wan Rd via Cheung Fei Temple

(sensor points F to I). This is an extremely complex network with many entrances and exits, both official and informal. Several trailheads were not covered by this research, including a number of unmaintained paths in poor condition around Tai Hang (see hazard symbols on left side of map) and the Mount Parker Road Green Trail in Quarry Bay. This last route is a major omission because it provides the main entryway from Quarry Bay into Tai Tam Country Park. However, it was not possible to install a sensor there because it was under the management of the AFCD, was too wide, and lacked accessible trees to attach sensors to since it was lined by a chain link fence along its entire length. There are also several informal routes utilising

slope maintenance stairs in Shau Kei Wan. There were signs of usage by local residents despite many of these paths being fenced off. One of these slope maintenance stairways was monitored by sensor G.

8.1 DAILY PRESENCES AT SIR CECIL'S RIDE AND MOUNT PARKER

Due to the size of the trail network, the site was divided into two halves, Sir Cecil's Ride and Mount Parker, and data was collected in two stages. Several problems were encountered during data collection. Like Mount Davis, data collection for round 1 of Sir Cecil's Ride was affected by poor weather and software glitches. Data collection had to be rescheduled and only 2.5 days' worth of valid data was collected. Separately, some other sensors malfunctioned. During round 1 on Mount Parker sensors H and I stopped functioning on the second to last day (16 July). During round 2, sensor D malfunctioned from 7 January to 9 January until it was replaced. Sensor F also malfunctioned on 17–18 December.

Some of the sensors also recorded anomalous results for unknown reasons. During round 1, sensor B at Sir Cecil's Ride (Table 22A) detected an unusually low amount of foot traffic on the weekend of 13–14 August when there were less than 40 presences per day, which is highly inconsistent with results from January 2023 when there were at least 200 presences per day (Table 22B). Additionally, sensors F and G detected almost no activity (i.e. 0–2 presences per day) between 14 and 17 July despite registering dozens to hundreds of presences previously. It is thought that the sensors may have been turned away from the path on purpose or by accident. The anomalous results from F and G were therefore discarded.

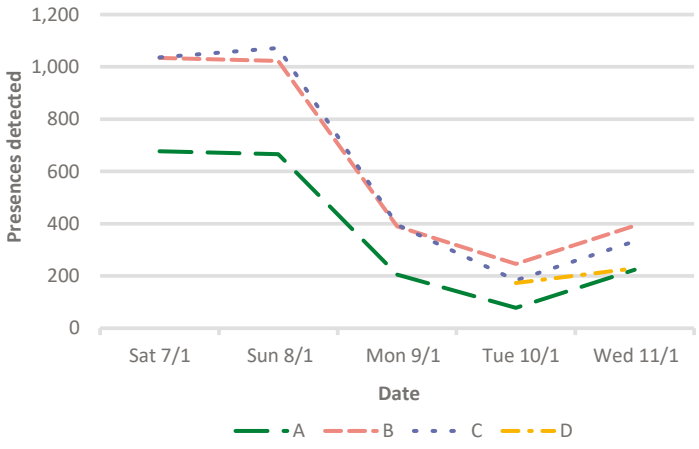
TABLE 22A: DAILY PRESENCES AT SIR CECIL'S RIDE, AUG 2022

Round 1			Daily presences			
Rain (mm)	Date	Day	A	B	C	D
≁ 0	13/8/2022	Sat	523	26*	984	554
0	14/8/2022	Sun	673	31*	1,424	569
0	15/8/2022	Mon	*(a.m. only) 121*	*(a.m. only) 55*	*(a.m. only) 320*	*(a.m. only) 173*

TABLE 22B: DAILY PRESENCES AT SIR CECIL'S RIDE, JAN 2023

Round 2			Daily presences			
Rain (mm)	Date	Day	A	B	C	D
0	6/1/2023	Fri	*(p.m. only) 171*	*(p.m. only) 288*	*(p.m. only) 292*	*(p.m. only) 182*
0	7/1/2023	Sat	677	1,034	1,036	-
Trace	8/1/2023	Sun	666	1,023	1,072	-
0.1	9/1/2023	Mon	205	390	396	-
5.5	10/1/2023	Tue	78	246	183	173
3.2	11/1/2023	Wed	224	392	333	229

CHART OF TABLE 22B: SIR CECIL'S RIDE, DAILY PRESENCES, JAN 2023



Full day data only

TABLE 22C: DAILY PRESENCES AT MOUNT PARKER, JUL 2022

Round 1			Daily presences				
Rain (mm)	**Date**	**Day**	**E****	**F**	**G**	**H**	**I**
Trace	8/7/2022	Fri	165	411	35	99	12
Trace	9/7/2022	Sat	255	570	91	109	6
Trace	10/7/2022	Sun	212	401	48	147	58
0	11/7/2022	Mon	66	291	32	58	19
0	12/7/2022	Tue	34	231	20	66	30
0	13/7/2022	Wed	27	*(a.m. only) 82*	15	37	26
0	14/7/2022	Thu	44	-	-	78	11
0.2	15/7/2022	Fri	12	-	-	79	26
🗲 1.5	16/7/2022	Sat	87	-	-	*(a.m. only) 62*	*(a.m. only) 15*
1.2	17/7/2022	Sun	131	-	-	-	-

TABLE 22D: DAILY PRESENCES AT MOUNT PARKER, DEC 2022

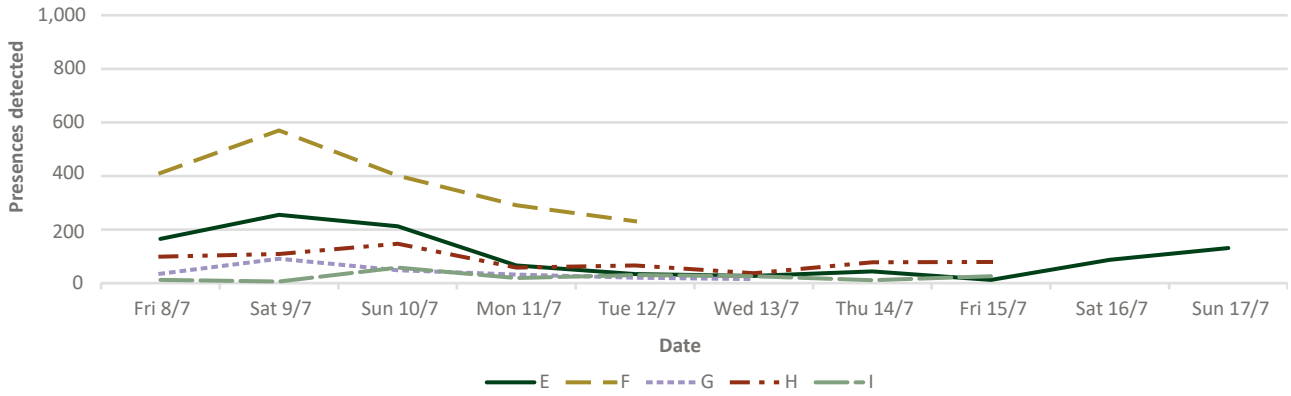
Round 2			Daily presences				
Rain (mm)	**Date**	**Day**	**E**	**F**	**G**	**H**	**I**
0.9	16/12/2022	Fri	*(p.m. only) 196*	*(p.m. only) 69*	*(p.m. only) 9*	*(p.m. only) 16*	*(p.m. only) 11*
🗲 9.1	17/12/2022	Sat	929	305	31	73	22
Trace	18/12/2022	Sun	1,265	-	93	276	29
0	19/12/2022	Mon	731	*(p.m. only) 101*	56	83	*(p.m. only) 32*
0	20/12/2022	Tue	887	358	82	108	55
Trace	21/12/2022	Wed	998	261	86	117	19
0	22/12/2022	Thu	*(a.m. only) 538*	*(a.m. only) 199*	*(a.m. only) 42*	*(a.m. only) 51*	*(a.m. only) 14*

"-" No data
*Anomalous, view with caution
** Unreliable data due to poor installation conditions, view with caution
🗲 Thunderstorm warning

Sensor C which is located along the main route on Sir Cecil's Ride above Braemar Hill detected heavy foot traffic—around 1,000 presences a day during the weekends and 200–400 presences per day on weekdays. This is clearly a very well-used trail. Based on the winter 2023 data, it appears that the trailhead at sensor B, which is a footpath next to the St. Joan of Arc Secondary School on Braemar Hill Road is the most well-used entry and exit point (about 300 people on weekdays and 1,000 on weekends). However, as noted above, very little foot traffic (less than 40 presences per day) was detected there on the weekend of 13–14 August 2022. The footpath is a private road owned by the school so there may have been some kind of route closure. The popularity of this trailhead, especially on weekends, makes sense as it is across the road from a bus and minibus terminus. Trail entrance A was surprisingly well-used (about 200 people on weekdays and over 600 on weekends) given its location on Mount Butler Road, a long distance from any major residential area. It was about as well-used as entrance D which is located near Braemar Hill, as far as can be determined from limited data.

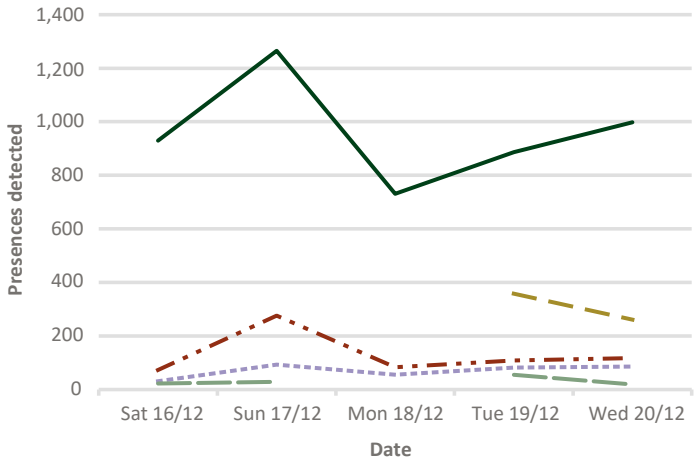
At Mount Parker (see Tables 22C and 22D), points E and F were the most well-used trailheads. Sensor E was in a very accessible location in Quarry Bay behind Nan Fung Sun Chuen and is also the beginning of the Wilson Trail Section 2. As this section of the path is very flat before it enters the country park, it is used for strolling, dog walking and serves as a gathering spot for domestic helpers on Sundays. It attracts a variety of recreational users, not just hikers. However, there was a very large discrepancy between summer and winter foot traffic, with the former not exceeding 260 presences per day and the latter approaching 1,000 presences per day. The summer figures may have been depressed by installation conditions and vandalism. The sensor was found on the ground when field workers went to change it (based on anomalies in the hourly the data, it appears to have been knocked down earlier that same day), and when it was reinstalled, it seems to have been placed at a poor angle. Still, while the difference was probably exaggerated by the technical issues, this location at the start of the Wilson Trail Section 2 would attract a large number of hikers from out-of-district whose activities are more influenced by the seasons than local residents.

CHART OF TABLE 22C: MOUNT PARKER, DAILY PRESENCES, JUL 2022



Full day data only

CHART OF TABLE 22D: MOUNT PARKER, DAILY PRESENCES, DEC 2022



Sensor F was located on a path connecting Yiu Hing Road in Sai Wan Ho to the trail network via the Shau Kei Wan Service Reservoir Playground. The service reservoir's access road provides the only safe, gentle, and easily accessible trail entrance in the area as the hillside is a steep, artificially reinforced cliffside. (The sensor is located on a narrower path segment further uphill from the service reservoir.) The trailheads at sensors E and F also provide fairly direct access into Tai Tam Country Park (Quarry Bay Extension), which has well-maintained trails.

Further east, the path along the Mount Parker lower catchwater (sensor H), saw somewhat lower foot traffic—around 50–100 presences on weekdays and 100–280 presences on weekends. This route lies just outside the country park boundary and includes some challenging sections that require climbing. However, the most likely factor discouraging use of this part of the trail is the lack of officially maintained access routes.

Sensor G was located on a slope maintenance staircase that is not supposed to be open to the public and which is not easily accessible from the street. There were still signs of activity—local residents were seen using the artificial cliff terraces for walking and jogging, and there were some informal seating areas and gardening plots in the area. Sensor I was located next to a temple on an unmaintained, overgrown path that appears to have been part of a former informal settlement. This route requires climbing onto a Water Supplies Department maintenance catwalk (which is not supposed to be open to the public) before continuing up a steep and challenging path that was overgrown and difficult to discern. Sensors G and I therefore registered fewer presences, not exceeding 100 per day at G and 60 per day at I.

8.2 | AVERAGE DAILY PRESENCES AT SIR CECIL'S RIDE AND MOUNT PARKER

TABLE 23: AVERAGE PRESENCES AT SIR CECIL'S RIDE

Summer 2022: 13–14 Aug 2022 (weekend data only)				
	A	**B***	**C**	**D**
Weekend a.m.	317	14	596	247
Weekend p.m.	271	15	608	562
Total weekend daily	**588**	**29**	**1,204**	**315**
Winter 2022-23: 16–22 Jan 2023				
	A	**B**	**C**	**D**
M-F a.m.	97	180	190	114
M-F p.m.	97	194	158	119
Total M-F daily	**194**	**374**	**349**	**233**
Weekend a.m.	273	427	474	-
Weekend p.m.	399	602	580	-
Total weekend daily	**672**	**1,029**	**1,054**	**-**

"-" No data
*Anomalous, view with caution
Totals may not add up due to rounding

As shown in Table 23, the summer average data for Sir Cecil's Ride was fairly similar to the winter data, with the exception of sensor B which as noted above, seems to have detected an abnormally low amount of foot traffic that weekend. What is noticeable is that compared to other backyard trails, Sir Cecil's Ride had a much more even split between morning and afternoon trail users. The weekend data shows that afternoon presences on average exceed morning presences, and even on weekdays during the winter the split is roughly equal. However, it is not known whether this was also the case for weekdays in the summer.

The residential areas closest to Sir Cecil's Ride were more affluent than those nearest most of the other backyard trails. According to the 2016 by-census, Tin Hau/Braemar Hill[15] had a median monthly wage of HK$45,000 (excluding foreign domestic helpers) and a very high labour force participation rate (70.1%). Retirees only made up 12% of its population.[16] This was compared to average monthly median wage of HK$15,500 (excluding foreign domestic helpers) and a labour force participation rate of 60.8%. 15.9% of Hong Kong's entire population is retired.[17] This might contribute to the different trail use patterns indicated by the available data, but since so much data is missing, more research is needed to be sure that Sir Cecil's Ride is used differently than other trails on an hourly basis.

However, it is clear that Sir Cecil's Ride attracts large numbers of weekend visitors. The winter data for sensor points A, B and C registered about 3 times as many presences on weekends as on weekdays. This differentiates it from smaller trails like Shum Wan Shan & Ping Shan which show fairly steady numbers of users throughout the week.

15 Tin Hau/Braemar Hill fall under Tertiary Planning Unit 152. Hong Kong is divided into over 200 Tertiary Planning Units, each identifiable by a three-digit code, for town planning purposes. They are the second smallest geographical units for which census data is reported.

16 HKSAR Census and Statistics Department, "2016 By-census Results—District Profiles", 2016, https://www.bycensus2016.gov.hk/en/bc-dp.html (accessed 14 June 2023).

17 HKSAR Census and Statistics Department, "2016 By-census Results—Economic Characteristics of Population in the Whole Territory, 2016", 2016, https://www.bycensus2016.gov.hk/en/bc-dp.html (accessed 14 June 2023).

TABLE 24: AVERAGE PRESENCES AT MOUNT PARKER

Summer 2022: 8–17 Jul 2022					
	E*	**F**	**G**	**H**	**I**
M-F a.m.	38	134	22	48	6
M-F p.m.	21	160	3	22	15
Total M-F daily	**58**	**294**	**26**	**70**	**21**
Weekend a.m.	125	209	64	61	9
Weekend p.m.	46	277	6	68	25
Total weekend daily	**171**	**486**	**70**	**129**	**35**
Winter 2022-23: 16–22 Dec 2022					
	E	**F**	**G**	**H**	**I**
M-F a.m.	454	180	51	51	13
M-F p.m.	384	112	18	43	20
Total M-F daily	**838**	**292**	**69**	**94**	**33**
Weekend a.m.	419	173	40	97	14
Weekend p.m.	678	132	23	78	12
Total weekend daily	**1,097**	**305**	**62**	**175**	**26**

*Unreliable, view with caution
"-" No data
Totals may not add up due to rounding

At Mount Parker (Table 24), there was likewise a relatively even split between morning and afternoon foot traffic at most of the sensor points including E, F and H. (Sensor E seemed to register an abnormally low number of users during summer 2022 and should be viewed with caution).

The only sensor point that was weighted strongly towards morning foot traffic was G, the slope maintenance stairway on the cliffside behind Yiu Tung Estate, which was used by a small number of people. Estate residents use the maintenance trails for daily exercise, but people who do not live there are unlikely to know how to navigate their maze-like structure, especially since many of them are blocked by fencing and gates. Sensor I near Cheung Fei Temple, which appears to be very little used, registered more users during the afternoon than in the morning, even on weekdays.

8.3 | HOURLY PRESENCES AT SIR CECIL'S RIDE AND MOUNT PARKER

To get a more detailed understanding of activity along the main trail, this subsection will focus on hourly presence data from sensors C and H, which are located along Sir Cecil's Ride and Mount Parker Lower Catchwater respectively. These two sensors functioned normally during both data collection rounds.

Unfortunately, there was little weekday data from sensor C in August 2022 (see Chart 32), but the January data showed a large contrast between weekend and weekday activity (see Chart 33). On weekdays in January 2023, there was a fairly consistent stream of people throughout the day (20–40 people per hour) , with one small, brief peak occurring during the late morning between 9:00 a.m. and 12:00 p.m. However, on the weekend of 7–8 January, there was a much more pronounced two-peak structure consisting of a large morning peak (over 100 presences an hour) followed by a slightly smaller afternoon peak. The first peak occurred between 9:00 a.m. and 12:00 p.m., somewhat later than at most other backyard trails. The afternoon peak reached its highest point at around 4:00 p.m. and fell sharply afterwards. The weekend of 13–14 August showed a similar two-peak structure, but with a bigger midday lull.

CHART 32: SIR CECIL'S RIDE C, HOURLY PRESENCES, AUG 2022

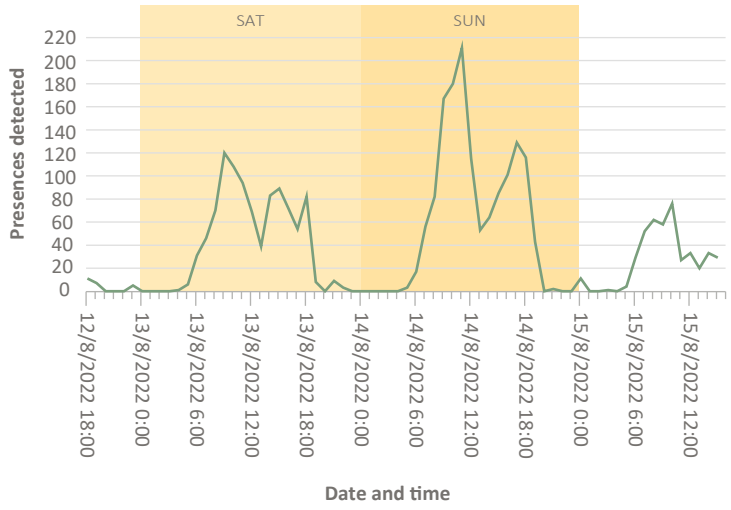
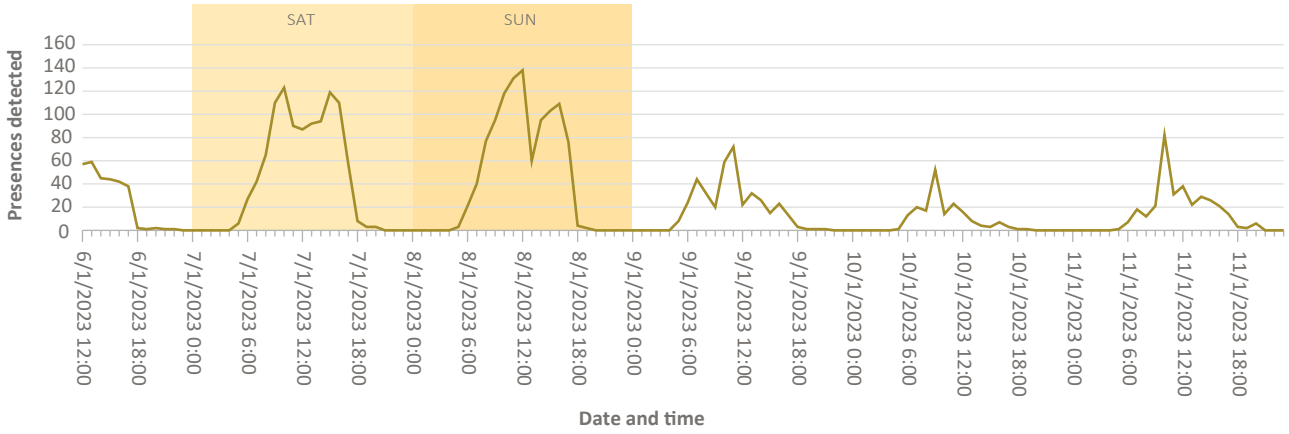


CHART 33: SIR CECIL'S RIDE C, HOURLY PRESENCES, JAN 2023



At sensor H on weekdays in July (see Chart 34), there was generally a small bump in foot traffic in the morning (roughly 20-something people over about 2 hours), followed by a few scattered individuals throughout the rest of the day. In December (Chart 35), foot traffic was spread out fairly evenly throughout the day. There were larger spikes in foot traffic on Sundays, but Saturday only saw slightly more activity than weekdays.

Sir Cecil's Ride saw a much larger number of trail users than Mount Parker, especially on weekends. It has broad appeal as it is a relatively gentle trail with multiple trailheads accessible by public transportation, and connects to a much larger network of trails within Tai Tam Country Park and outside of it. In contrast, the Mount Parker Lower Catchwater is more challenging and less accessible. There are portions that require climbing, and the steep cliff above Shau Kei Wan provides few safe and authorised access routes. Based on the high level of activity around sensors E and F, it appears that most users stay on the more established trails within the country park.

CHART 34: MOUNT PARKER H, HOURLY PRESENCES, JUL 2022

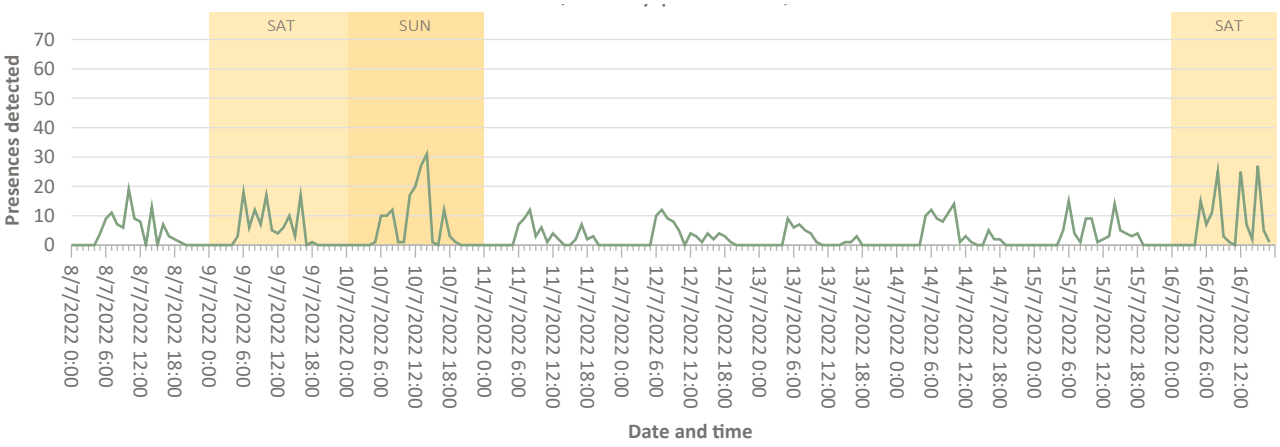
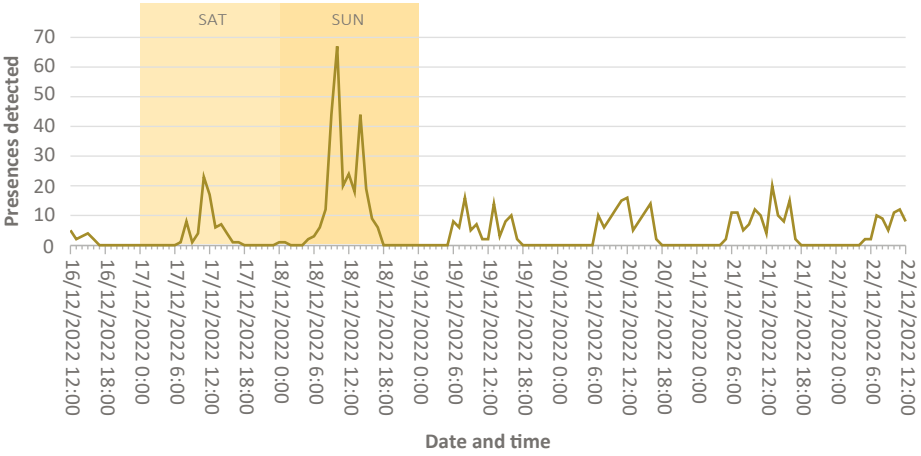


CHART 35: MOUNT PARKER H, HOURLY PRESENCES, DEC 2022



8.4 | DIRECTIONAL PRESENCE DATA AT SIR CECIL'S RIDE AND MOUNT PARKER

Directional presence data from Sir Cecil's Ride during January 2023 seems to show a fairly even balance of people travelling in both directions on most days, with some exceptions (see Table 25A). Sensor B shows more people walking uphill (entering the trail network) than downhill (exiting) every day for which there is full day data, especially on Saturday 7 January and Sunday 8 January, which seems to show that this is a favoured entry point.

Data from Mount Parker during December 2022 (Table 25B) also showed a fairly even balance for most locations for which there is full day data. However, sensor G appears to consistently show more people travelling downhill than uphill. As this is a steep maintenance staircase, it is understandable that more people use it to walk down than up. Sensor H, while quite balanced on most days, recorded a large imbalance on Sunday 18 December, when 175 out of 276 presences (64%) travelled in a westwards direction. There is insufficient data to say whether this is a typical occurrence on Sundays or an anomaly.

TABLE 25A: DIRECTIONAL DAILY PRESENCES AT SIR CECIL'S RIDE

Jan 2023	A		B		C		D	
Direction	**Downhill (L)**	**Uphill (R)**	**Downhill (R)**	**Uphill (L)**	**West (L)**	**East (R)**	**Downhill (R)**	**Uphill (L)**
	(p.m. only)	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*
Fri 6 Jan	*84*	*87*	*152*	*136*	*159*	*133*	*105*	*77*
Sat 7 Jan	353	324	464	570	514	522	-	-
Sun 8 Jan	358	308	464	559	511	561	-	-
Mon 9 Jan	109	96	189	201	214	182	-	-
Tue 10 Jan	45	33	105	141	64	119	104	69
Wed 11 Jan	129	95	188	204	196	137	111	118

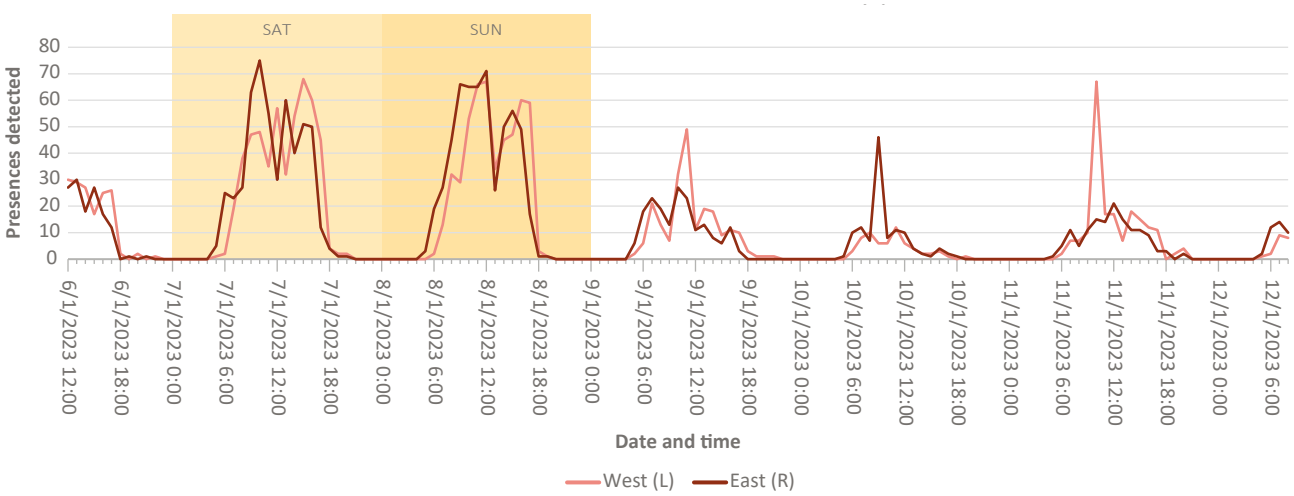
"-" No data

TABLE 25B: DIRECTIONAL DAILY PRESENCES AT MOUNT PARKER

Dec 2022	E		F		G		H		I	
Direction	**Downhill (R)**	**Uphill (L)**	**Downhill (R)**	**Uphill (L)**	**Downhill (L)**	**Uphill (R)**	**West (L)**	**East (R)**	**Downhill (L)**	**Uphill (R)**
	(p.m. only)	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*	*(p.m. only)*
Fri 16 Dec	*111*	*85*	*42*	*27*	*6*	*3*	*8*	*8*	*6*	*5*
			(a.m. only)	*(a.m. only)*						
Sat 17 Dec	451	478	*77*	*96*	21	10	39	34	11	11
Sun 18 Dec	676	589	-	-	52	41	176	100	13	16
			(p.m. only)	*(p.m. only)*					*(p.m. only)*	*(p.m. only)*
Mon 19 Dec	318	413	*58*	*44*	34	22	48	35	*17*	*15*
Tue 20 Dec	411	476	179	179	52	30	54	54	30	25
Wed 21 Dec	520	478	129	132	53	33	58	59	11	8

"-" No data

CHART 36: SIR CECIL'S RIDE C, DIRECTIONAL HOURLY PRESENCES, JAN 2023



Sensor C (see Chart 36) recorded a consistent delay between when people first start travelling eastwards in the morning and when they start travelling westwards, especially on the weekend. On Saturday 7 January, there is a spike in eastwards travel occurring at about 10:00–11:00 a.m., followed by a spike in westwards travel much later at 3:00–4:00 p.m. in the afternoon. On Sunday, the two lines more closely track each other in a two-peak pattern, but there is about a two hour delay between the peak flow of eastwards travel and the peak flow of westwards travel. On weekdays, the delay appears to be shorter (1 hour or less), but is punctuated by large groups of people moving in one direction. These may represent large hiking groups, but the figures may not be very accurate if people lingered in front of the sensors.

The origin point of many of the eastward travellers at sensor C would appear to be the trailhead near sensor B, but some may also have come from point A or even from as far away as Tai Tam Upper Reservoir near Hong Kong Parkview. On the weekend of 7–8 January at sensor B, there was a long delay of about 2 hours between presences travelling uphill in the morning and presences travelling downhill. The peak for eastwards presences occurred in the morning at around 10:00– 11:00 a.m., but the peak for westwards presences at 3:00 p.m. They are unlikely to be the same people doubling back. Hikers who travel eastwards along Sir Cecil's Ride often leave the trail around point E in Quarry Bay where there are more public transportation and dining options (see Map 7 excerpt). Those travelling westwards are probably heading towards the trailhead at B where there is a bus terminus, or slightly further to Lin Fa Kung Hill.

MAP 7 EXCERPT

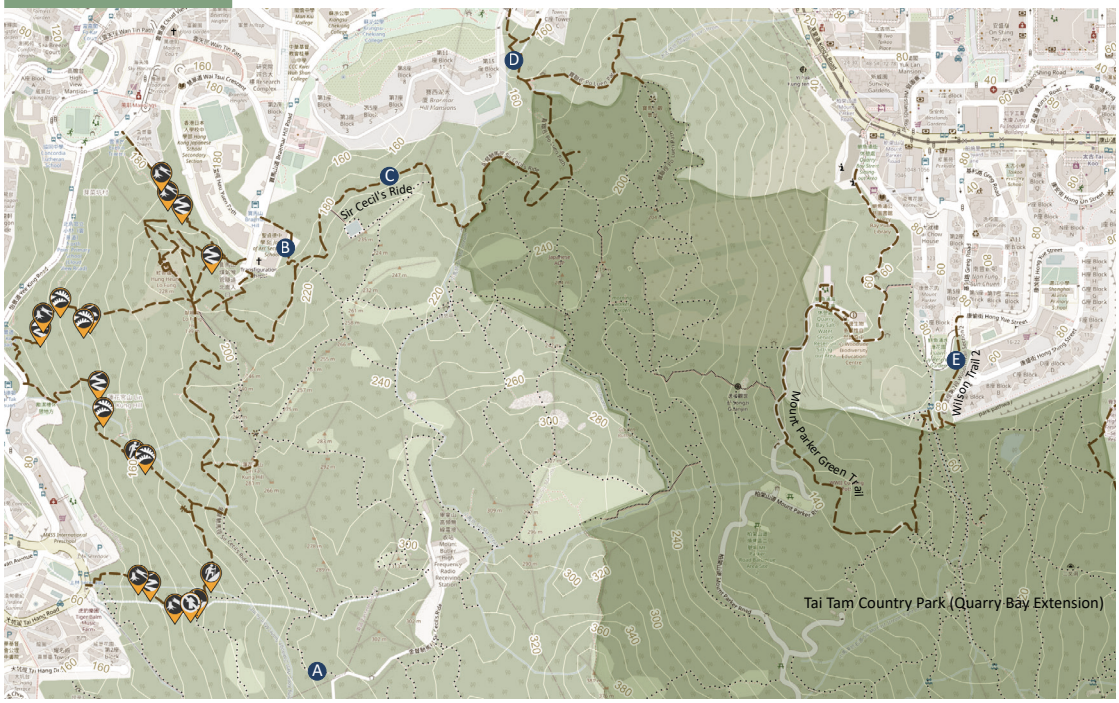


CHART 37: SIR CECIL'S RIDE B, DIRECTIONAL HOURLY PRESENCES, JAN 2023

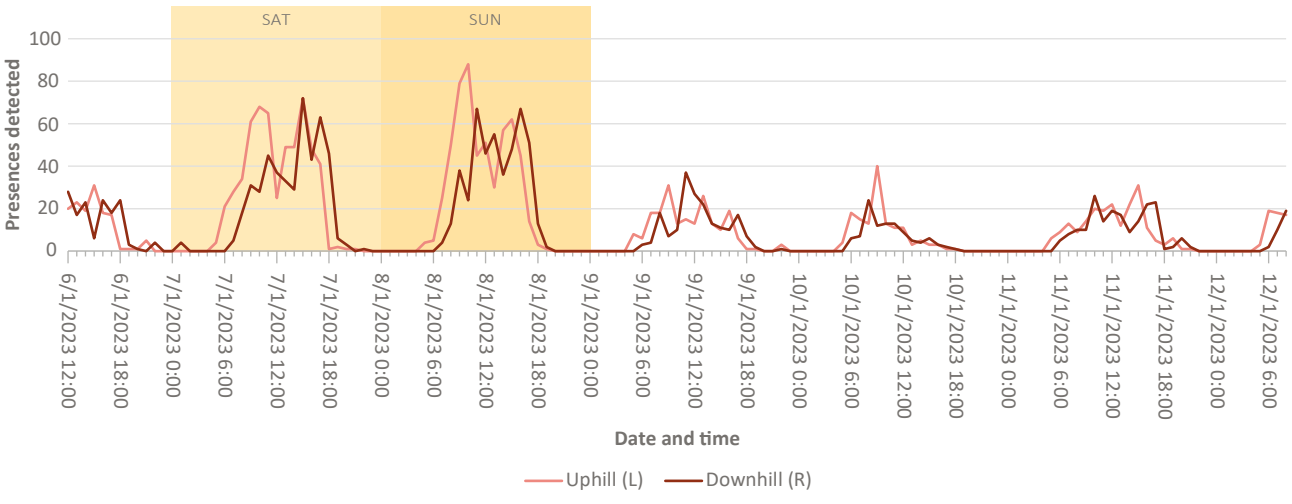
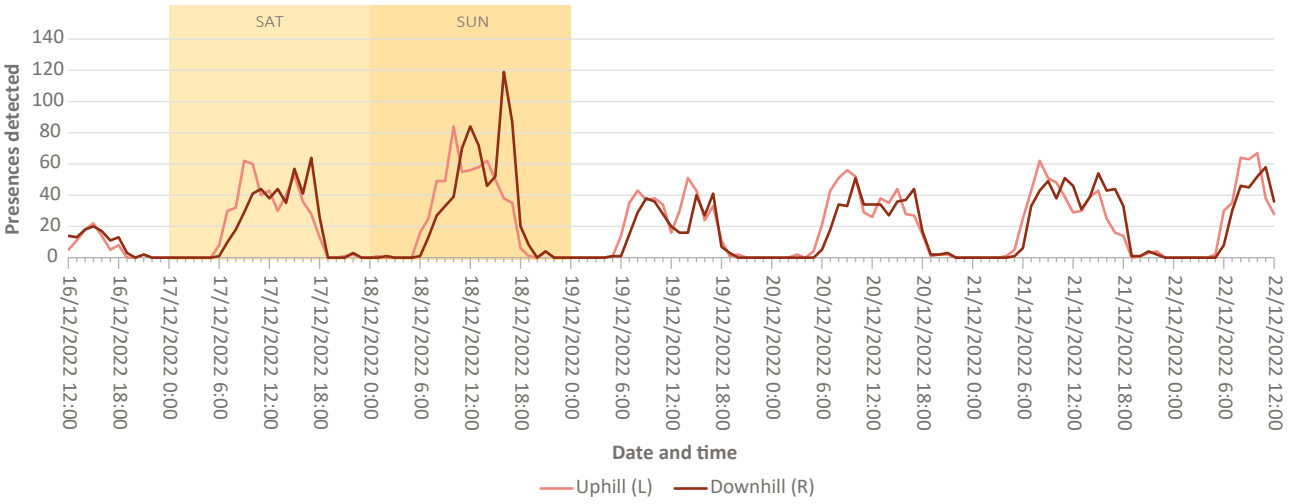


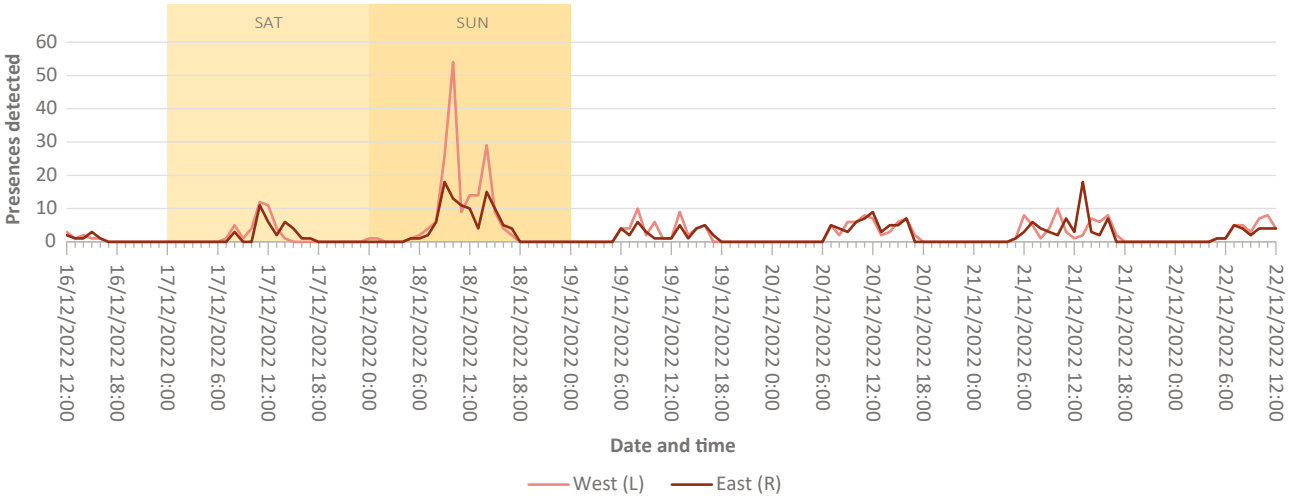
CHART 38: MOUNT PARKER E, DIRECTIONAL HOURLY PRESENCES, DEC 2022



Sensor E (Chart 38), which is located at the entrance to Tai Tam Country Park in Quarry Bay showed a very similar usage pattern to sensor B (Chart 37), but the Sunday data appeared to show more people travelling downhill (leaving) than uphill (entering). It could be surmised that people begin their hike at Braemar Hill, travel eastwards along Sir Cecil's Ride, enter the country park, then exit the trail network at Quarry Bay.

At sensor H (Chart 39) along the Mount Parker lower catchwater, there were very similar numbers of people travelling both westwards and eastwards throughout the day except on Sunday, 18 December, when large numbers of people were detected travelling westwards at 10:00–11:00 a.m. and 2:00–3:00 p.m. That Sunday was a very busy day across the entire Mount Parker network, but they did not come from either G or I, as neither registered a large number of presences travelling uphill on that day. They may have originated further eastwards towards Chai Wan or from further uphill in Tai Tam Country Park via an informal hillside trail. However, the overall picture shows that the Mount Parker Lower Catchwater is somewhat separate from the rest of the trail network in that it is less accessible and attracts fewer trail users.

CHART 39: MOUNT PARKER H, DIRECTIONAL HOURLY PRESENCES, DEC 2022



8.5 OVERALL TRAIL USER ESTIMATE FOR SIR CECIL'S RIDE AND MOUNT PARKER

Considering the numerous data collection problems encountered together with the fact that it was not possible to cover all of the entrance and exit points on this extremely complex trail network, the following estimates should be treated cautiously as a very conservative estimate. In particular, this estimate excludes the large number of people who enter and exit the trail network through the Mount Parker Road Green Trail in Quarry Bay, which as noted above, was not monitored because it belongs to Tai Tam Country Park.

This estimate will include sensors A, B, D, E, F, G and I, which overlooked entry and exit points to the trail network.

As no valid weekday data was collected at Sir Cecil's Ride (sensors A, B and D) in summer 2022, and no valid weekend data was collected at sensor D in winter 2022–23, estimates were reconstructed based on the average ratio between weekday and weekend presences across the rest of the trail network during the same season.

As Table 26 shows, at minimum, between 750 and 1,000 people visit Sir Cecil's Ride and Mount Parker on weekdays, and 1,450–1,800 on the weekends.

TABLE 26: OVERALL VISITOR CALCULATION FOR SIR CECIL'S RIDE AND MOUNT PARKER

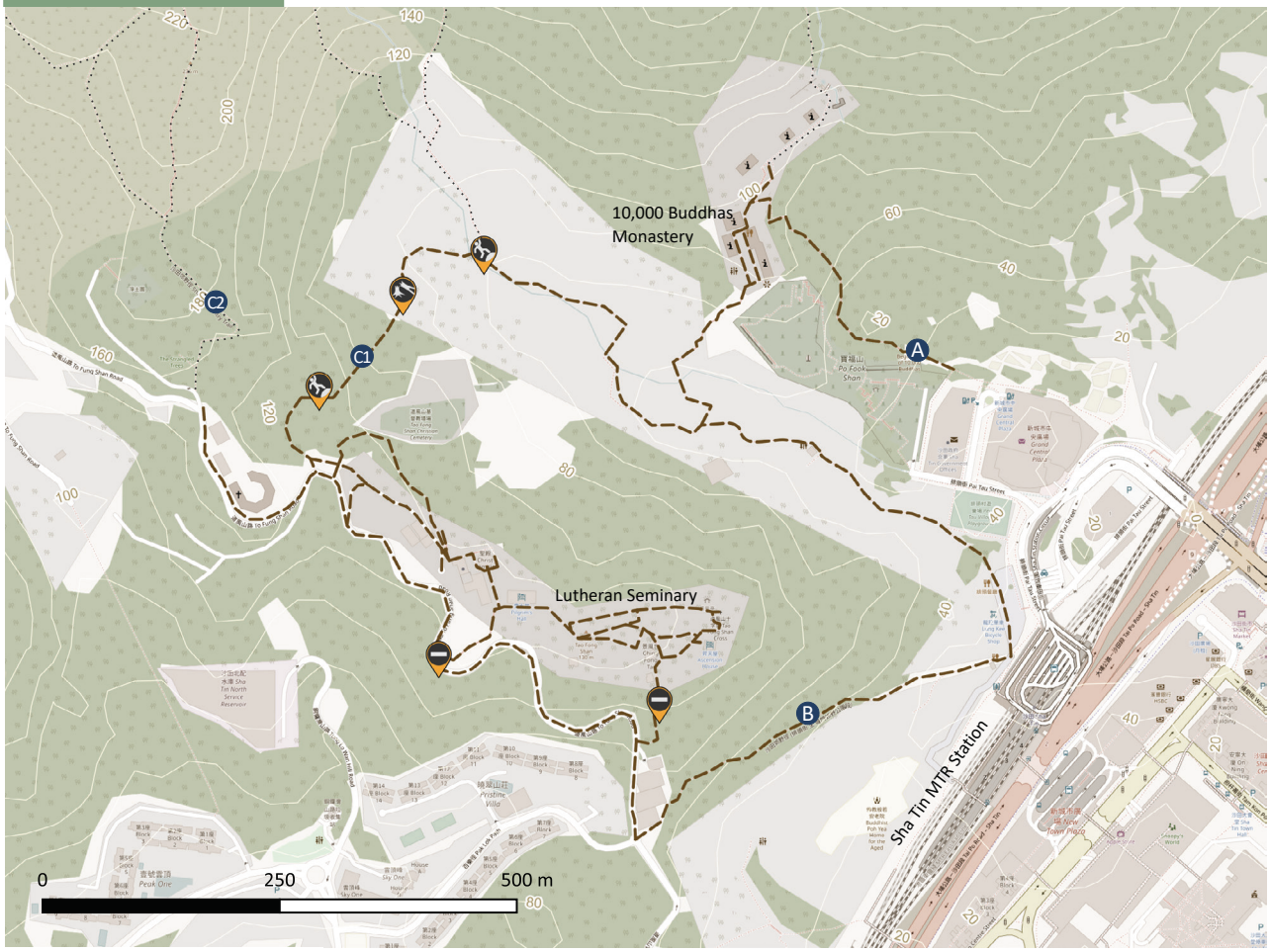
		Sir Cecil's Ride								Mount Parker	
		A	B	D	Subtotal/2	E	F	G	I	Subtotal/2	Total/2
Jul–Aug 2022	M-F average	308*	630*	165*	**417**	58	294	26	21	**200**	**751**
	Weekend average	588	1,204	315	**1,054**	171	486	70	35	**381**	**1,435**
Dec–Jan 2023	M-F average	194	374	233	**401**	838	292	69	33	**616**	**1,017**
	Weekend average	672	1,029	413*	**1,057**	1,097	305	62	26	**745**	**1,802**

*Reconstructed estimate

Rounded to the nearest whole number

9. To Fung Shan

MAP 8: TO FUNG SHAN



Explored paths

Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- A Route from Pai Tau Street to 10,000 Buddhas Monastery
- B Sha Tin Country Trail (Pai Tau Section) linking Sha Tin Train Station with Pak Lok Path

Round 1 only

- C1 Path between To Fung Shan Lutheran Church and 10,000 Buddhas Monastery

Round 2 only:

- C2 Sha Tin Country Trail linking To Fung Shan Road with Shing Mun Country Park

To Fung Shan is located between Tai Wai and Sha Tin. It lies to the north-west of Sha Tin Town Centre and is separated from the built-up area by the East Rail Line. On the other side of the tracks, there are village houses and some significant places of worship including the 10,000 Buddhas Monastery and the Tao Fung Shan Lutheran Seminary, both of which are major tourist attractions. Further uphill, the trail eventually connects to the MacLehose Trail Section 7 and Shing Mun Country Park. Sensor A monitored the main path leading from Sha Tin Town Centre to the 10,000 Buddhas Monastery. Sensor B was located on a trail segment linking Sha Tin Town Centre with To Fung Shan road near the Lutheran Seminary. Sensor C1 was located on an informal trail leading between the seminary and the monastery. However, it was found that this trail was used by very few people. Therefore during round 2, this sensor was relocated to position C2 near the seminary, monitoring the beginning of the path linking To Fung Shan Road to the MacLehose Trail.

9.1 | DAILY PRESENCE DATA AT TO FUNG SHAN

TABLE 27A: DAILY PRESENCES AT TO FUNG SHAN, JUL 2022

Round 1			Daily presences detected		
Rain (mm)	**Date**	**Day**	**A**	**B**	**C1**
↯ 0.5	6/7/2022	Wed	*(p.m. only) 140*	*(p.m. only) 139*	*(p.m. only) 5*
↯ 13.1	7/7/2022	Thu	238	326	0
Trace	8/7/2022	Fri	116	461	1
Trace	9/7/2022	Sat	233	699	0
Trace	10/7/2022	Sun	321	598	4
0	11/7/2022	Mon	-	363	*(a.m. only) 1*
0	12/7/2022	Tue	-	*(a.m. only) 179*	-

TABLE 27B: DAILY PRESENCES AT TO FUNG SHAN, FEB 2023

Round 2			Daily presences detected		
Rain (mm)	**Date**	**Day**	**A**	**B**	**C2**
0	3/2/2023	Fri	*(p.m. only) 353*	*(p.m. only) 191*	*(p.m. only) 107*
0.4	4/2/2023	Sat	1,071	504	389
Trace	5/2/2023	Sun	3,281	574	594
0.1	6/2/2023	Mon	-	288	187
Trace	7/2/2023	Tue	-	307	232
Trace	8/2/2023	Wed	-	365	191

"-"No data
↯ Thunderstorm warning

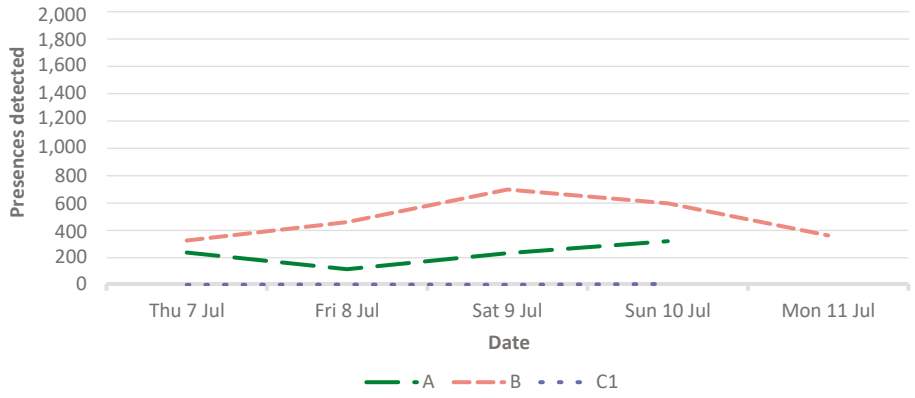
The first round of data collection was cut short by bad weather so that only 5.5 days' worth of valid data was collected. During the second round, sensor A malfunctioned and did not record any data between 6 February and 8 February. Therefore, only weekend data plus one half weekday was recorded.

Sensor A, which was located en route to the 10,000 Buddhas Monastery, recorded dramatically different figures during summer 2022 and winter 2023 see Tables 27A and 27B). During the weekend of 9–10 July, just 200–300 presences per day were recorded. On the weekend of 4–5 February, 1,000–3,000 presences per day were recorded. The increased foot traffic was probably related to the Lunar New Year holiday two weeks earlier. There may have been ongoing religious events. Alternatively, there may have been an increase in tour group activity after the lifting of inbound quarantine requirements in December 2022.

In contrast, sensor B recorded similar numbers of presences during both data collection rounds, so the rise in trail users was isolated to the temple. The trail on which sensor B was located is not only used by recreational walkers but also by residents of To Fung Shan to walk to Sha Tin Town Centre.

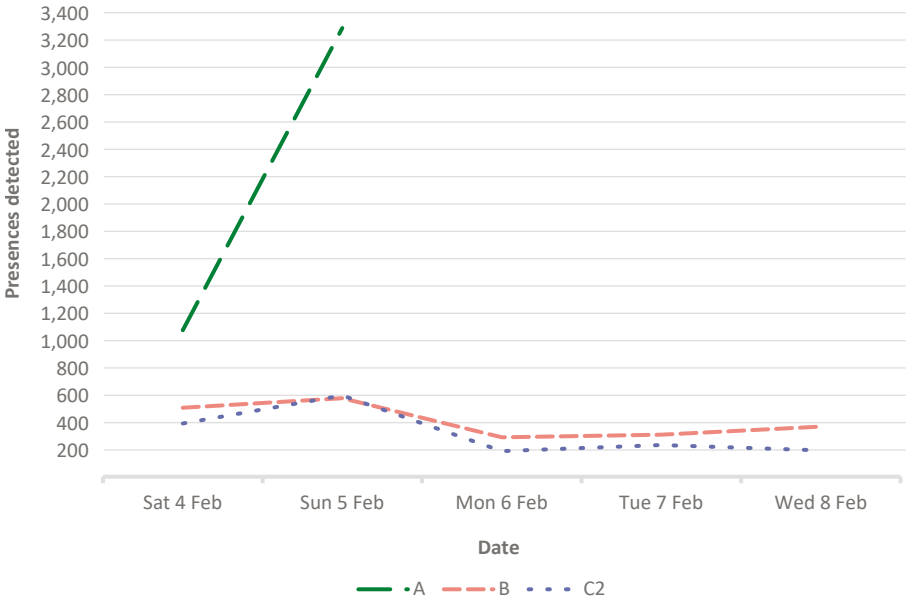
Sensor C1 only recorded 5 or fewer presences per day. It was located on an informal path through a wooded area between the Lutheran seminary and the 10,000 Buddhas Monastery. Fewer than 5 people a day crossed between the two religious buildings. Instead the majority of recreational trail users passing the seminary walked further uphill towards Shing Mun Country Park. This was confirmed by sensor C2 during the winter round, which recorded up to 600 presences on the weekend and around 200 presences on weekdays.

CHART OF TABLE 27A: TO FUNG SHAN, DAILY PRESENCES, JUL 2022



Full day data only

CHART OF TABLE 27B: TO FUNG SHAN, DAILY PRESENCES, FEB 2023



Full day data only

9.2 | AVERAGE DAILY PRESENCES AT TO FUNG SHAN

TABLE 28: AVERAGE PRESENCES AT TO FUNG SHAN

Summer 2022: 7 Jul–12 Jul 2022			
	A	**B**	**C1**
M-F a.m.	72	187	0
M-F p.m.	117	186	2
Total M-F daily	**189**	**373**	**2**
Weekend a.m.	142	280	0
Weekend p.m.	136	369	2
Total weekend daily	**287**	**649**	**2**
Winter 2022-23: 3 Feb–8 Feb 2023			
	A	**B**	**C2**
M-F a.m.	-	134	106
M-F p.m.	-	187	100
Total M-F daily	**-**	**321**	**206**
Weekend a.m.	756	173	200
Weekend p.m.	1,420	366	292
Total weekend daily	**2,176**	**539**	**492**

Totals may not add up due to rounding

Average daily figures for To Fung Shan shown in Table 28 reveal that on weekdays, there was a relatively even distribution of trail users between the morning and afternoon, and on weekends, the majority of trail users were seen in the afternoon. This differs from backyard trails such as Duckling Hill and Fu Yung Shan where the majority of activity took place in the morning. To Fung Shan appears to lack a significant morning walker user base, but is used by a more diverse range of people including village residents, tourists, worshippers and recreational hikers. Activity on To Fung Shan is more evenly distributed throughout the day as well as more weekend-focused. Weekends saw between 150% and 240% of the number of presences that weekdays did.

There are several reasons for the relative lack of morning walkers around To Fung Shan. The hillside is fairly built-up with residential and religious land uses, and the path network is fragmented. Some of these land uses, such as luxury residential complexes towards Tai Wai, and funerary facilities near Pai Tau Village, detract from the natural character of the hillside and may put off some recreational walkers. Sha Tin also has attractive alternative public open spaces such as its riverfront walks and a bicycle network.

9.3 | HOURLY PRESENCES AT TO FUNG SHAN

At sensor A (see Chart 40), weekday data during July 2022 showed a fairly constant stream of foot traffic that started at around 9:00 a.m. and ended at 5:00–6:00 p.m., which coincides with the opening hours of the monastery. Weekend foot traffic (9–10 July) was substantially higher and peaked at lunch hour (12:00–1:00 p.m.), which can be explained by the presence of the monastery's vegetarian restaurant. In February 2023, the amount of weekend foot traffic was even higher, especially on Sunday 5 February. Instead of there being a sharp lunchtime spike, peak hours extended from 10:00 a.m. to around 3:00 p.m.

At sensors B and C2 (see Charts 42–44), the hourly data showed similar daily patterns. On weekdays, foot traffic was spread out through the day with multiple mini-spikes and no consistent bias towards the morning or afternoon. Weekend foot traffic was higher than weekdays. In July 2022, this foot traffic was spread out throughout the day, but in February 2023, most foot traffic was concentrated in the afternoon with the peak occurring at 2:00–3:00 p.m. More afternoon activity in winter time was also observed at several other backyard trails, including Hammer Hill, Shum Wan Shan & Ping Shan and Sir Cecil's Ride. People adjust their behaviour for hot weather in the summer months by walking and hiking in the morning rather than the afternoon.

However, there was no dramatic increase in the number of presences detected at sensor B in winter compared to summer. The temple visitors were a separate group of users from the people detected at B and C2.

CHART 40, TO FUNG SHAN A, HOURLY PRESENCES, JUL 2022

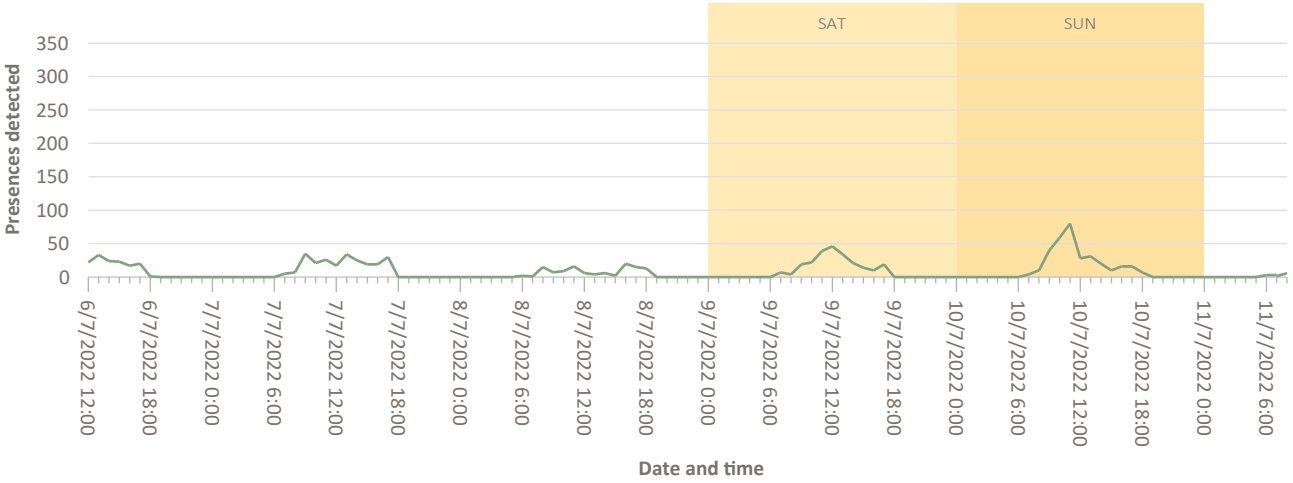


CHART 41, TO FUNG SHAN A, HOURLY PRESENCES, FEB 2023

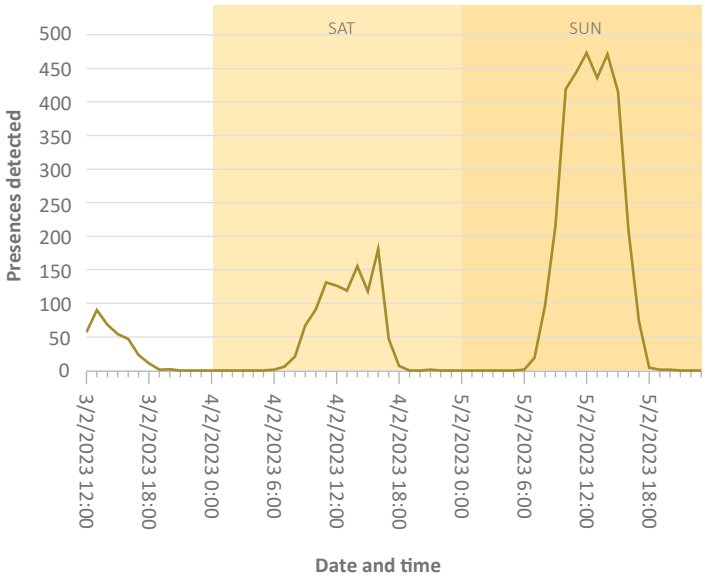


CHART 42, TO FUNG SHAN B, HOURLY PRESENCES, JUL 2022

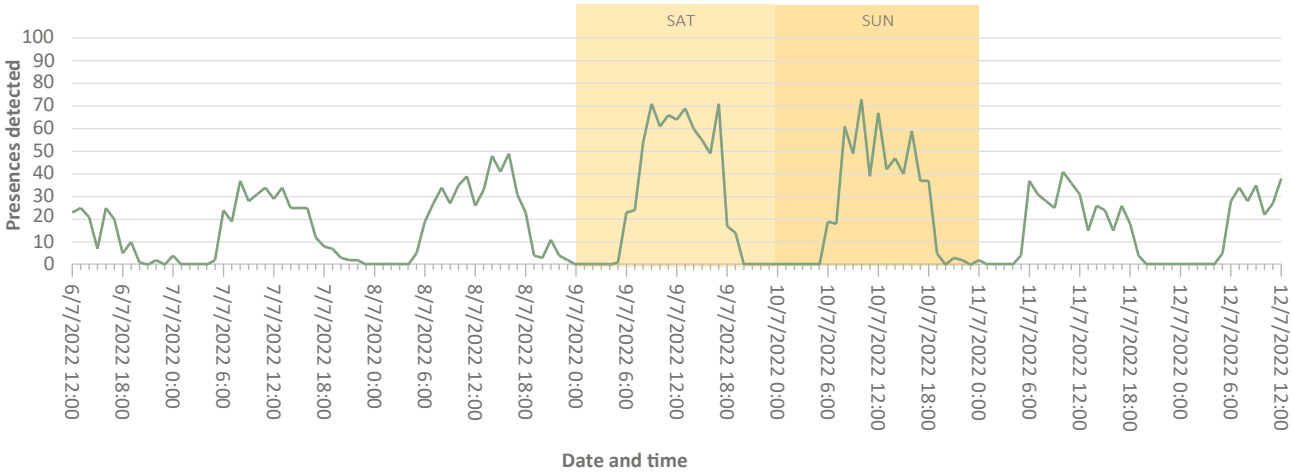


CHART 43, TO FUNG SHAN B, HOURLY PRESENCES, FEB 2023

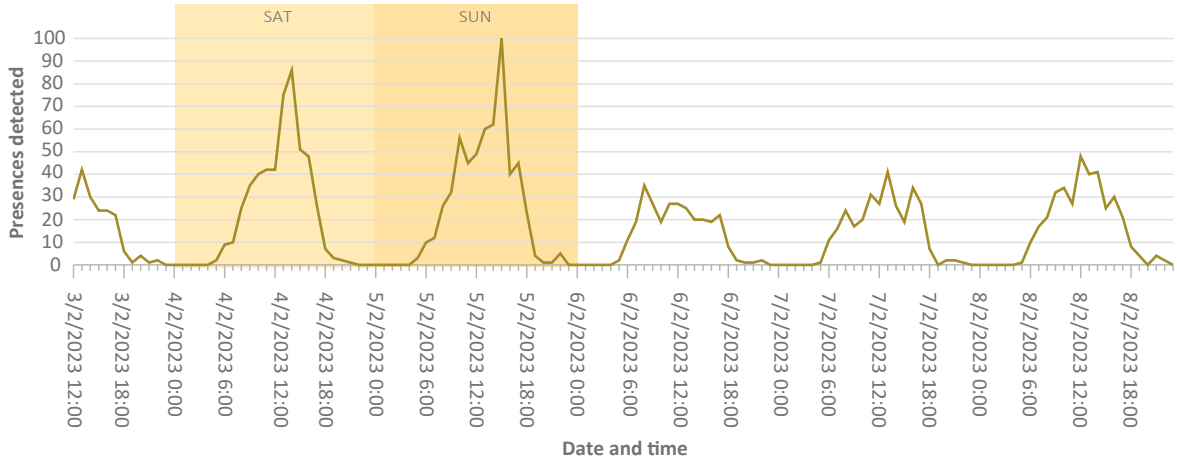
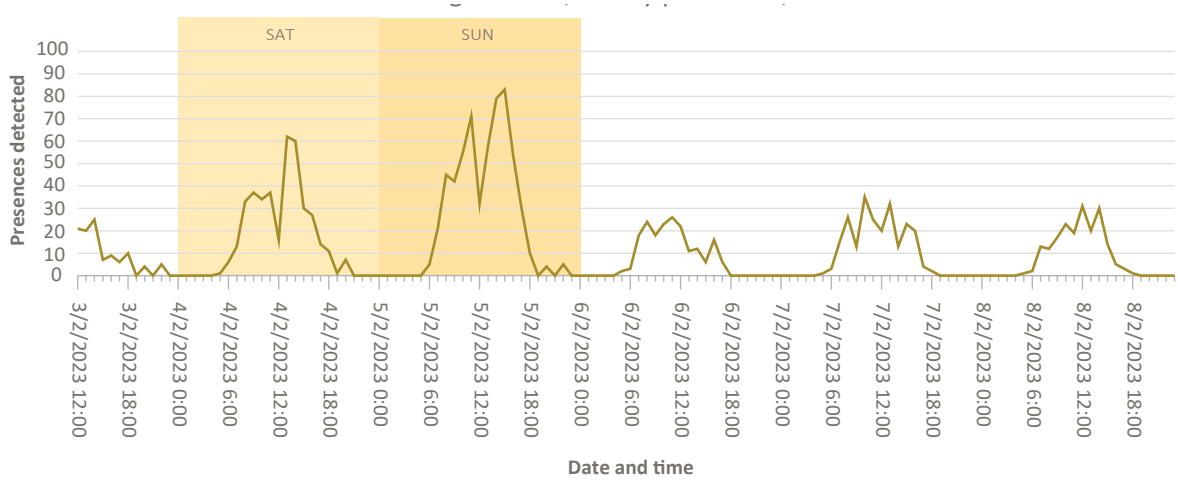


CHART 44, TO FUNG SHAN C2, HOURLY PRESENCES, FEB 2023



9.4 | DIRECTIONAL PRESENCES AT TO FUNG SHAN

TABLE 29: DIRECTIONAL DAILY PRESENCES AT TO FUNG SHAN

Feb 2023	A		B		C	
Direction	**Downhill (R)**	**Uphill (L)**	**Downhill (R)**	**Uphill (L)**	**Downhill (R)**	**Uphill (L)**
Fri 3 Feb	*(p.m. only) 213*	*(p.m. only) 140*	*(p.m. only) 124*	*(p.m. only) 67*	*(p.m. only) 76*	*(p.m. only) 31*
Sat 4 Feb	528	543	298	206	232	157
Sun 5 Feb	1,462	1,819	298	276	341	253
Mon 6 Feb	-	-	165	123	101	86
Tue 7 Feb	-	-	180	127	148	84
Wed 8 Feb	-	-	222	143	106	85

CHART 45: TO FUNG SHAN A, DIRECTIONAL HOURLY PRESENCES, FEB 2023

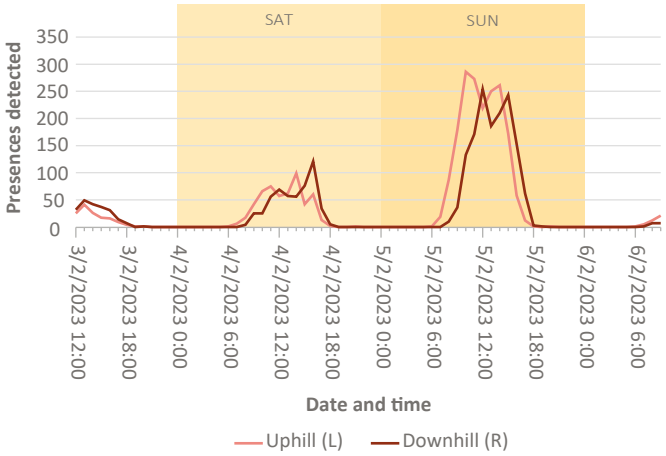
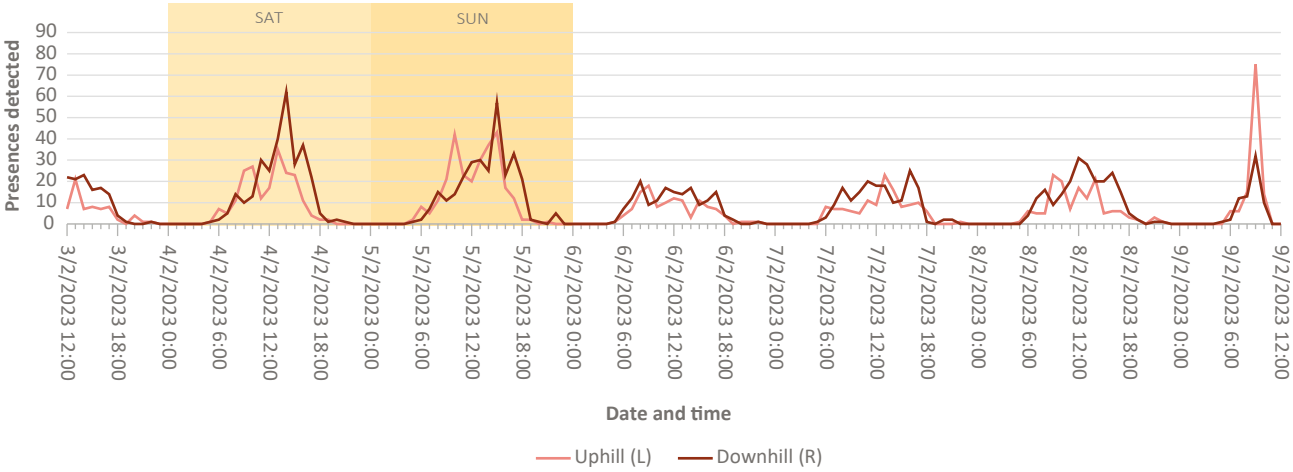


CHART 46: TO FUNG SHAN B, DIRECTIONAL HOURLY PRESENCES, FEB 2023

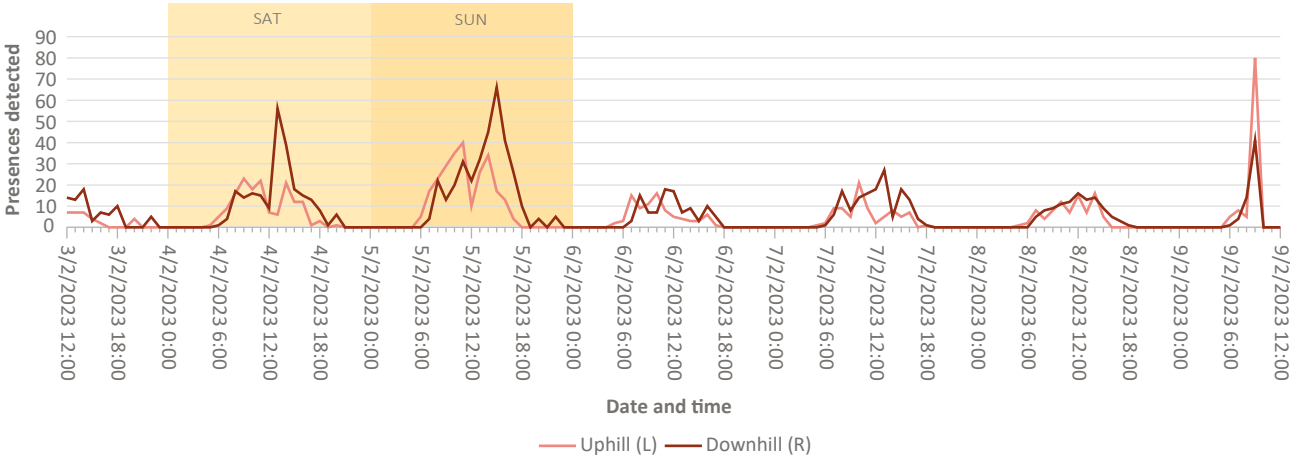


Directional daily presence data (see Table 29) show that at sensor A, there was a similar number of presences travelling both uphill and downhill on Saturday 4 February, but about 350 more travelled uphill than downhill on Sunday 5 February. These people probably left by the temple's back entrance which leads back down to Sha Tin through Pai Tau Village.

Meanwhile, sensors B and C2 consistently detected somewhat more presences travelling downhill than uphill. As To Fung Shan is part of a complex network of trails that connect to Shing Mun Country Park, people probably entered the trail network elsewhere and chose to exit towards Sha Tin.

This is confirmed by the directional hourly data, which shows clear differences in foot traffic patterns between sensors A on one hand, and B and C on the other. At sensor A (Chart 45), the shape of the graph for uphill and downhill travel closely track one another

CHART 47: TO FUNG SHAN C, DIRECTIONAL HOURLY PRESENCES, FEB 2023



with an approximately two hour delay. People walk up to the temple, spend 1–2 hours there, then most of them leave by the same route.

On the other hand, there is a less clear relationship between uphill and downhill travel at sensors B and C (Charts 46 and 47). There is a much shorter gap between the time the first uphill travellers are detected and the first downhill travels are detected. The lines do not closely track one another, and on Saturday and Sunday there was a spike in downhill travel during the early afternoon between 1:00 p.m. and 3:00 p.m., indicating large groups of people leaving the trail.

9.5 | OVERALL TRAIL USER ESTIMATE FOR TO FUNG SHAN

To estimate the overall number of trail users, the average number of presences detected at A, B, and C2 are added up and divided in half. Sensors A and B overlook trail entrances/exits near Sha Tin MTR station, while C2 is an entrance/exit towards Shing Mun Country Park. This is a conservative estimate as the trail network is complex and fragmented, with other entrances/exits that were not included.

Due to missing data, estimates and proxy figures are used in some places. There was no weekday data for sensor A in February 2023. However, since foot traffic at point A is of a different nature than that at B and C, the latter will not be of help in estimating the missing figure. Therefore the July figures for 2022 will be used as a basis: as the weekend average for February 2023 was 7.6 times the weekend average for July 2022, it is estimated that the February weekday average was 7.6 times the July weekday average.

The missing figures for C2 are based on the data from B since the two sensors had similar patterns of foot traffic. The average daily presences in July at sensor B were 1.19 times that at the same location in February. Therefore, the February figures from C2 will be each multiplied by 1.19 to arrive at the July estimate.

As shown in Table 30, it is estimated that around 400 people visited To Fung Shan on weekdays in July, and about 750 visited daily on the weekend. The weekday and weekend estimates for February are about 980 and 1,600 visitors, respectively. The February estimates are elevated entirely due to the increased number of temple-goers two weeks after the Lunar New Year, so these figures are unlikely to be typical of the winter months in general.

TABLE 30: OVERALL VISITOR CALCULATION FOR TO FUNG SHAN

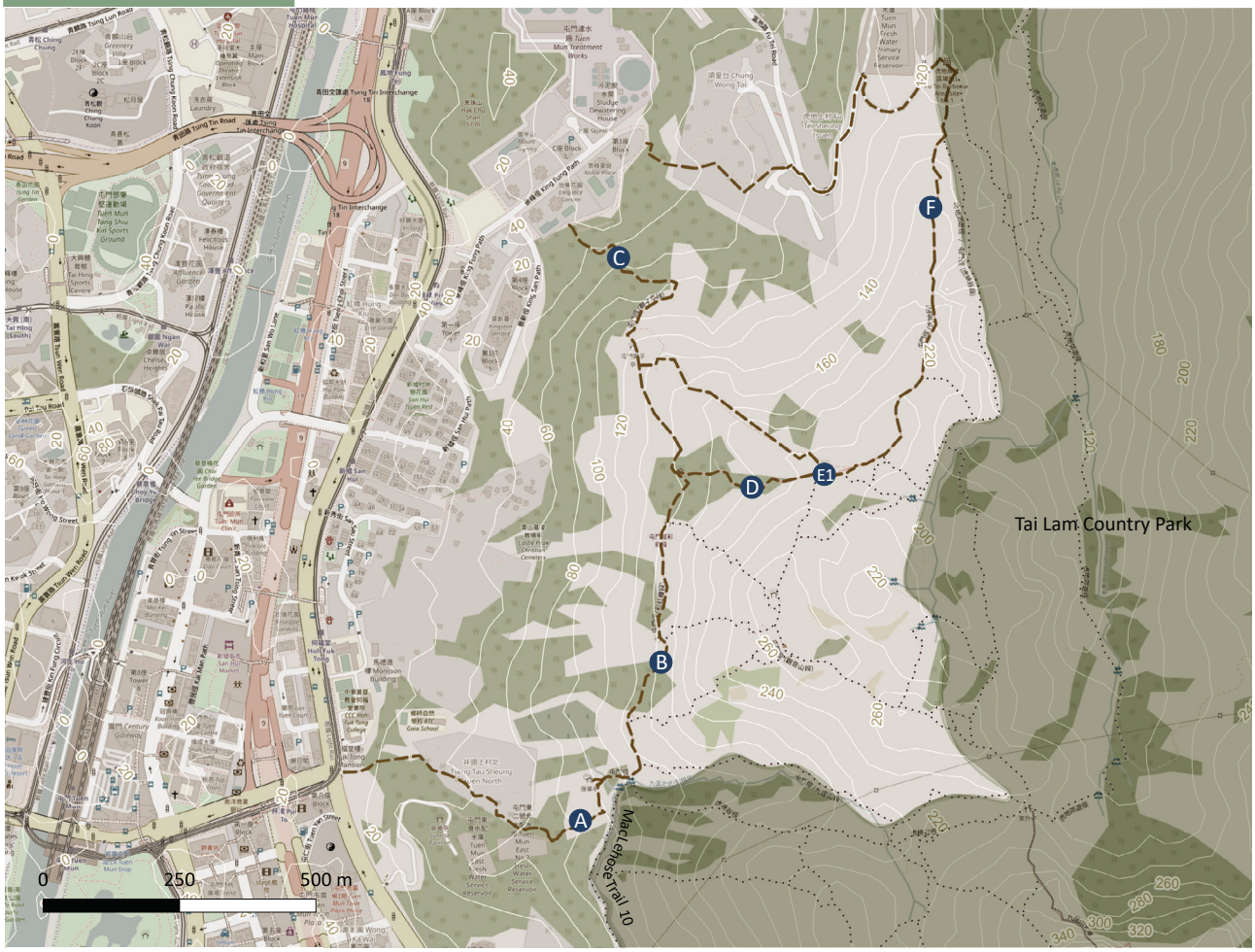
		A	B	C2	Total/2
Jul 2022	Monday-Friday average	189	373	245*	**404**
	Weekend average	287	649	585*	**761**
Feb 2023	Monday-Friday average	1,433*	321	206	**980**
	Weekend average	2,176	539	492	**1,604**

*Reconstructed estimate

Rounded to the nearest whole number

10. Tuen Mun Trail

MAP 9: TUEN MUN TRAIL



Explored paths

Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- A Entrance/exit to Pui To Road, end of MacLehose Trail Section 10
- B Along Tuen Mun Trail
- C Entrance/exit to King Fung Path
- D East/West stairs
- F Path to/from Fu Tei Sheung Tsuen

Round 1 only

- E1 Crossroads at ridge summit

Tuen Mun Trail is located on the hillside on the eastern side of Tuen Mun New Town. A trailhead on Castle Peak Road near Chi Lok Fa Yuen provides access to Tuen Mun Trail via point A. At the top of this climb, the MacLehose Trail Section 10 extends to the south along the catchwater, forming the boundary of Tai Lam Country Park. Tuen Mun Trail extends to the north, following the contour of the hill via points B, D, and E over green belt land. To the north, the path descends via point F back down towards Fu Tei Sheung Tsuen, where a trailhead meets with King Fung Path near Lingnan University. There are also several paths connecting Tuen Mun Trail to Tai Lam Country Park via Kwun Yam Shan.

Unfortunately, Tuen Mun was a site of rampant vandalism so limited data was collected. During the second round, regular trail users informed the

research team's fieldwork assistants that sensors were stolen less than a day after they were installed. The fieldwork team also learned from trail users that some people believed that the sensors were surveillance cameras in spite of the notices posted informing them that they could only detect infrared.

10.1 | DAILY PRESENCES AT TUEN MUN TRAIL

During the first data collection round in July–August 2022, sensors C, D, and E were stolen, resulting in complete loss of data at C and partial loss at D and E. During the second round in January–February 2023, every sensor except F was stolen at least once. Therefore, only 2.5 days' worth of data from A and 5.5 days' worth of data from F was obtained.

The July–August data indicate that Sunday was the busiest day of the week (see Table 31A), but since it rained on both Saturdays, a fair comparison could not be made. Three days of heavy rain (including a typhoon signal 1) during the second week also apparently reduced foot traffic.

Of the sensors for which valid data was collected, it appeared that point A was the busiest, especially in January 2023 (Chart 31B). This trailhead is both the endpoint of the MacLehose Trail Section 10 and the start of Tuen Mun Trail. Sensor B detected approximately half to one third of the foot traffic of A, indicating that the majority of trail users entering via A either went towards the MacLehose Trail, or hiked further uphill.

No data was collected from point C, so it is not known how many people use that trailhead. However, it appeared to be quite well-used when explored by the research team during Part 1. At point D further north along Tuen Mun Trail, a similar number of presences were detected as at B. Sensor E1 was located at a crossroads and therefore detected a larger number of people coming from various directions. (This sensor was eliminated during the second round to conserve resources and because its location was not useful for determining which direction people were walking in.) The northernmost sensor, F, detected the least foot traffic.

In January–February, data was only retrieved from A and F. However, compared to the same sensor locations in July–August, there were between 2–3 times as many presences detected, especially over the weekend of 28–29 January. This was probably due to the tail end of the Lunar New Year school holidays, which for most schools ran from 23 January to 31 January.

TABLE 31A: DAILY PRESENCES AT TUEN MUN TRAIL, JUL–AUG 2022

Round 1

Rain (mm)	Date	Day	A	B	D	E1	F
0	28/7/2022	Thu	*(p.m. only) 121*	*(p.m. only) 34*	*(p.m. only)*	-	-
⛈ 0	29/7/2022	Fri	445	189	195	-	119
⛈ 🌧 2.4	30/7/2022	Sat	495	203	192	-	140
⛈ 0	31/7/2022	Sun	591	471	373	-	224
0	1/8/2022	Mon	434	200	216	-	140
⛈ 0.2	2/8/2022	Tue	419	249	-	*(p.m. only) 10*	109
⛈ 🌧 T1 34.9	3/8/2022	Wed	246	172	-	128	83
⛈ T1 14.9	4/8/2022	Thu	206	65	-	149	71
⛈ 🌧 165.5	5/8/2022	Fri	195	92	-	141	73
⛈ 5.5	6/8/2022	Sat	406	205	-	433	168
⛈ 2.8	7/8/2022	Sun	609	281	-	511	299

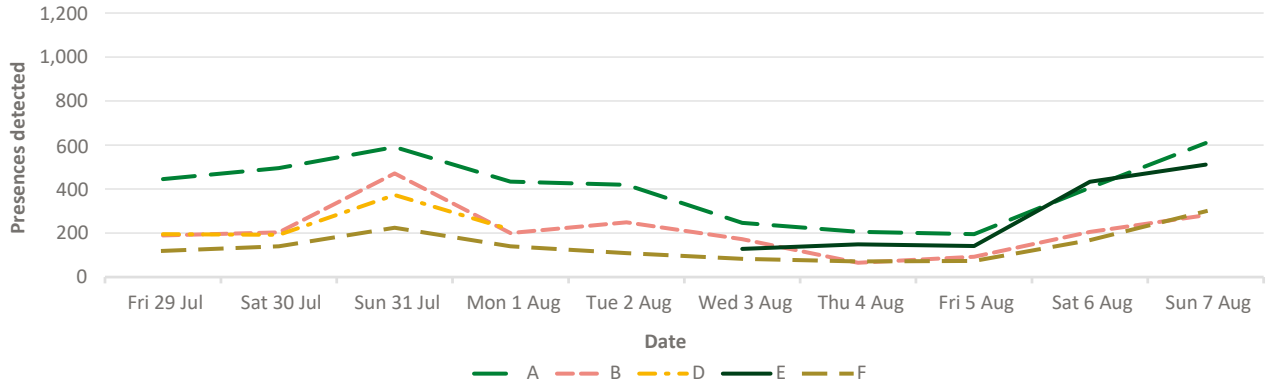
TABLE 31B: DAILY PRESENCES AT TUEN MUN TRAIL, JAN–FEB 2023

Round 2

Rain (mm)	Date	Day	A	F
0	27/1/2023	Fri	*(p.m. only) 390*	*(p.m. only) 187*
0	28/1/2023	Sat	924	427
0	29/1/2023	Sun	1,210	500
0	30/1/2023	Mon	-	189
0	31/1/2023	Tue	-	214
0	1/2/2023	Wed	-	224

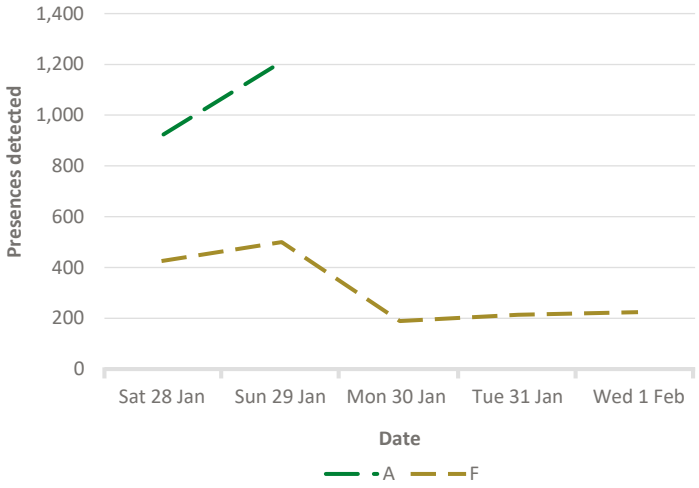
"-" No data
⛈ Thunderstorm warning
🌧 Amber rainstorm warning
T1 Typhoon Signal No. 1

CHART OF TABLE 31A, TUEN MUN TRAIL, DAILY PRESENCES, JUL–AUG 2022



Full day data only

CHART OF TABLE 31B, TUEN MUN TRAIL, DAILY PRESENCES, JAN–FEB 2023



Full day data only

10.2 | AVERAGE DAILY PRESENCES AT TUEN MUN TRAIL

TABLE 32: AVERAGE PRESENCES AT TUEN MUN TRAIL

Summer 2022: 28 Jul–7 Aug 2022

	A	B	D	E	F
M-F a.m.	204	127	176	99	76
M-F p.m.	120	34	29	33	24
Total M-F daily	**324**	**161**	**205**	**132**	**99**
Weekend a.m.	325	219	204	364	130
Weekend p.m.	201	71	79	108	78
Total weekend daily	**525**	**290**	**283**	**472**	**208**

Winter 2022-23: 27 Jan-1 Feb 2023

	A	F
M-F a.m.	-	128
M-F p.m.	-	108
Total M-F daily	**-**	**235**
Weekend a.m.	392	190
Weekend p.m.	676	274
Total weekend daily	**1,067**	**464**

Rounded to the nearest whole number

Totals may not add up due to rounding

Due to limited data, it was not possible to calculate average daily presences for most of the sensors during the winter data gathering round (see Table 32). It should also be noted that the average weekday figures for the first round were depressed by three days of severe bad weather.

In July–August 2022, the majority of the activity was concentrated in the morning. This was especially the case along Tuen Mun Trail (B-F) where morning presences made up 75% or more of the full day average on weekdays, and around 60–75% on weekends. At sensor A, the imbalance between morning and afternoon activity was less pronounced, with morning presences making up about 60% of the total on both weekdays and the weekend. It appears that Tuen Mun Trail is primarily a morning walker's trail, while other hikers tend to head southwards to the MacLehose Trail.

In January–February, sensors A and F detected a somewhat larger proportion of presences in the afternoon. At F on weekdays, morning presences made up 54% of the total, down from 67% in the summer. On weekends, afternoon presences made up 60% of the total at both A and F. A shift towards afternoon activity in the afternoon was seen at several other trails during the winter.

10.3 | HOURLY PRESENCE DATA AT TUEN MUN TRAIL

This subsection presents hourly data from sensors A, B, and F, for which the most complete data exists. Data from sensor A in July–August 2022 (Chart 48) shows sharp morning peaks that reached 80 or 90 presences an hour at around 8:00–9:00 a.m. Foot traffic fell sharply afterwards. Afternoon peaks, if present, were much smaller, rarely exceeding 30 presences an hour. Sundays (31 July and 8 August)

CHART 48: TUEN MUN TRAIL A, HOURLY PRESENCES, JUL–AUG 2022

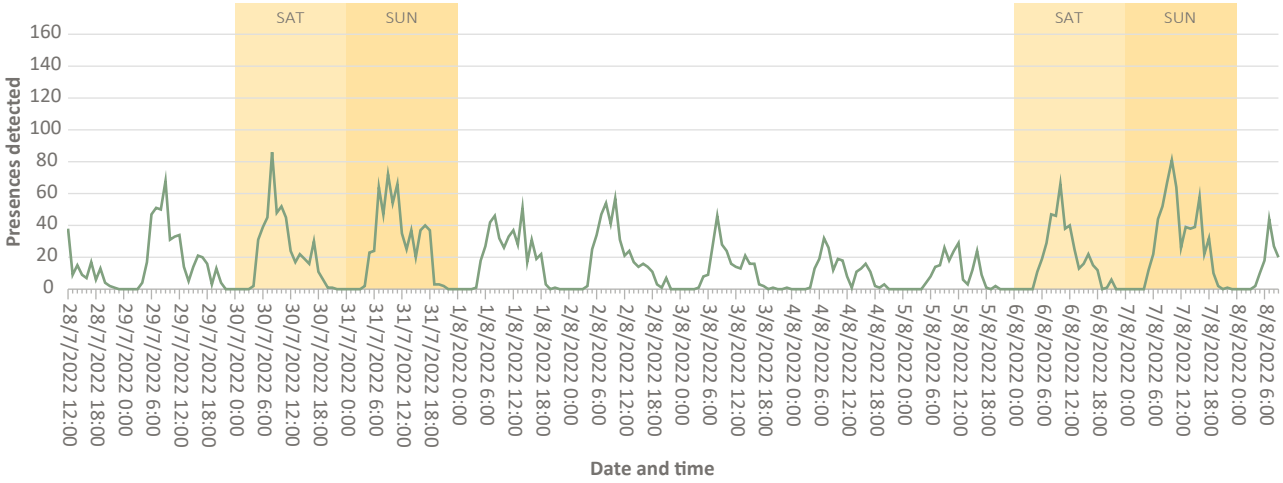
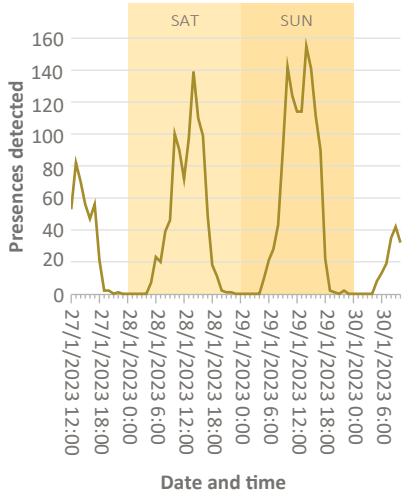


CHART 49: TUEN MUN TRAIL A, HOURLY PRESENCES, JAN 2023



saw somewhat more afternoon foot traffic, but the majority of activity still occurred in the morning. During the period of bad weather from 3–5 August, the same pattern was still observed but with fewer presences. Activity returned almost to normal by the weekend of 6–7 August, when there was light to moderate rain.

However, during 28–29 January (Chart 49), sensor A recorded a very different pattern of activity, with a smaller peak occurring at around 10:00 a.m. followed by a larger one in the afternoon at around 2:00–3:00 p.m. More research would be needed to find out whether this shift towards afternoon activity only occurs around the holidays or is characteristic of the winter months. Unfortunately, it is unlikely that this research will be carried out due to the high risk of sensor theft at this location.

At sensor B (Chart 50), the concentration of activity in the mornings is even more dramatic, with short sharp morning peaks and nearly nonexistent afternoon peaks. This confirms Tuen Mun Trail's primary role as a morning walker's trail, at least in the summer.

A similar dynamic was observed at point F (Charts 51 and 52). In July, the peak hour was around 8:00–9:00 a.m. on weekdays, and around 10:00–11:00 a.m. on weekends. The secondary afternoon peak was much smaller except for on Sundays. However, in January–February 2023, there were multiple peaks throughout the day that varied from one day to the next.

CHART 50: TUEN MUN TRAIL B, HOURLY PRESENCES, JUL–AUG 2022

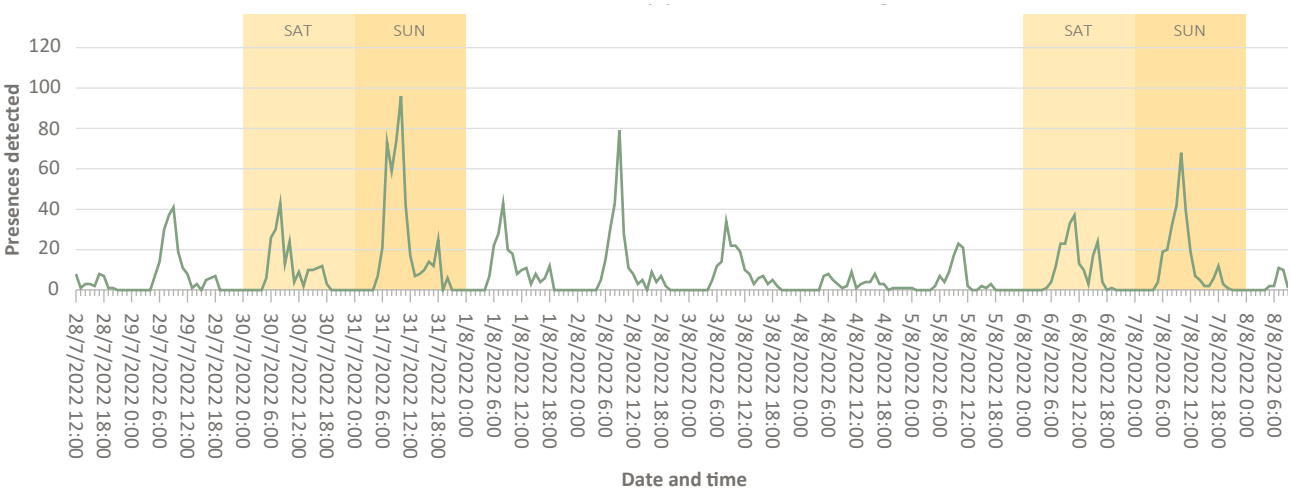


CHART 51: TUEN MUN TRAIL F, HOURLY PRESENCES, JUL–AUG 2022

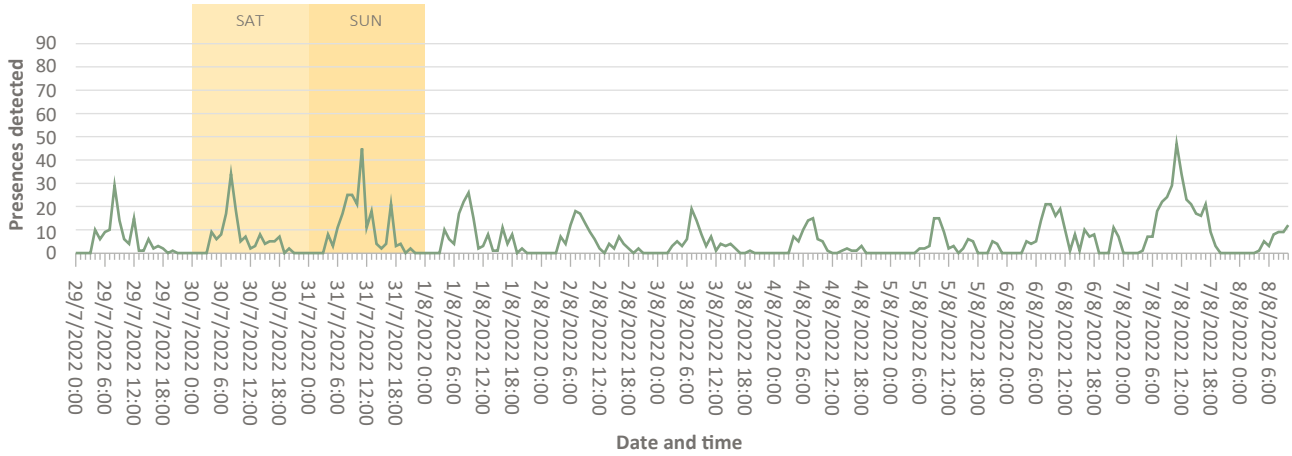
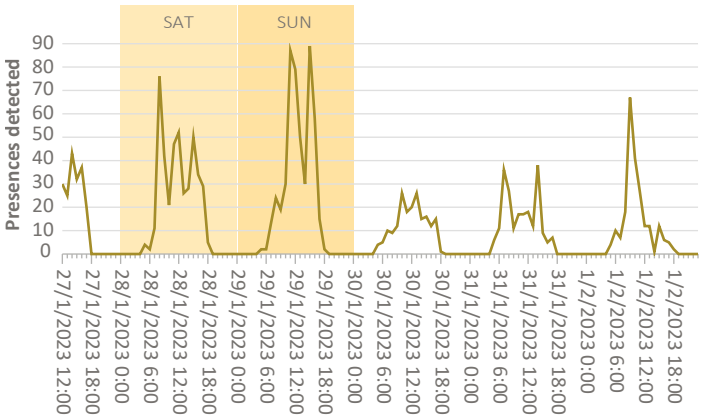


CHART 52: TUEN MUN TRAIL F, HOURLY PRESENCES, JAN–FEB 2023



10.4 | DIRECTIONAL HOURLY PRESENCES AT TUEN MUN TRAIL

TABLE 33: DIRECTIONAL DAILY PRESENCES AT TUEN MUN TRAIL

Jan–Feb 2023	A		F	
Direction	**Downhill (R)**	**Uphill (L)**	**Downhill (R)**	**Uphill (L)**
Fri 27 Jan	*(p.m. only) 229*	*(p.m. only) 161*	*(p.m. only) 110*	*(p.m. only) 77*
Sat 28 Jan	452	472	250	177
Sun 29 Jan	571	639	306	194
Mon 30 Jan	-	-	102	87
Tue 31 Jan	-	-	104	110
Wed 1 Feb	-	-	115	109

"-" No data

Very limited directional data was available as the summer directional data was unreliable and only two sensors were retrieved in the winter. The limited data available showed that on the weekend, there was a slight tendency for more people to travel uphill at point A, and a clear tendency for more people to travel downhill at point F. Weekend visitors were using point F mainly as a departure point (see Table 33).

Weekday figures for point A are missing, but there was a more balanced flow of traffic on point F. This suggests that weekday trail users live nearby as they both come and go from this location.

The directional hourly chart for sensor A from 27 January to 30 January (Chart 53) shows almost no delay between the appearance of uphill and downhill directional presences in the morning; i.e. people start travelling in both directions almost simultaneously, which indicates that trail users are entering and exiting the network from different points simultaneously.

However, on Sunday, large numbers of people entered the network between 9:00 and 11:00 a.m., and must have departed elsewhere because there is no corresponding downhill spike later in the day. The last entries were detected at around 5:00 p.m. with the last departures occurring about an hour later.

At point F (Chart 54), the weekend data showed large spikes in downhill travel that exceeded the number of persons travelling uphill at any point during the day.

10.5 | OVERALL TRAIL USER ESTIMATE FOR TUEN MUN TRAIL

Trail use estimates for Tuen Mun Trail will be a significant underestimate due to the loss of sensor C, which covered a major entry point into the trail network. The only trailheads for which there was valid data were therefore A and F. There are also other trailheads that were not included as they

CHART 53: TUEN MUN TRAIL A, DIRECTIONAL HOURLY PRESENCES, JAN 2023

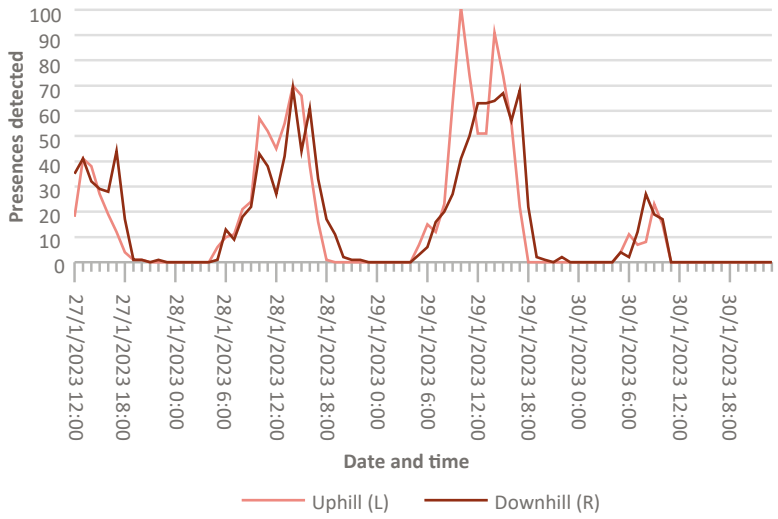
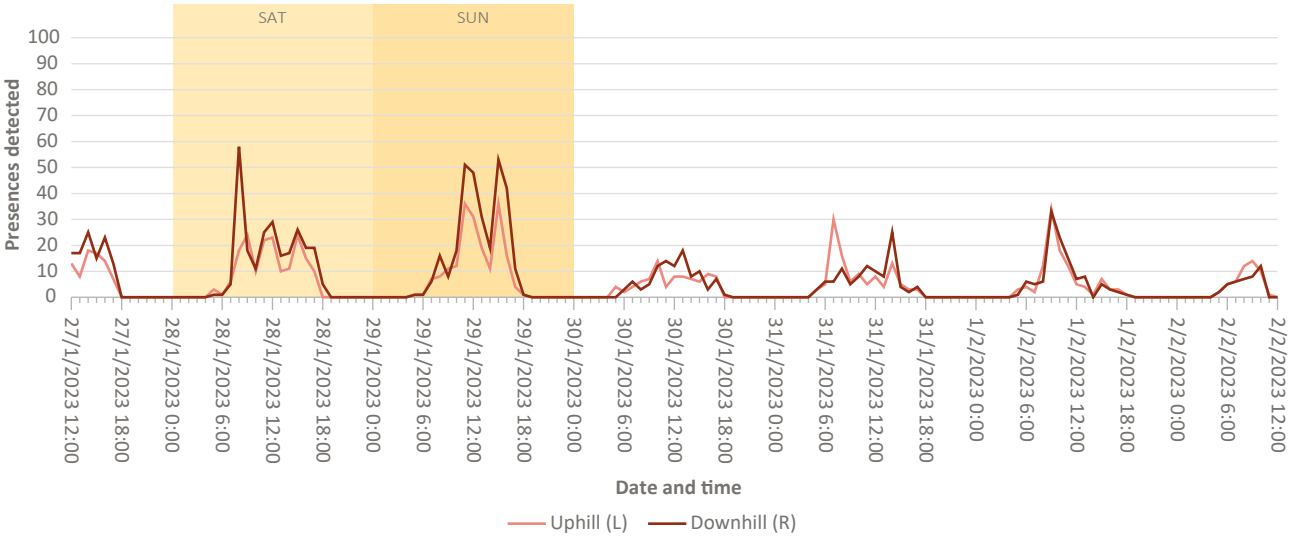


CHART 54: TUEN MUN TRAIL F, DIRECTIONAL HOURLY PRESENCES, JAN 2023



were located beyond the area of study—i.e. one further to the north of F which exits under the Yuen Long Highway, and one to the south of A which is part of the MacLehose Trail. There were also several steep uphill connections to Tai Lam Country Park that were not monitored by sensors.

Due to missing data from sensor A on weekdays in winter 2023, an estimate was reconstructed based on the proportional number of weekday visitors at sensor F.

At a conservative estimate (Table 34), there were a minimum of 200 visitors on weekdays and 350 on the weekend in July-August. In January–February 2023, there were a minimum of about 400 visitors on weekdays and about 750 on weekends.

TABLE 34: OVERALL VISITOR CALCULATION FOR TUEN MUN TRAIL

		A	F	Total/2
Jul–Aug 2022	Monday-Friday average	324	99	**211**
	Weekend average	525	208	**366**
Jan– Feb 2023	Monday-Friday average	540*	235	**388**
	Weekend average	1,067	464	**766**

*Reconstructed estimate

11. Woh Chai Shan and Garden Hill

MAP 10: WOH CHAI SHAN & GARDEN HILL

Explored paths

Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- B Entrance/exit to Tong Yam Street via temple
- C Entrance exit to Tong Yam Street near Tai Hang Tung Recreation Ground
- D Entrance/exit to pedestrian path behind Police Sports and Recreation Club
- E Entrance/exit to Tai Po Road behind YHA Mei Ho House

Round 1 only

- A1 Entrance/exit to Berwick Street
- F1 Entrance/exit to Tai Po Road behind North Kowloon Magistracy

Round 2 only

- A2 Entrance/exit to Berwick Street (further uphill)

Woh Chai Shan and Garden Hill are a pair of small hills located in Shek Kip Mei. Protected due to their role in housing key water supply infrastructure, they are now entirely surrounded by urban development. In this project, they are analysed together as they are only about 500 m from each other and their population catchment areas overlap significantly. As the trail network is quite compact, sensors were placed at all entrances and exits. Sensor A2 was moved slightly further uphill during round 2, and sensor F1 was eliminated due to resource limitations.

Sensor A on Woh Chai Shan is located on a path that meets with Berwick Street near Shek Kip Mei Estate. This is the most convenient point of access for people living in Sham Shui Po and Shek Kip

Mei Estate. Sensor B is located on a stairway that leads up from a small alley on Tong Yam Street opposite Tai Hang Tung Estate. This relatively hidden path leads through a temple that appears to be a holdover from the informal settlement that existed on Woh Chai Shan until the 1980s. Sensors C and D are located near the Tai Hang Tung Recreation Ground and are the most conveniently accessible for residents of Tai Hang Tung Estate and Prince Edward. Sensor E is located at the base of Garden Hill near the YHA Mei Ho House Youth Hostel on Tai Po Road. Sensor F1 is located further to the north-west on a route leading up behind the former North Kowloon Magistracy building.

11.1 | DAILY PRESENCES AT WOH CHAI SHAN AND GARDEN HILL

TABLE 35A: DALY PRESENCES AT WOH CHAI SHAN & GARDEN HILL JUL–AUG 2022

Round 1

Rain (mm)	Date	Day	A1	B	C	D	E	F1
0	22/7/2022	Fri	-	266	14	364	272	281
0	23/7/2022	Sat	-	215	12	406	211	248
0	24/7/2022	Sun	-	214	13	407	211	326
0	25/7/2022	Mon	-	127	8	296	128	220
0	26/7/2022	Tue	-	146	*(a.m. only) 18*	374	161	205
0	27/7/2022	Wed	-	154	-	-	115	*(a.m. only) 213*
0	28/7/2022	Thu	767	50	-	210	155	176
0	29/7/2022	Fri	873	56	-	172	143	214
⚡ 🌧 2.4	30/7/2022	Sat	691	77	-	226	*(a.m. only) 106*	230
0	31/7/2022	Sun	978	80	-	406	-	279
0	1/8/2022	Mon	*(a.m. only) 475*	*(a.m. only) 36*	-	*(a.m. only) 148*	-	-

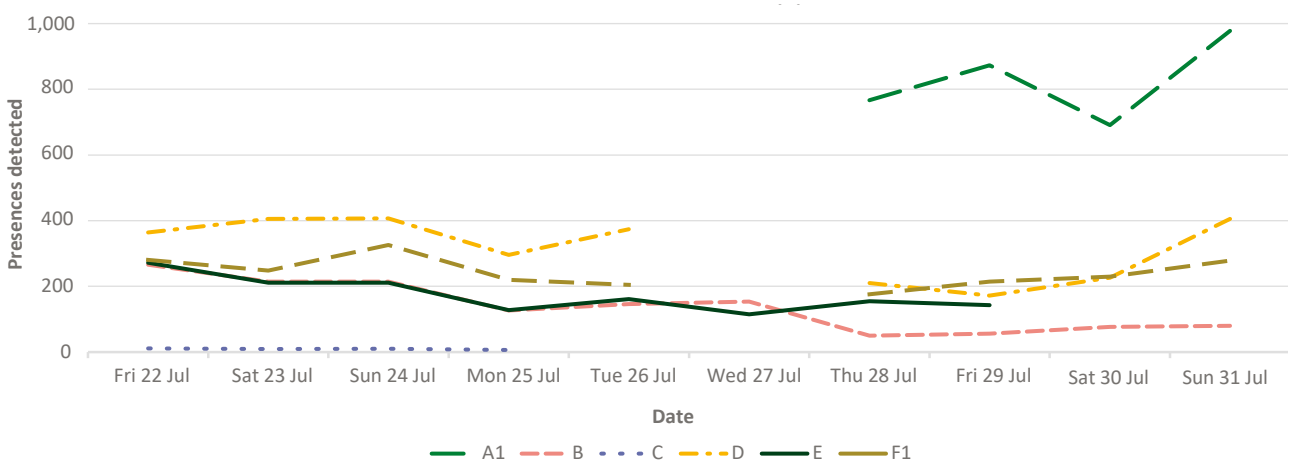
TABLE 35B: DALY PRESENCES AT WOH CHAI SHAN & GARDEN HILL JAN 2023

Round 2

Rain (mm)	Date	Day	A2	B	C	D	E
3.4	14/1/2023	Sat	686	43	68	206	869
Trace	15/1/2023	Sun	755	66	120	289	784
0	16/1/2023	Mon	599	54	91	220	329
0	17/1/2023	Tue	650	59	94	239	401
0	18/1/2023	Wed	675	67	69	199	608
0	19/1/2023	Thu	*(a.m. only) 289*	*(a.m. only) 32*	*(a.m. only) 32*	*(a.m. only) 85*	*(a.m. only) 145*

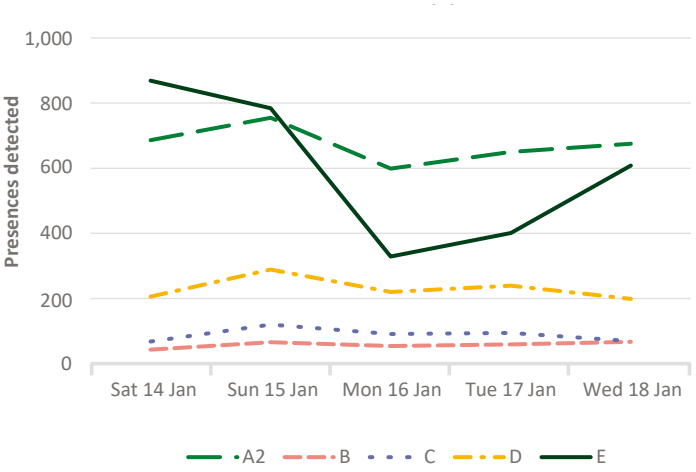
"-"No data
⚡ Thunderstorm warning
🌧 Amber rainstorm warning

CHART OF TABLE 35A: WOH CHAI SHAN & GARDEN HILL, DAILY PRESENCES, JUL 2022



Full day data only

CHART OF TABLE 35B: WOH CHAI SHAN & GARDEN HILL, DAILY PRESENCES, JAN 2023



Full day data only

There were several sensor malfunctions during the first data collection round, but none during the second round. Overall, enough data was collected to form a fairly accurate picture of the level of foot traffic at the site (see Tables 35A and 35B).

At Woh Chai Shan, sensor A1/A2 which looked over the Berwick Street trailhead was the most heavily frequented location. It detected over 600 presences on both weekdays and weekends. Woh Chai Shan has attracted more visitors since December 2021 when the Water Supplies Department (WSD) started offering three daily guided tours of the Ex-Sham Shui Po Service Reservoir,[18] each with between 24 and 36 participants.[19] The official departure point for the guided tours is at Berwick Street. It is estimated that in July 2022, around 200 of the daily presences at sensor A consisted of guided tour participants.

18 HKSAR Tourism Board, "Ex-Sham Shui Po Service Reservoir: history of water supply in Kowloon told by a century-old historic structure", *Discover Hong Kong,* last updated 2023, https://www.discoverhongkong.com/eng/explore/culture/ex-sham-shui-po-service-reservoir.html (accessed 15 June 2023).

19 HKSAR Water Supplies Department, "Guided tour to ex-Sham Shui Po Service Reservoir", last updated 5 June 2023, https://www.waterconservation.gov.hk/en/ex-sspsr/index.html (accessed 15 June 2023).

Since October 2022, WSD has also permitted self-guided tours for up to 210 visitors per day.[20] Based on WSD's website at the time of writing, the weekend sessions are usually full, while the weekday sessions only full to about 15% capacity. In January 2023 self-guided tour participants are estimated to have generated about 420 presences on weekends and around 60–70 presences on weekdays. (While self-guided tour participants are not required to use the Berwick Street entrance, this route is recommended on the tour booking site.) Tour participants therefore accounted for roughly 620 presences per day on the weekend and 260 presences per day on weekdays during the second round. This means that there were still a few hundred presences each day that were not accounted for by tour participants. The neighbourhood around Berwick Street has a high population density and poor open space provision. While there are some playgrounds and ball courts available within Shek Kip Mei Estate, most are hard paved and small in size, making Woh Chai Shan an important amenity for this neighbourhood.

The path monitored by sensor D on the south-eastern side of the hill was also quite well-used with about 200–400 presences per day. On this side of the hill, Woh Chai Shan is complemented by other public open spaces including the Tai Tang Tung Recreation Ground, the Boundary Street Recreation Ground, and a shaded walking path behind the Police Sports and Recreation Club. Point C was very close to D, but received less use (generally fewer than 100 presences per day), probably because it was located on the other side of the recreation ground's fence. Sensor B, located uphill from the temple entrance, detected around 50–200 presences a day.

At Garden Hill, both sensors E and F1 detected around 200–300 presences per day during July–August 2022; in January 2023, sensor E alone detected around 500 presences on weekdays and around 800 on the weekend.

The lower numbers recorded during the summer might have been partly due to reduced sensor sensitivity in the heat. Environmental conditions were more of a problem at Garden Hill than at any other backyard trails because it was extensively shotcreted from top to bottom along the route where E was located, resulting in higher ambient temperatures. There were only a handful of small trees, providing little choice about where to install the sensor. The Hong Kong Observatory's very hot weather warning was in force for the entire time data was collected at Woh Chai Shan and Garden Hill in the summer. There was somewhat more tree cover at sensor F.

At the same time, Garden Hill is a well-known Instagram location due to the panoramic view it offers of Sham Shui Po and Stonecutter's Bridge at sunset. It attracts large numbers of camera-wielding visitors from outside the district on weekends, and this foot traffic might be more prone to fluctuations depending on the weather, visibility conditions, and holidays. 14–15 January was one week before the Lunar New Year, which may have contributed to more visitors.

20 HKSAR Information Services Department, "WSD to offer self-guided tours of Ex-Sham Shui Po Service Reservoir", press release, 14 October 2022, https://www.info.gov.hk/gia/general/202210/14/P2022101400401.htm (accessed 15 June 2023).

11.2 | DAILY AVERAGES PRESENCES AT WOH CHAI SHAN & GARDEN HILL

TABLE 36: AVERAGE PRESENCES AT WOH CHAI SHAN & GARDEN HILL

Summer 2022: 22 Jul–1 Aug 2022						
	A1	**B**	**C**	**D**	**E***	**F1**
M-F a.m.	458	85	12	175	126	176
M-F p.m.	370	45	2	86	36	50
Total M-F daily	**828**	**130**	**14**	**261**	**162**	**227**
Weekend a.m.	474	82	6	197	131	176
Weekend p.m.	361	65	7	165	68	95
Total weekend daily	**835**	**147**	**13**	**361**	**199**	**271**

Winter 2022-23: 14–19 Jan 2023					
	A2	**B**	**C**	**D**	**E**
M-F a.m.	294	40	41	115	135
M-F p.m.	346	18	40	94	314
Total M-F daily	**640**	**58**	**82**	**209**	**449**
Weekend a.m.	353	30	47	145	199
Weekend p.m.	368	25	47	103	628
Total weekend daily	**721**	**55**	**94**	**248**	**827**

Rounded to the nearest whole number
Totals may not add up due to rounding
*Figures likely to be unreliable due to poor environmental conditions

Table 36 shows that with the exception of point E, there was not a large difference between the average number of presences logged on weekdays and on weekends. Woh Chai Shan had a consistent level of week-round use as well as a fairly even split between morning and afternoon foot traffic, and not just due to the scheduled tours.

Garden Hill was an unusual case, both in that it attracted a large number of additional weekend visitors during the January round, and that most of these additional visits took place during the late afternoon (see Section 11.3 for further details). Sensor E detected similar numbers of presences in the morning on the weekend during summer (131 presences) and winter (199 presences), but during the winter session, there were 560 additional visitors in the afternoon.

11.3 | HOURLY PRESENCES AT WOH CHAI SHAN AND GARDEN HILL

This section will examine hourly data from sensors A1 and A2, D, E, and F1. A1/A2 and D were the most well-used entrances and exits to Woh Chai Shan. E and F1 are the only two entry/exit points to Garden Hill.

At point A (Chart 55) foot traffic began very early in the morning at around 4:00 a.m. or 5:00 a.m. This rose to a first peak between 9:00 and 10:00 a.m. In July 2022, this peak was very regular and consistent, coinciding with the start of the first guided tour at 10:00 a.m. There was a dip in activity at noon, then another almost equal sized peak at around 3:00 p.m. WSD ran two tours in the afternoon, at 2:00 p.m. and 3:30 p.m. The 3:00 p.m. peak seems to coincide with 2:00 p.m. group leaving and the 3:30 p.m. group arriving.

In January 2023 (Chart 56), instead of a dual peak pattern, sensor A detected multiple small spikes in activity which reached its highest point at around 11:00 a.m.–12:00 p.m. By this time, WSD had introduced self-guided tour sessions, which were scheduled at 8:45 a.m., 11:30 a.m., and 1:00 p.m. This was reflected in more activity at around noon.

CHART 55: WOH CHAI SHAN & GARDEN HILL A, HOURLY PRESENCES, JUL–AUG 2022

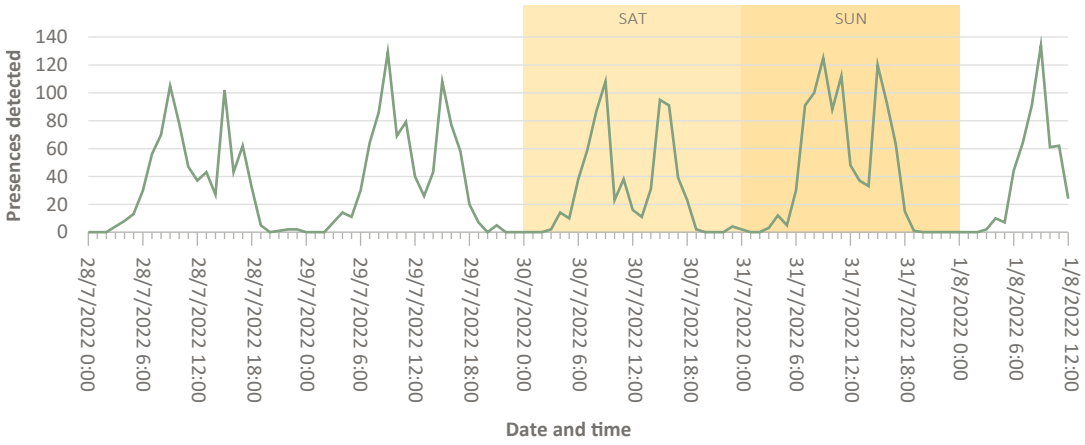


CHART 56: WOH CHAI SHAN & GARDEN HILL A, HOURLY PRESENCES, JAN 2023

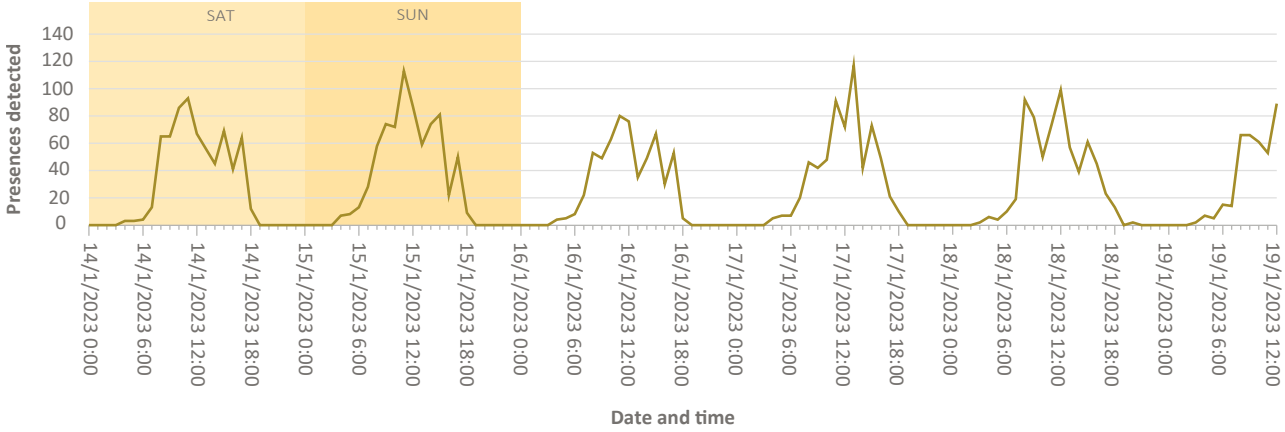


CHART 57: WOH CHAI SHAN & GARDEN HILL D, HOURLY PRESENCES, JUL–AUG 2022

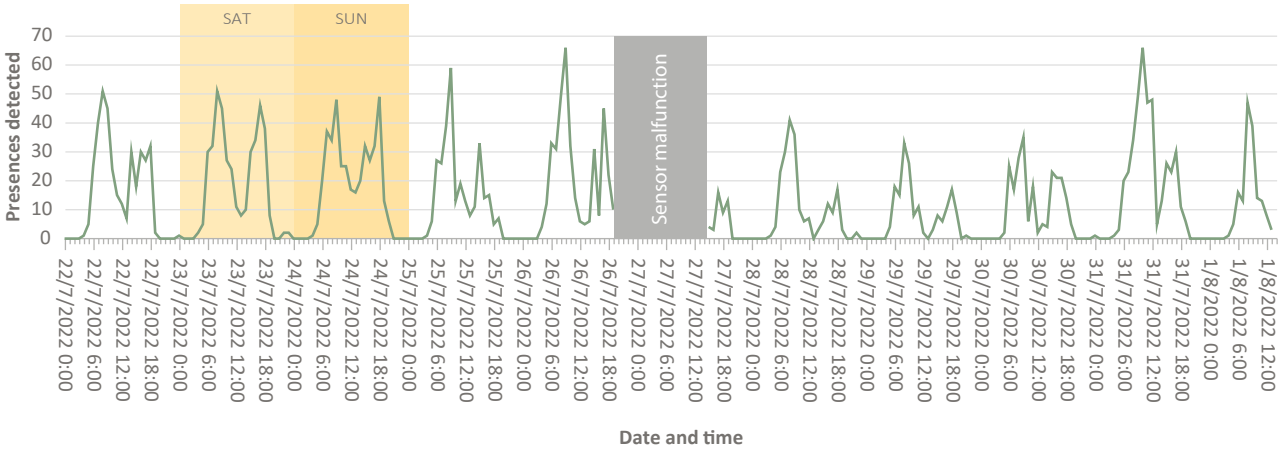
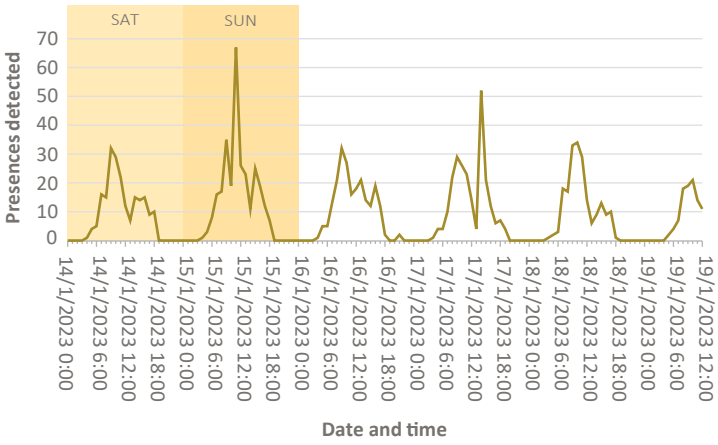


CHART 58: WOH CHAI SHAN & GARDEN HILL D, HOURLY PRESENCES, JAN 2023



Sensor D in July–August 2022 (Chart 57) detected a similar dual-peak pattern, but since this route was not used by tour participants, the peak times were less regular than at A. The morning peak sometimes occurred at various times between 8:00 a.m. and 10:00 a.m., while the afternoon peak varied from 4:00–7:00 p.m. The January 2023 data (Chart 58) showed that activity was less concentrated in two distinct peaks and more spread out throughout the day. This is consistent with changes in summer and winter activity observed at various other trails.

At sensor E (Chart 59), foot traffic appeared to be quite erratic with little consistency from day to day. This may have been due to the poor environmental conditions for the sensor, as explained above. However, excessive sun exposure should have resulted in reduced sensitivity during the hottest parts of the day, not produced false positives. The presences registered after dark were most likely genuine.

In contrast, sensor F1 in summer detected a much more consistent pattern of morning activity, with a distinct daily peak at around 7:00–8:00 a.m. Sensor F had somewhat more tree cover, but was also located in a slightly more out-of-the-way location. Whereas sensor E was located closer to the centre of urban Sham Shui Po, the trail entrance/exit to sensor F was further up Tai Po Road next to the former North Kowloon Magistracy shortly before the pavement ends and the road turns into limited access highway. There is also a small sitting out-area about halfway up the hill. Being somewhat less accessible, the people who walked there would have had to make a little more effort and were more likely to be regulars.

However, sensor F (Chart 60) confirmed that activity also occurred at unusual times such as late at night. Garden Hill is unusual in that activity was frequently detected after dark, even as late as 2:00 or 3:00 a.m. Although there are no street lights, it is a very urban location with many dining outlets nearby, making it convenient for people to bring take-out meals or take late-night walks.

CHART 59: WOH CHAI SHAN & GARDEN HILL E, HOURLY PRESENCES, JUL–AUG 2022

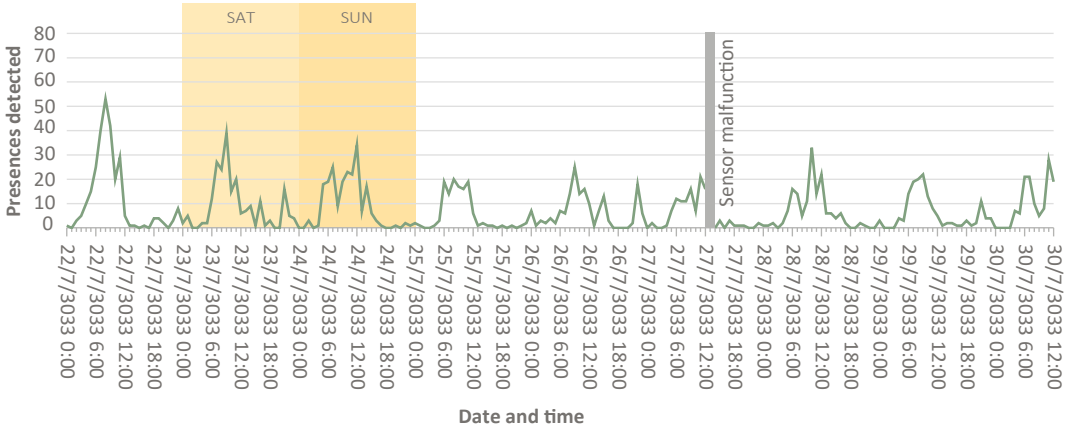


CHART 60: WOH CHAI SHAN & GARDEN HILL F, HOURLY PRESENCES, JUL–AUG 2022

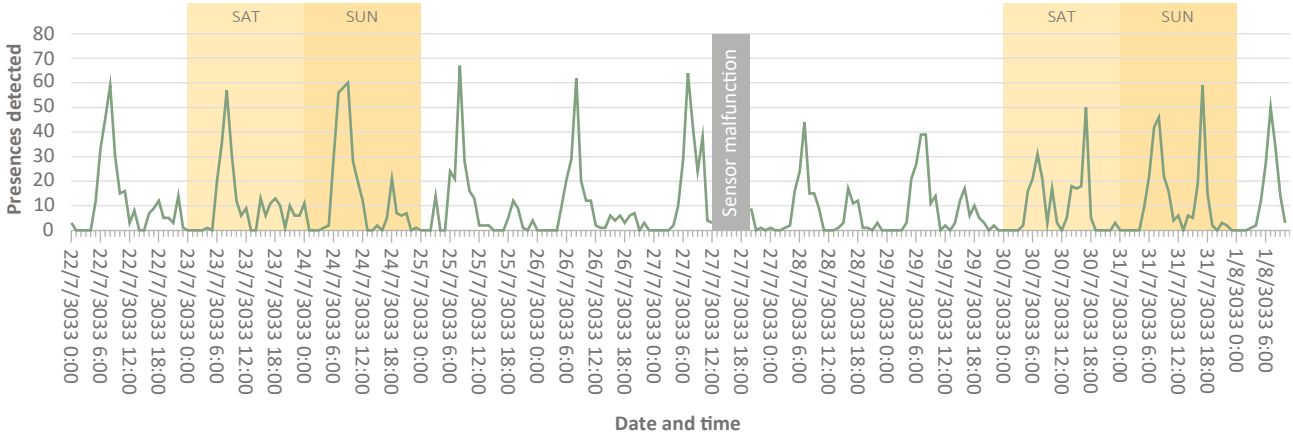
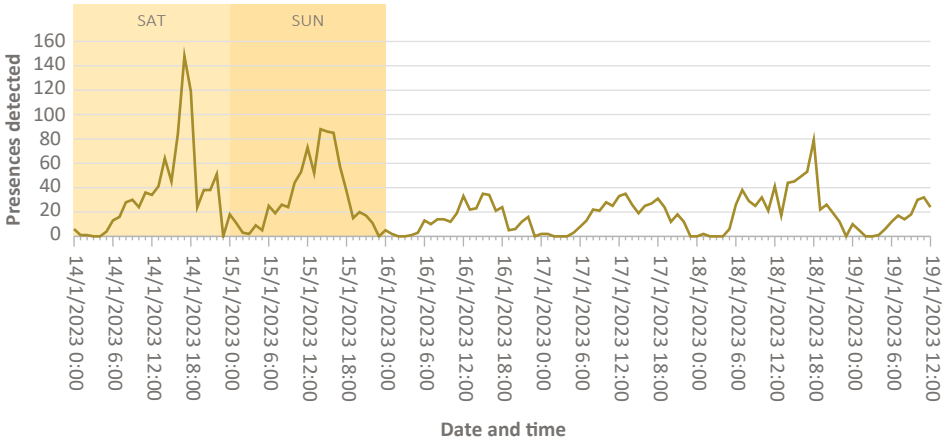


CHART 61: WOH CHAI SHAN & GARDEN HILL E, HOURLY PRESENCES, JAN 2023



In January 2023, sensor E detected large peaks in foot traffic in the mid to late afternoon of Saturday 14 January and Sunday 15 January, which is consistent with visitors going to take photos at sunset (see Chart 61). On the weekdays, (16–18 January), activity was fairly evenly distributed throughout the day, weighted towards the afternoon, and continued until as late as 10:00 p.m. The one other backyard trail where people were detected late at night was Mount Davis, but this did not seem to be as routine as an occurrence as at Garden Hill.

11.4 | DIRECTIONAL PRESENCE DATA AT WOH CHAI SHAN AND GARDEN HILL

TABLE 37: DIRECTIONAL DAILY PRESENCES AT WOH CHAI SHAN & GARDEN HILL

Jan 2023	A		B		C		D		E	
Date	Downhill (R)	Uphill (L)	Downhill (R)	Uphill (L)	Downhill (R)	Uphill (L)	Downhill (R)	Uphill (L)	Downhill (L)	Uphill (R)
Sat 14 Jan	355	331	19	24	30	38	110	96	399	470
Sun 15 Jan	379	376	35	31	57	63	161	128	355	429
Mon 16 Jan	125	159	13	24	14	31	117	103	44	49
Tue 17 Jan	338	312	25	34	44	50	147	92	199	202
Wed 18 Jan	339	336	29	38	36	33	125	74	293	315
Thu 19 Jan	*(a.m. only)* *139*	*(a.m. only)* *150*	*(a.m. only)* *21*	*(a.m. only)* *11*	*(a.m. only)* *10*	*(a.m. only)* *22*	*(a.m. only)* *51*	*(a.m. only)* *34*	*(a.m. only)* *74*	*(a.m. only)* *71*

Table 37 shows that at Woh Chai Shan and Garden Hill on weekdays, there were relatively similar numbers of people walking uphill and downhill at each trailhead, with some anomalies (i.e. short-lived spikes in downhill movements at sensor D on 15 January and 17 January, see Chart 63). These spikes were probably spurious as they were not matched by earlier spikes in uphill movements anywhere on the trail. On the weekend at Garden Hill, there were somewhat more people walking uphill than downhill at point E (Chart 64) throughout from morning until late afternoon, which means that people were probably looping back down via point F. For the most part, the line for downhill movements tracks the line for uphill movements fairly closely, which indicates that most people are spending about 1–2 hours on the trail.

CHART 62: WOH CHAI SHAN & GARDEN HILL A, DIRECTIONAL HOURLY PRESENCES, JAN 2023

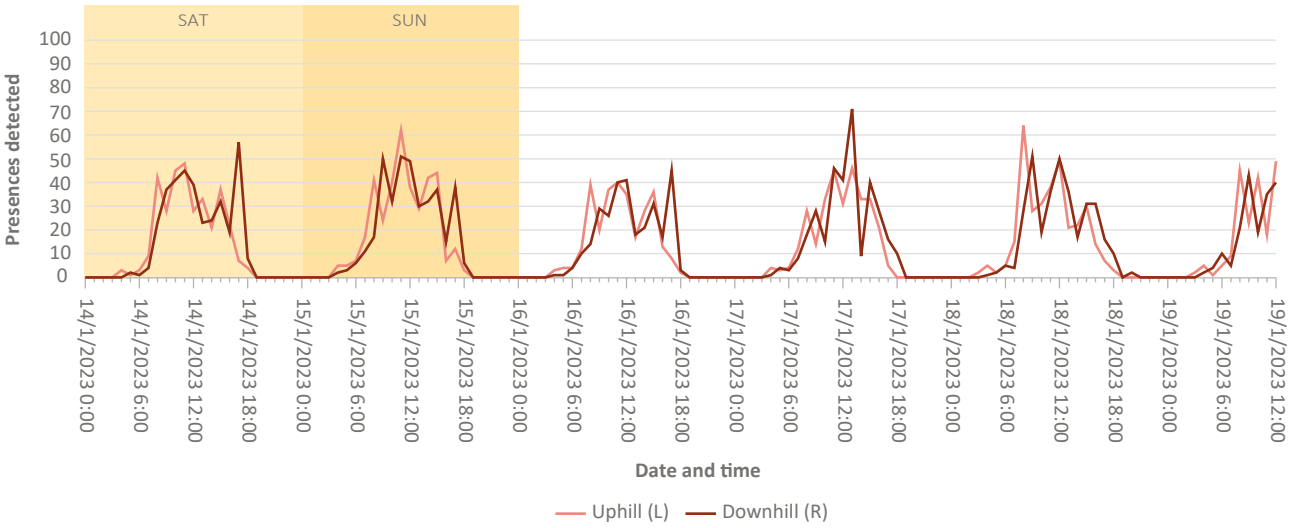


CHART 63: WOH CHAI SHAN & GARDEN HILL D, DIRECTIONAL HOURLY PRESENCES, JAN 2023

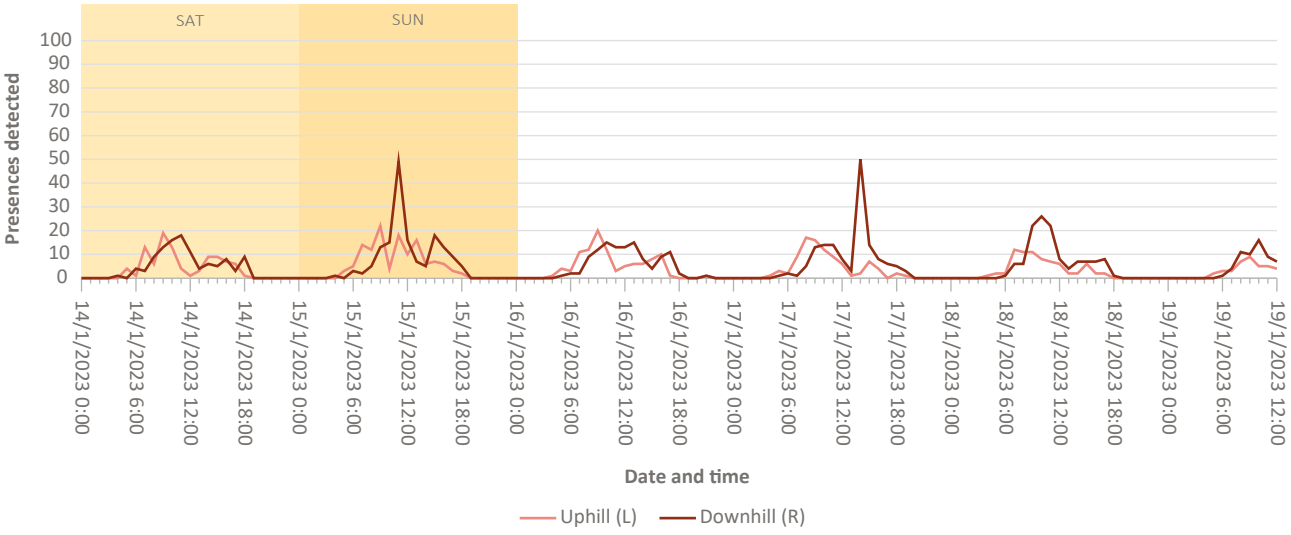
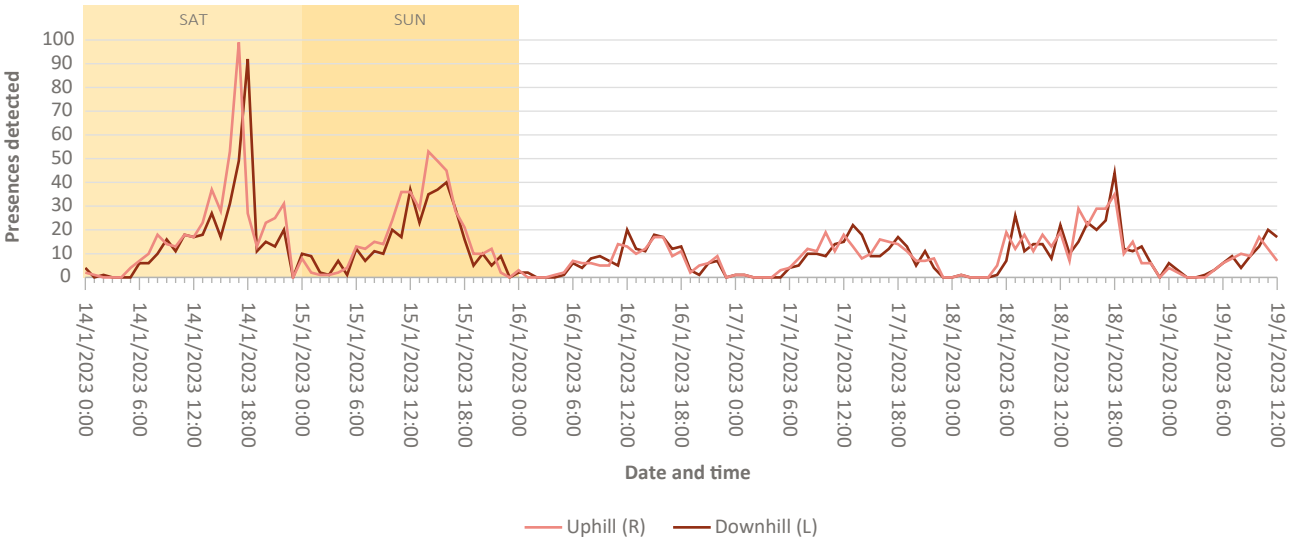


CHART 64: WOH CHAI SHAN & GARDEN HILL E, DIRECTIONAL HOURLY PRESENCES, JAN 2023



11.5 | OVERALL VISITOR ESTIMATE FOR WOH CHAI SHAN AND GARDEN HILL

Since all trailheads were covered by sensors except position F during round 2, it should be possible to obtain a fairly accurate estimate of the number of trail users, at least during round 1. However, there were some complications. Sensor E likely suffered from decreased sensitivity due to heat overexposure in July, affecting accuracy. Additionally, since so many more people were detected at sensor E in January than in July, it is difficult to estimate what the January count would have been at the absent sensor F.

To reconstruct the winter average for sensor F, a number of assumptions had to be made. First it was assumed that the same number of regular neighbourhood trail users would have walked by F in January as in July. The average number of presences detected before noon at F in July 2022 was 227 presences on weekdays and 271 presences on weekends. This was set as the baseline.

Second, it was assumed that the 90% of out-of-district visitors to Garden Hill would have ascended via point E, since this is the closest access point from most public transport options in urban Sham Shui Po. If one assumes that there was an additional 10% of people who instead

ascended via point F, then there would be an additional 49 presences at F on weekdays and an additional 91 on weekends.

Third, some of the people who ascended at E must have descended at F. In January 2023, the average number of presences detected ascending and descending on weekdays at point E was 224 and 226, respectively, which was almost equal. However, on the weekend, there was an average of 450 presences ascending and 377 presences descending. It is assumed that the remaining 73 persons walked downhill via F since there were no other routes.

Therefore, it is estimated that the average number of presences on weekdays at F during January 2023 was 227+49=276 and on the weekend was 271+91+73=435.

Based on the above assumptions shown in Table 38, it is therefore estimated that around 800–850 people visit Woh Chai Shan and Garden Hill combined on weekdays, and between 900 and 1,150 on weekends. Considering their compact size, these are very well-used urban trails.

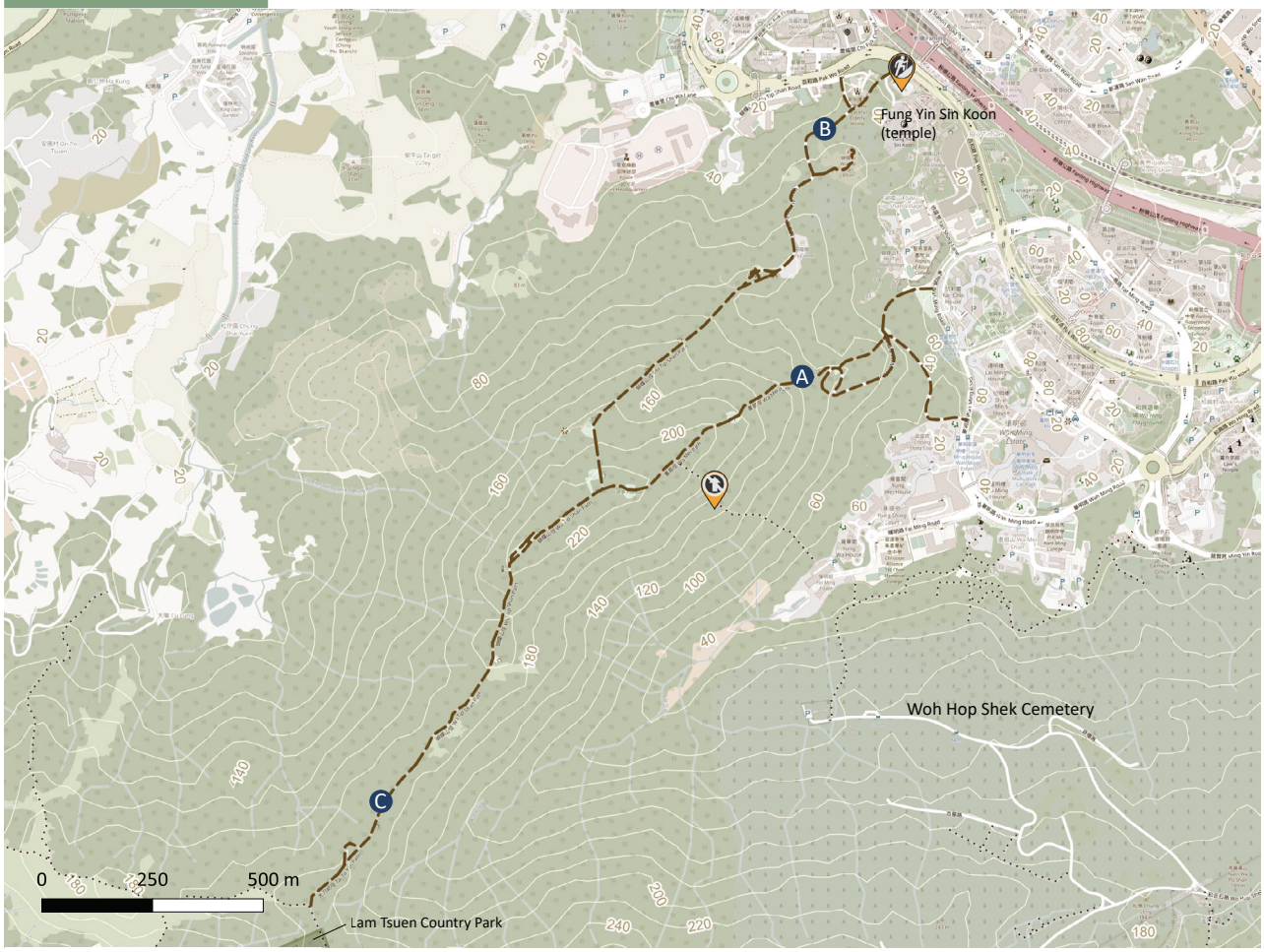
TABLE 38: OVERALL VISITOR CALCULATION FOR WOH CHAI SHAN AND GARDEN HILL

		A	B	C	D	Woh Chai Shan subtotal/2	E	F	Garden Hill subtotal/2	Total/2
Jul 2022	Monday-Friday average	828	130	14	261	**617**	162	227	**195**	**811**
	Weekend average	835	147	13	361	**678**	199	271	**235**	**913**
Feb 2023	Monday-Friday average	640	58	82	209	**495**	449	276*	**363**	**857**
	Weekend average	721	55	94	248	**559**	827	435*	**631**	**1,165**

*Reconstructed estimate based on assumptions described above
Rounded to the nearest whole number

12. Wu Tip Shan

MAP 11 WU TIP SHAN



Explored paths

Trail hazards

- Blocked path
- Broken connection
- Fall risk
- Fallen tree
- Poor/rough path condition
- Steep
- Overgrown path

Sensor locations

- A Entrance/exit to Wah Ming Road
- B Entrance/exit to Pak Wo Road
- C Path connecting Wu Tip Shan with Lam Tsuen Country Park

Wu Tip Shan is a mostly unzoned hill on the south-western fringe of Fanling New Town. There are two trailheads, one near Wah Ming Estate (sensor A) and the other on Pak Wo Road (sensor B) behind the Fung Ying Seen Koon temple. Woh Hop Shek Public Cemetery lies on the southern slope of Wu Tip Shan, and there are many other graves dotting the hillside behind the temple. The main trail leads south-west along its ridge (sensor C), eventually linking up with Lam Tsuen Country Park, which consists of two separate mountains, Kai Kung Leng and Tai To Yan.

12.1 | DAILY PRESENCES AT WU TIP SHAN

TABLE 39A: DAILY PRESENCES AT WU TIP SHAN, JUL–AUG 2022

Round 1

Rain (mm)	Date	Day	A	B	C
0	28/7/2022	Thu	-	*(p.m. only) 404*	-
⚡ 0	29/7/2022	Fri	818	1,174	614
⚡ 🌧 2.4	30/7/2022	Sat	922	1,147	747
⚡ 0	31/7/2022	Sun	1,292	1,310	917
0	1/8/2022	Mon	1,079	850	768
⚡ 0.2	2/8/2022	Tue	1,110	1,036	754
⚡ 🌧 T1 34.9	3/8/2022	Wed	*(a.m. only) 388*	793	*(a.m. only) 398*
⚡ T1 14.9	4/8/2022	Thu	-	-	-
⚡ 🌧 165.5	5/8/2022	Fri	-	-	-
⚡ 5.5	6/8/2022	Sat	-	-	-
⚡ 2.8	7/8/2022	Sun	-	-	-
⚡ 33.3	8/8/2022	Mon	-	-	-
⚡ T3 72	9/8/2022	Tue	-	*(p.m. only) 61*	-
⚡ T3 49.7	10/8/2022	Wed	-	*(a.m. only) 216*	-

TABLE 39B: DAILY PRESENCES AT WU TIP SHAN, JAN–FEB 2023

Round 2

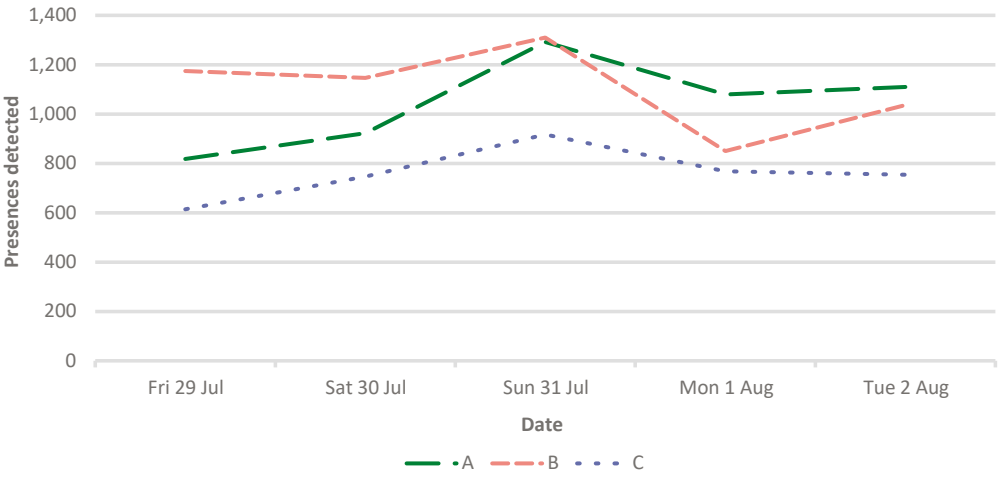
Rain (mm)	Date	Day	A	B
0	28/1/2023	Sat	782	1,268
0	29/1/2023	Sun	878	1,340
0	30/1/2023	Mon	653	1,076
0	31/1/2023	Tue	643	1,085
0	1/2/2023	Wed	648	1,004
0	2/2/2023	Thu	*(a.m. only) 332*	*(a.m. only) 584*

"-" No data
⚡ Thunderstorm warning
🌧 Amber rainstorm warning
T1 Typhoon signal no. 1
T3 Typhoon signal no. 3

At Wu Tip Shan, several data collection problems were encountered. Sensor A did not function during the second half of the data collection period during round 1. Sensor B might have been tampered with as it did not record any presences for five days from 4 August to 8 August, which coincided partially with a period of bad weather (see below for further discussion). Additionally, sensor C was stolen during the second half of round 1. During round 2, while A and B functioned normally, sensor C was once again stolen.

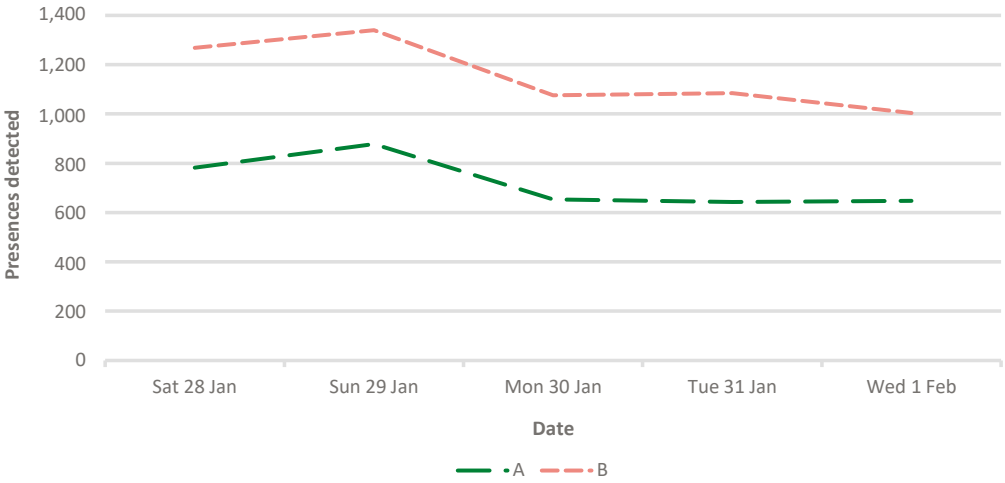
However, the data presented in Tables 39A and 39B showed that Wu Tip Shan is a very well-used trail. At sensor B, which had the most foot traffic, the number of weekday presences regularly exceeded 1,000 and reached 1,300 on the weekend. Even sensor C, which was at the most remote location, detected over 700 presences on most of the days during which valid data was collected. Wu Tip Shan's popularity might be because it is appealing to both neighbourhood residents and long-distance hikers. The initial section of the trail is completely paved which makes it more accessible to elderly residents, but as the trail moves towards Lam Tsuen Country Park, the trail is unpaved and the terrain becomes much more challenging.

CHART OF TABLE 39A: WU TIP SHAN, DAILY PRESENCES, JUL–AUG 2022



Full day data only

CHART OF TABLE 39B: WU TIP SHAN, DAILY PRESENCES, JAN–FEB 2023



Full day data only

TABLE 40: AVERAGE PRESENCES AT WU TIP SHAN

Summer 2022: 28 Jul–10 Aug 2022	A	B*	C
M-F a.m.	525	695	453
M-F p.m.	431	345	241
Total M-F daily	**957**	**1,040**	**694**
Weekend a.m.	621	804	500
Weekend p.m.	486	425	333
Total weekend daily	**1,107**	**1,229**	**832**

Winter 2022-23: 28 Jan–2 Feb 2023	A	B
M-F a.m.	329	558
M-F p.m.	320	506
Total M-F daily	**649**	**1,064**
Weekend a.m.	371	590
Weekend p.m.	460	715
Total weekend daily	**830**	**1,304**

Rounded to the nearest whole number
Totals may not add up due to rounding
*Includes fine weather period 27/7 to 2/8 only for better comparability

12.2 | AVERAGE DAILY PRESENCES AT WU TIP SHAN

The average figures calculated for Wu Tip Shan shown in Table 40 are based only on the first week of data during which all three sensors managed to collect valid data and when the weather was mostly fine.

The five days over which sensor B detected nothing (4–8 August) were excluded as an anomaly as it is more likely that human tampering or a mechanical fault was responsible than a genuine absence of trail users. While there was inclement weather during this period, the heavy rain began before and ended after the period of sensor inactivity. For better comparability with A and C, the 24 hour period during which the sensor resumed activity on 9 and 10 August was also excluded because there was a typhoon signal no. 3.

The weekday and weekend averages show that Wu Tip Shan is well-used week-round. The weekday average was about 80%–90% that of the weekend average. Additionally, there was strong afternoon trail usage. In July–August 2022, the number of presences detected in the afternoon was about 50% of that detected in the morning. At sensor A, the figure was about 82%. In January–February 2023, there were about equal numbers of presences detected in the mornings and afternoons on weekdays, and more presences in the afternoon on weekends. The year-round, day-long usage indicates the importance of this backyard trail to the neighbourhood.

12.3 | HOURLY PRESENCES AT WU TIP SHAN

This section shall examine the hourly presence data from sensors A and B, which are the two trail entrances/exits to Fanling, and which see the most usage.

The hourly presence data at Wu Tip Shan revealed a familiar dual peak structure common to many backyard trails. In July and August, (Charts 65 and 67) the first peak occurred at around 8:00–9:00 a.m., typically exceeding 120 presences an hour at the highest point at both sensors A and B. The second peak occurred at around 6:00–7:00 p.m., reaching around 80 presences an hour.

In January–February (Charts 66 and 68) the dual peak structure was still visible but with a smaller midday dip. For example, at sensor B in the summer, presences at noon to 2:00 p.m. usually fell below 40 presences an hour, but in winter, remained at 60–80. On the weekend (28–29 January), the size of the afternoon peak equalled or exceeded the morning peak. The peak times also shifted, with the morning peak occurring later in the morning at around 10:00–11:00 a.m., and the second peak occurring earlier, at 3:00–4:00 p.m. People did not use the trail less in summer, but changed the time of day when they visited.

CHART 65: WU TIP SHAN A, HOURLY PRESENCES, JUL–AUG 2022

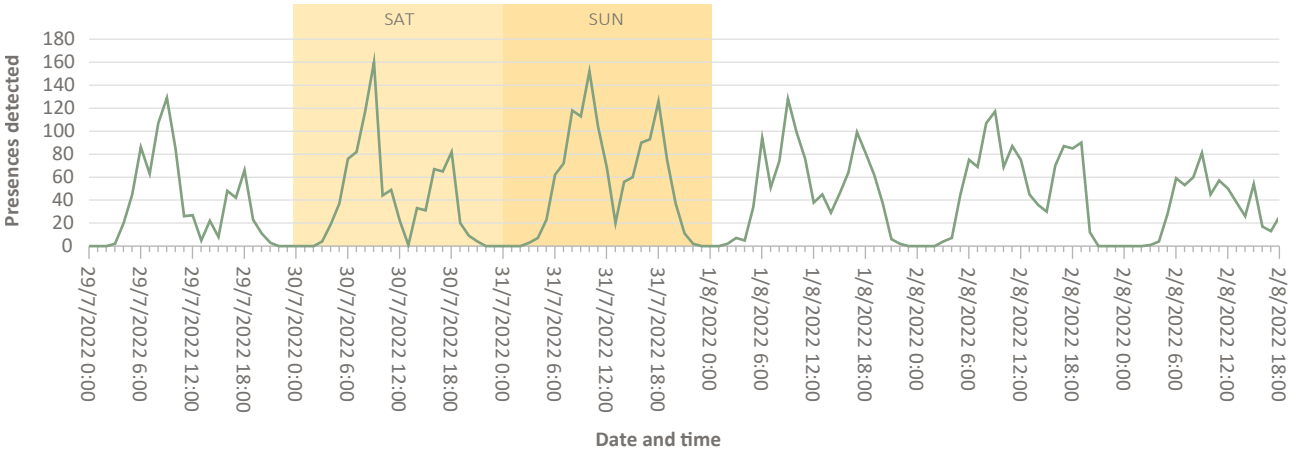


CHART 66: WU TIP SHAN A, HOURLY PRESENCES, JAN–FEB 2023

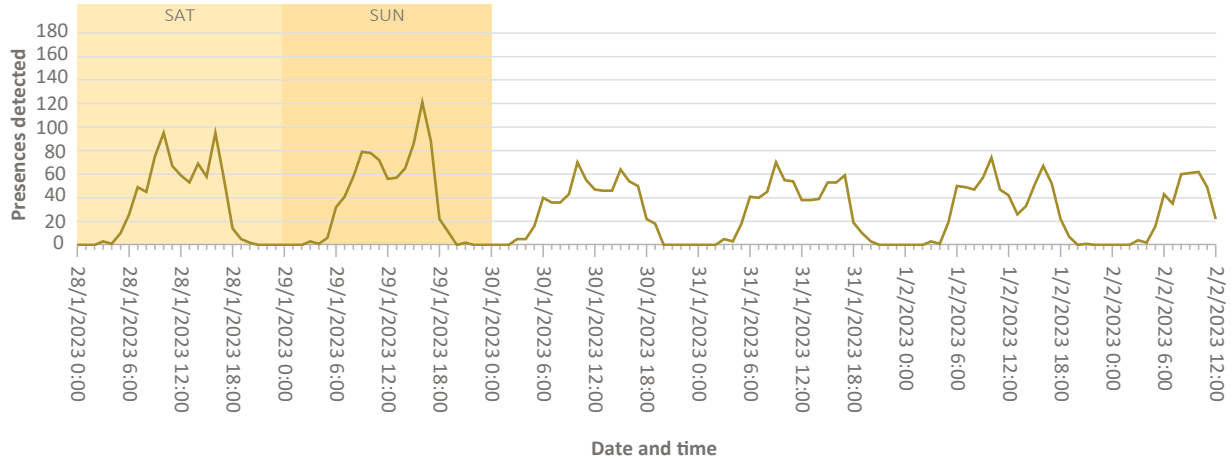
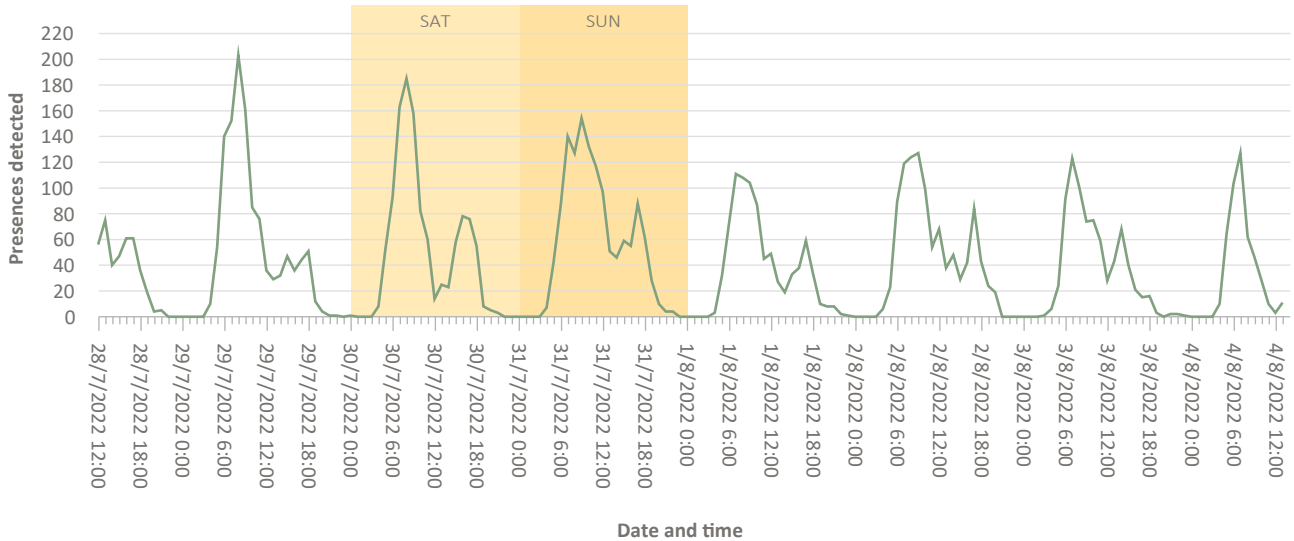
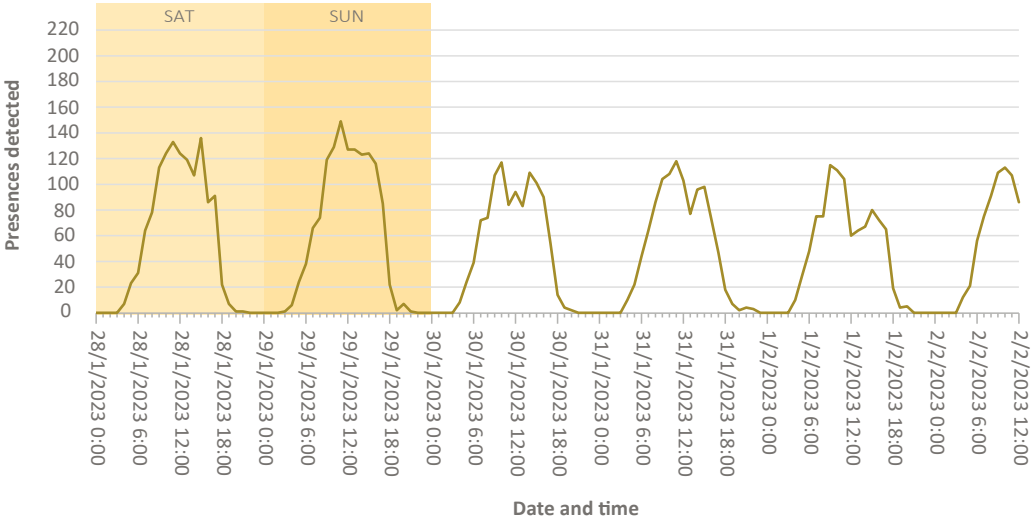


CHART 67: WU TIP SHAN B, HOURLY PRESENCES, JUL–AUG 2022*



*Anomalous and poor weather period excluded

CHART 68: WU TIP SHAN B, HOURLY PRESENCES, JAN–FEB 2023



12.4 | DIRECTIONAL PRESENCE DATA AT WU TIP SHAN

TABLE 41: DIRECTIONAL DAILY PRESENCES AT WU TIP SHAN

Jan–Feb 2023	A		B	
	Downhill (R)	Uphill (L)	Downhill (R)	Uphill (L)
Sat 28 Jan	392	390	605	663
Sun 29 Jan	445	433	648	692
Mon 30 Jan	331	322	510	566
Tue 31 Jan	294	349	516	569
Wed 1 Feb	305	343	483	521
Thu 2 Feb	*(a.m. only) 169*	*(a.m. only) 163*	*(a.m. only) 226*	*(a.m. only) 358*

On a daily basis, there were fairly similar numbers of people walking both uphill and downhill at both trailheads, with slightly more people heading uphill on certain days (see Table 41). These trail users may have hiked towards Lam Tsuen Country Park and exited near Tsiu Keng or Pat Heung.

The directional hourly data from Wu Tip Shan in January–February revealed a fairly long gap of 2 hours or longer between the peak in uphill travel and downhill travel in the early morning and late afternoon, which indicates that people are spending longer periods of time on the trail (see Charts 68 and 69). At sensor B, there were several days (28 January to 30 January 2023) where the peak in uphill travel occurred in the morning but the peak in downhill travel occurred in the afternoon. Wu Tip Shan covers a larger area compared to very urban trails such as Hammer Hill or Shum Wan Shan, so neighbourhood trail users could be spending more time there. However, hikers going to or coming from Tai To Yan or Kai Kung Leng would be expected to spend at least 3 hours on the trail. (Hikers exiting the trail in the afternoon would have most likely started from the other end of the trail, and vice-versa.)

CHART 69: WU TIP SHAN A, DIRECTIONAL HOURLY PRESENCES, JUL–AUG 2022

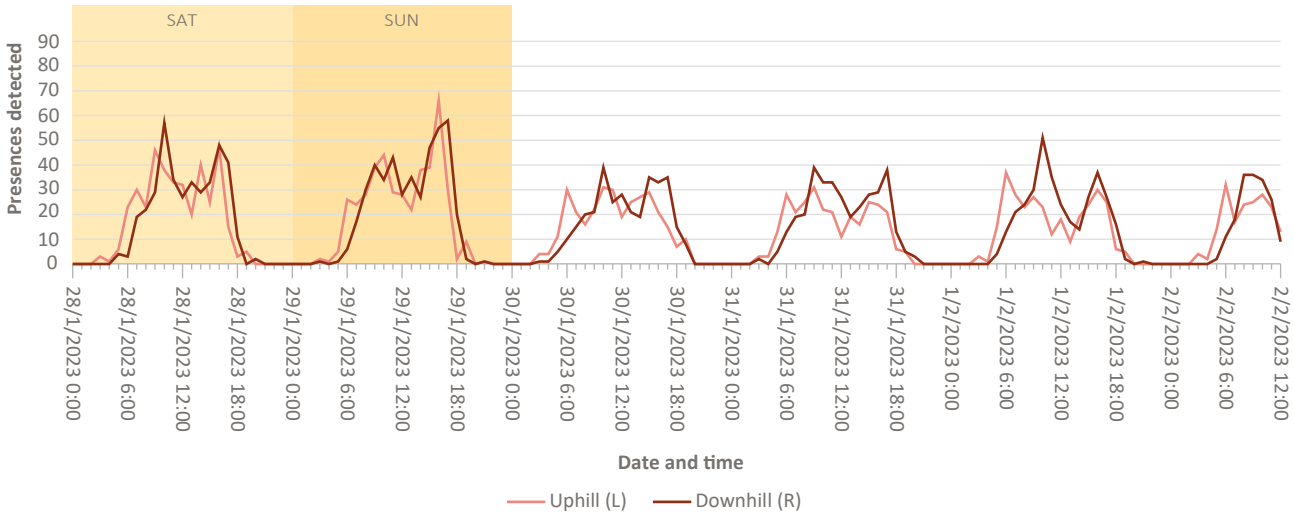
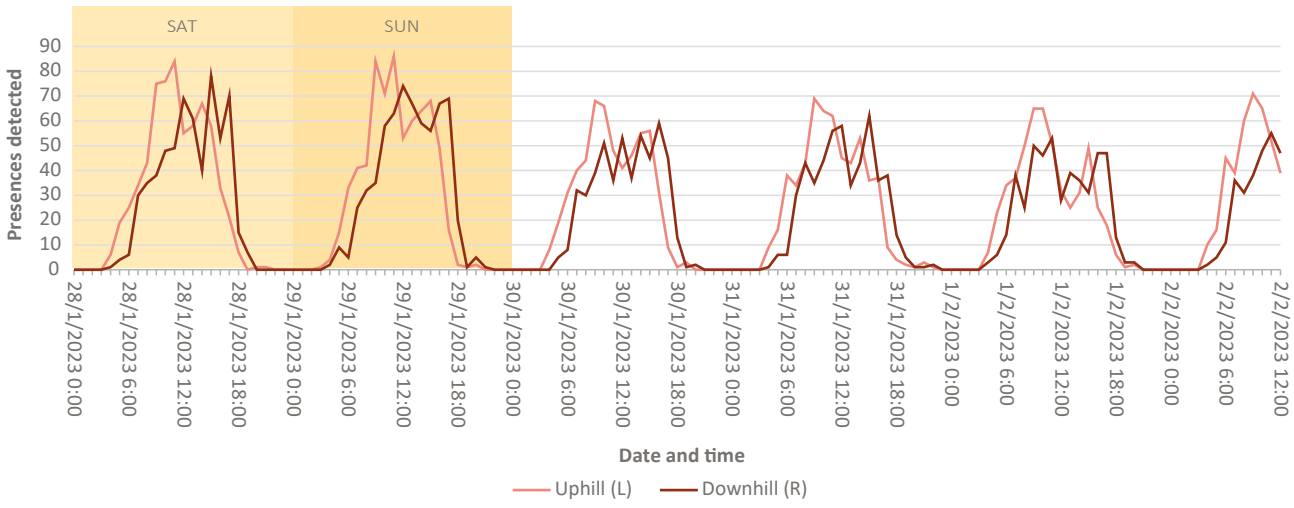


CHART 69: WU TIP SHAN B, DIRECTIONAL HOURLY PRESENCES, JUL–AUG 2022



12.5 | OVERALL TRAIL USE ESTIMATE FOR WU TIP SHAN

The simple structure of Wu Tip Shan's trail network makes it easy to estimate the overall number of visitors with accuracy, however data is missing for sensor C in January–February 2023. Since there is not much difference between the average number visitors during the summer and winter rounds, the summer figures are used as a proxy for the winter estimate.

At shown in Table 42, it is estimated that Wu Tip Shan is visited by around 1,200–1,300 people on weekdays and around 1,500–1,600 people per day on weekends.

TABLE 42: OVERALL VISITOR CALCULATION AT WU TIP SHAN

		A	B	C	Total/2
Jul–Aug 2022	Monday-Friday average	957	1,040	694	**1,346**
	Weekend average	1,107	1,229	832	**1,584**
Jan–Feb 2023	Monday-Friday average	649	1,064	694*	**1,204**
	Weekend average	830	1,304	832*	**1,483**

*Proxy figures based on Jul–Aug figures
Figures may not add up due to rounding

13. The effect of rainfall on trail use

The logical assumption to make is that rainfall discourages trail use, and the heavier the rain, the less trail use we would expect to see. But how much impact does the rain actually have on trail use? Over the two data collection rounds, there were several episodes of rain, including a typhoon signal no. 1 and several thunderstorm warnings, and amber rainstorm warnings. This data provides the opportunity to quantify the degree to which trail use is affected by the rain. These findings should be regarded as preliminary as the sample size was small. There were only twelve days with significant rainfall (more than 2mm). Additionally, due to limited equipment, sensors were only deployed at one or two trails at a time. Furthermore, some data had to be excluded for the sake of comparability. Because sensors only collected data for 5 to 10 days, there was insufficient data on weekends to establish a baseline for foot traffic in dry conditions, so only weekdays were included in the analysis. Sensors that failed at any point during the data collection period were also excluded.

In the end, there were 7 weekdays over 4 data collection periods during which significant rainfall occurred (see Tables 43 to 46). The number of presences detected at all functioning deployed sensors during those periods were added up. A baseline figure for each period was calculated by averaging the daily total number of presences on weekdays when it did not rain. In the right-most column of Tables 43 to 46 below, the number of rainy day presences is expressed as a percentage of the baseline.

TABLE 43: RAINY PERIOD 1, BASELINE OF 703 PRESENCES/DAY

Date	Day	Weather warnings	Rain (mm)	Fu Yung Shan B	Fu Yung Shan D	To Fung Shan B	Total presences	% of base-line*
7 Jul 2022	Thur	Thunderstorm	13.1	143	72	326	541	77.0%
8 Jul 2022	Fri	Very hot weather	Trace	227	86	461	774	110.0%
11 Jul 2022	Mon	Very hot weather	0	178	91	363	632	89.9%

*Baseline defined as average daily presences on days with <2mm rainfall

TABLE 44: RAINY PERIOD 2, BASELINE OF 771.6 PRESENCES/DAY

Date	Day	Weather warnings	Rain (mm)	Hammer Hill A	Hammer Hill B	Hammer Hill E	Duckling Hill B	Duckling Hill C	Total	% of base-line*
15 Jul 2022	Fri	Very hot weather	0.2	127	107	89	515	34	872	113.0%
18 Jul 2022	Mon	Very hot weather	2.7	88	113	46	417	28	692	89.7%
19 Jul 2022	Tue	Very hot weather	Trace	104	111	144	218	72	649	84.1%
20 Jul 2022	Wed	Very hot weather	0.6	171	83	316	116	36	722	93.6%
21 Jul 2022	Thur	Very hot weather	0.3	170	93	317	143	43	766	99.3%
22 Jul 2022	Fri	Very hot weather	0	160	83	405	181	20	849	110.0%

*Baseline defined as average daily presences on days with <2mm rainfall

TABLE 45: RAINY PERIOD 3, BASELINE OF 768 PRESENCES/DAY

Date	Day	Weather warnings	Rain (mm)	Tuen Mun Trail A	Tuen Mun Trail B	Tuen Mun Trail F	Total	% of base-line*
29 Jul 2022	Fri	Thunderstorm; Very hot weather	0	445	189	119	753	98.0%
1 Aug 2022	Mon	Very hot weather	0	434	200	140	774	100.8%
2 Aug 2022	Tue	Thunderstorm; Very hot weather	0.2	419	249	109	777	101.1%
3 Aug 2022	Wed	T1; Amber rain; Thunderstorm	34.9	246	172	83	501	65.2%
4 Aug 2022	Thur	T1, Thunderstorm	14.9	206	65	71	342	44.5%
5 Aug 2022	Fri	Amber rain; Thunderstorm	165.5	195	92	73	360	46.9%

*Baseline defined as average daily presences on days with <2mm rainfall

TABLE 46: RAINY PERIOD 4, BASELINE OF 1,542 PRESENCES/DAY

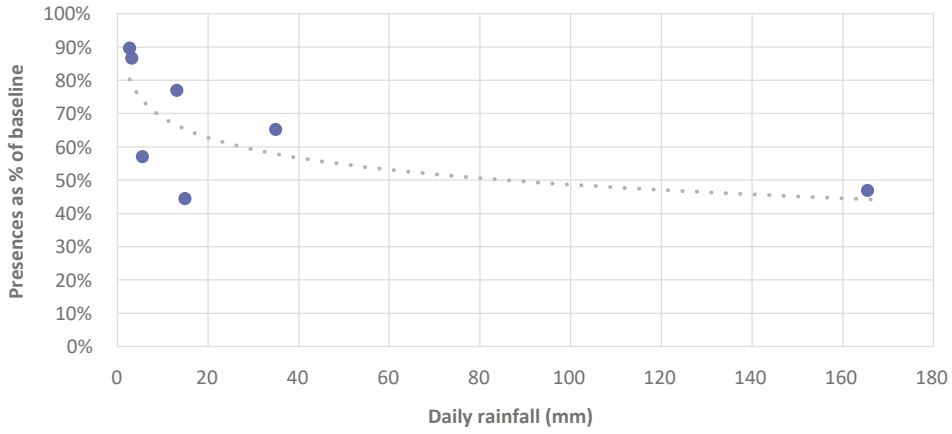
Date	Day	Weather warnings	Rain (mm)	Sir Cecil's Ride A	Sir Cecil's Ride B	Sir Cecil's Ride C	Mount Davis A	Mount Davis B	Mount Davis C	Fu Yung Shan A	Fu Yung Shan C	Fu Yung Shan D	Total	% of baseline
9 Jan 2023	Mon	Yellow fire	0.1	205	390	396	62	2	11	389	5	82	1,542	100%
10 Jan 2023	Tue		5.5	78	246	183	77	0	0	235	10	52	881	57.1%
11 Jan 2023	Wed		3.2	224	392	333	117	3	4	207	6	52	1,338	86.7%

*Baseline defined as average daily presences on days with <2mm rainfall

TABLE 47: FOOT TRAFFIC AS % OF BASELINE ON RAINY DAYS

Date	Rainfall-related weather warnings	Rain (mm)	Foot traffic as % of baseline
18 Jul 2022		2.7	89.7%
11 Jan 2023		3.2	86.7%
10 Jan 2023		5.5	57.1%
7 Jul 2022	Thunderstorm	13.1	77%
4 Aug 2022	T1, thunderstorm	14.9	44.5%
3 Aug 2022	T1, amber rain, thunderstorm	34.9	65.2%
5 Aug 2022	Amber rain, thunderstorm	165.5	46.9%

CHART OF TABLE 47: SCATTER PLOT OF RAINY DAY FOOT TRAFFIC AS % OF BASELINE



A scatter plot can be drawn of the relationship between trail use as a percentage of the normal baseline and rainfall (see chart of Table 47). Although there are only seven data points, there is a visible downwards trend where the heavier the rain, the less the trail use. Light rain (2–4mm a day) appears to decrease trail use by around 10-15%. Moderate rain (5–15mm) seems to reduce trail use by around 20–30%. In heavy rain (30mm or more), trail use decreases by about 45–55%. Even on 5 August, when there was 164.5mm of rainfall and amber rainstorm and thunderstorm warnings, sensors on Tuen Mun Trail still detected about 47% of the baseline number of presences. (For reference, according to Hong Kong Observatory records going back to 1884, only 136 days or 0.3% of all days ever recorded had more rainfall recorded than 5 August 2022.)[21] The day with the second highest amount of rainfall, 34.9mm on 3 August 2022, was exceeded by 5% of all days recorded since 1884. Unfortunately due to technical failures at Wu Tip Shan, Tuen Mun Trail was the only trail that provided usable data on that day. Still, there

21 HKSAR Hong Kong Observatory, "Daily Total Rainfall All Year—Hong Kong Observatory", historical data series, https://data.gov.hk/en-data/dataset/hk-hko-rss-daily-total-rainfall (accessed 19 January 2023).

is no reason to believe that Tuen Mun Trail—a concretised trail with stairs leading from street level to a contour-hugging main route—was unique. Other trails such as Fu Yung Shan and Sir Cecil's Ride share similar features. Another data point that was excluded due to incompleteness was that on 10 August when there was 49.7mm of rainfall, a T3 signal and a thunderstorm warning, 216 people were detected by a sensor on Wu Tip Shan before noon, about 30% of the good weather weekday morning average. Whether they were very persistent regular users or deliberate thrill seekers, the preliminary evidence suggests that backyard trails see some use even in extreme weather conditions.

14. Discussion

14.1 | HOW ARE BACKYARD TRAILS USED?

Each of the backyard trails included in this study had its own unique features. However, several of them shared characteristics that can be described as typical backyard trail usage patterns. These trails included Duckling Hill, Hammer Hill, Shum Wan Shan & Ping Shan, Woh Chai Shan (but not Garden Hill), and Wu Tip Shan. One thing that these trails had in common was a strong "morning walker" (i.e. daily neighbourhood visitor) presence. However, the data shows that the term "morning walker" is itself an oversimplification because "morning walkers" do not only walk in the morning.

In the summer, most "morning walkers" actually walk in the morning. Trail activity usually begins at around 5:00–6:00 a.m. (sometimes earlier), rises sharply until about 9:00 a.m., and then falls dramatically by lunchtime. However, this is often followed another slightly smaller peak during the late afternoon. In winter, trail use is more evenly spread out throughout the day. There was a more even balance between the number of people in the morning and in the afternoon. The peaks were gentler and spread out over a longer period, and more people stayed on the trails at noon. At some locations, the summertime two-peak pattern disappeared entirely and was replaced by an erratic flow of people from sunrise to sunset and sometimes beyond.

These typical backyard trails saw as many if not more users in summer as in winter. Instead of avoiding the trails during the summer, people shifted the time of day of their visits. Furthermore, while there were usually more visitors on weekends than on weekdays, the contrast was not dramatic. These usage patterns are indicative of green spaces that serve a base of local users consistently throughout the year.

Some trails did not fit this pattern including Sir Cecil's Ride, Mount Davis, Garden Hill, Fu Yung Shan, and To Fung Shan. They differ in place-specific ways. Sir Cecil's Ride, Mount Davis and Garden Hill drew much larger weekend crowds compared to their weekday foot traffic, especially in the afternoon during the winter. These trails attracted out-of-district visitors for different reasons. Sir Cecil's Ride is highly accessible and part of a larger network of hiking trails stretching through the centre of Hong Kong Island through Tai Tam Country Park all the way to Tai Tam Reservoir. Garden Hill is a well-known Instagram location for taking photos of the sunset. Mount Davis draws barbecuers, wargamers, university students, and historical tour participants on weekends. Mount Davis has a smaller number of weekday users due to its accessibility issues, a situation that also applies to Mount Parker.

Fu Yung Shan and To Fung Shan are two backyard trails whose foot traffic patterns are complicated by more varied land uses around the trail. At both sites, there are significant places of worship and villages. Their foot traffic is therefore composed of a combination of recreational walkers, religious worshippers, tourists, and residents.

Fu Yung Shan did have a morning peak, but barely any afternoon peak. It also attracted twice as many trail users on the weekend as on weekdays along its main uphill/downhill route, probably due to the fact that it connects urban Tsuen Wan to Tai Mo Shan Country Park. Sensors located in the temple district detected substantially different patterns of activity driven by temple visitors and village residents.

At To Fung Shan, religious worshippers, tourists, residents, and hikers used different parts of the trail network for different reasons. To Fung Shan has major tourist attractions in the form of the 10,000 Buddhas Monastery, and as a result, also saw double the number of visitors on weekends.

Trails that attracted more out-of-district visitors on the weekend were also those where dramatic seasonal differences in the number of visitors were observed, for example at the 10,000 Buddhas Monastery, Garden Hill, and the entrance to the Wilson Trail Section 2 in Quarry Bay.

In terms of user numbers, the backyard trails included in this study saw daily visitors ranging from less than 100 to well over 1,000. The median backyard trail saw around 400–500 visitors on weekdays and 700–800 on weekends. For a rough comparison, the Agriculture, Fisheries and Conservation Department reported that in 2021–22, 12.1 million people visited country parks altogether.[22] If this is divided between 24 country parks, then by the number of days in a year, this amounts to

22 HKSAR Agriculture, Fisheries and Conservation Department, "Useful Statistics", last updated 16 January 2023, https://www.afcd.gov.hk/english/country/cou_lea/cou_lea_use/cou_lea_use.html (accessed 15 June 2023).

an average of 1,381 people visiting each country park a day. Considering that country parks are much larger, backyard trail visitor figures compare quite favourably.

As another point of comparison, the Leisure and Cultural Services Department does not publish figures for park attendance, but it does publish figures for its gazetted beaches. In 2021–22, 6,608,000 people visited Hong Kong's 42 gazetted beaches.[23] Considering that lifeguard services are provided at all beaches only from April to October (excluding for simplicity the six beaches where lifeguard services are also provided in March and November), this averages out to 735 beachgoers per beach per day when lifeguards are on duty.[24] This was comparable to or exceeded by the number of people visiting many backyard trails, including Duckling Hill, Shum Wan Shan & Ping Shan, Woh Chai Shan & Garden Hill, Wu Tip Shan, and Sir Cecil's Ride & Mount Parker. The number of beachgoers in 2021–22 was down from the pre-pandemic figure of 11,001,000 in 2019–20, which averaged out to 1,254 beachgoers per beach per day. This was comparable to the two most popular backyard trails, Wu Tip Shan and Sir Cecil's Ride. With the caveat that the figures gathered during this project are based on small sample sizes and not necessarily indicative of year-round use, they provide preliminary evidence of the importance of backyard trails to Hong Kong residents' daily leisure activities and well-being.

14.2 | TRAIL ACCESSIBILITY AND SAFETY

This research project included several trail segments that were not very safe or accessible. They included steep informal paths on the north-eastern side of Mount Davis and the north side of Shum Wan Shan, and an abandoned village path at the eastern end of the Mount Parker Lower Catchwater. Sensors detected much less foot traffic on these challenging

FIGURE 2: SHUM WAN SHAN A

Source: Jonathan Yip, 2023

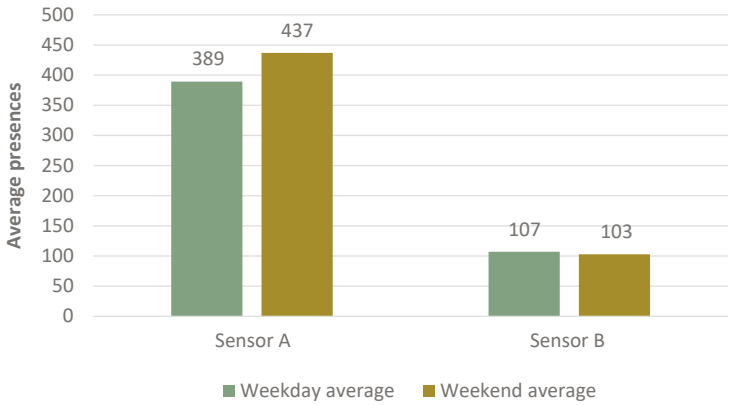
FIGURE 3: SHUM WAN SHAN B

Source: Jonathan Yip, 2023

23 HKSAR Leisure and Cultural Services Department, "Statistics Report", last revised 28 June 2022, https://www.lcsd.gov.hk/en/aboutlcsd/ppr/statistics/leisure.html (accessed 15 June 2023).

24 Reported figures were for the fiscal year 1 April 2021 to 31 March 2022. This time period was largely unaffected by pandemic-related beach closures. Beaches were opened on 29 March 2021, just before the start of the fiscal year 2021–22. They remained open for almost the entire year until 17 March 2022, when the fifth wave of the pandemic struck Hong Kong. However, attendance was still down from pre-pandemic numbers, which saw 11.001 million visitors in the fiscal year 2019–20.

CHART 71: SHUM WAN SHAN, AVERAGE DAILY PRESENCES, JUL 2022



paths than on nearby safer, less steep routes. Chart 71 contrasts the average number of daily presences detected at point A on the paved Chun Wah Road Morning Trail on the southern side of Shum Wan Shan with the much steeper, community-built path at point B on the northern side. There were about four times as many presences detected at point A as point B. However, while the path at point B is steep, there were signs that it is still being actively used and maintained by members of the community. People had built steps into the hillside using rocks, planks and other materials and there were several informal seating and exercise areas located along the route.

At Mount Davis, there was an even greater discrepancy between the average number of daily presences detected at point A, a gentle access road on the southern side of the hill, and point C, a steep informal path on the northern side. Only a handful of people used the northern route, which included three make-shift bridges and which was so steep in places that trail users had strung ropes between the trees to serve as hand holds.

As noted in Section 6, the absence of a safer route on the northern side of Mount Davis facing Kennedy Town appears to deter visitors to Mount Davis in general—only about 60 people visited on weekdays and about 200–300 on weekends (Chart 72).

A lack of accessibility also hinders the use of the Mount Parker Lower Catchwater. As noted in Section 8, there is just one safe and authorised route connecting Shau Kei Wan to Mount Parker Lower Catchwater, via the Shau Kei Wan Service Reservoir Playground near sensor F. The other

FIGURE 4: MOUNT DAVIS A

Source: Jonathan Yip, 2023

FIGURE 5: MOUNT DAVIS C

Source: Jonathan Yip, 2023

CHART 72: MOUNT DAVIS, AVERAGE DAILY PRESENCES, JAN 2023

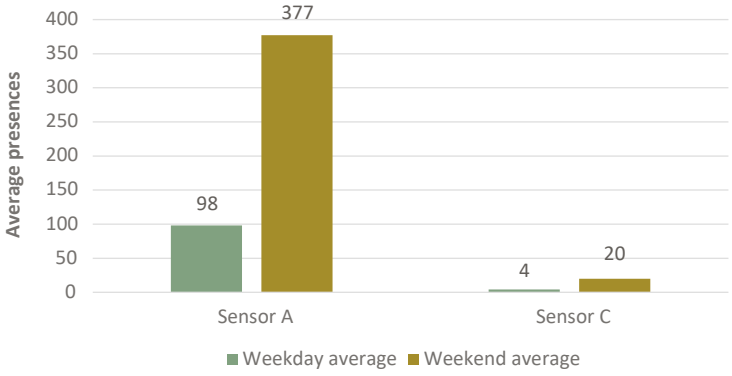
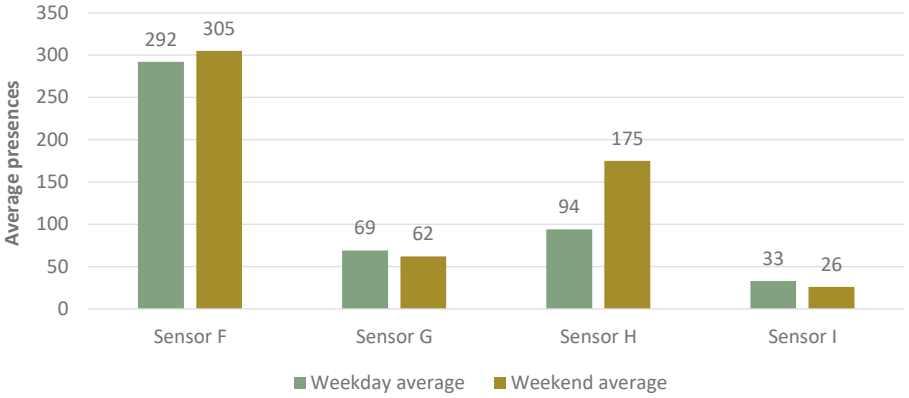


CHART 73: MOUNT PARKER, AVERAGE DAILY PRESENCES, JAN 2023



two access routes were at G (a slope maintenance stairway) and I (an abandoned village path in poor condition). Chart 73 shows that the number of presences detected at F far exceed those at G, and I. Subsequently, the number of presences seen walking along the catchwater itself at H is roughly 1/3 to 1/2 of that seen at point F. It seems that most people entering the trail network at F turn westwards towards Tai Tam Country Park rather than walk along the catchwater.

Residents of Shau Kei Wan and Kennedy Town would benefit from trail improvements. (A staircase on the north side of Mount Davis opposite the Island West Transfer Station, currently closed due to an ongoing public housing development at Ka Wai Man Road, is scheduled to be reopened in 2028 with the completion of Phase 2.[25]) Residents of Lai Tak Tsuen in Tai Hang would also benefit from improvements in trail facilities to provide better access to Sir Cecil's Ride. Path improvements are less critical at Shum Wan Shan because there are two alternative routes and the informal path is accessible enough to be relatively well-used.

However, it is necessary to balance the interests of potential trail users with environmental protection. The construction of more concretised paths should not be pursued as a solution, even if this would be more administratively convenient and cost effective. Safe paths do not necessarily have to be paved—large sections of Sir Cecil's Ride are not paved, as are many paths within Tai Tam Country Park. As discussed in the first report, "Backyard Trails Pilot Project—Part 1: Exploring the Urban Fringe", eco-friendly trail building methods should be prioritised, and non-profit organisations can develop the capacity to assist the government in building and maintaining them.

25 HKSAR Housing Department, "Public Housing Development at Ka Wai Man Road", C&W DC Paper No. 100/2017, October 2017, https://www.districtcouncils.gov.hk/central/doc/2016_2019/en/dc_meetings_doc/11741/20171012_DC_Paper_100_2017.pdf (accessed 15 June 2023).

FIGURE 6: MOUNT PARKER F

Source: Wa Ka Cheong, 2023

FIGURE 7: MOUNT PARKER G

Source: Wa Ka Cheong, 2023

FIGURE 8: MOUNT PARKER I

Source: Wa Ka Cheong, 2023

FIGURE 9: UPHIL FROM MOUNT PARKER I

Source: Carine Lai, 2022

FIGURE 10: MOUNT PARKER H

Source: Wa Ka Cheong, 2023

TABLE 48: OZP AREAS SERVED BY BACKYARD TRAILS WITH INADEQUATE OPEN SPACE PROVISION

Backyard Trail	Adjacent OZP areas with inadequate open space provision	Estimated open space per person m² (2012)
	Mong Kok	0.6
Woh Chai Shan and Garden Hill	Cheung Sha Wan	1.4
	Kennedy Town & Mount Davis	1.0
Mount Davis	Pok Fu Lam	1.9
	North Point	1.6
	Quarry Bay	1.6
Sir Cecil's Ride & Mount Parker	Shau Kei Wan	1.6
Hammer Hill	Ngau Chi Wan	1.9

14.4 | BACKYARD TRAILS AS A SUPPLEMENT TO INADEQUATE URBAN OPEN SPACE

An important part of the story is that many of the densely built-up urban areas that backyard trails serve have inadequate provision of recreational open space that is considered countable by the Planning Department.[26] While the following figures are now somewhat outdated, it was estimated that in 2012, about 1.3 million people, mostly in older urban areas, lived in Outline Zoning Plan (OZP) areas with less than the already meagre planning standard of 2m² of open space per person.[27] Several of these OZP areas are adjacent to four of the 10 backyard trails included in this study. This makes these trails an especially important amenity for the residents who live there. The relevant trails and OZP areas are listed in Table 48.

14.4 | BACKYARD TRAIL UTILISATION COMPARED WITH POPULATION CATCHMENT SIZE

To place backyard trail visitor figures into further context, user estimates from each trail are compared with the size of their catchment populations. In the first Backyard Trails report: "Backyard Trails Pilot Project—Part 1: Exploring the Urban Fringe", catchment populations were estimated by calculating the number of residents living within 15 minutes' walking distance of all the trailheads in each trail network.[28] By dividing the number of daily users by the catchment population then multiplying by 1,000, a trail utilisation rate was calculated in terms of users/day per 1,000 residents, i.e. for every 1,000 residents in the catchment area, *n* people visited the trail each day (see Table 49).

It should be noted that most of the figures here are underestimates, and in some cases serious underestimates, due to limited data collection. Utilisation rates ranged from 1.5 users/day per 1,000 residents at the lowest (Mount Davis on weekdays) to 45.8 users/day per 1,000 at the highest (To Fung Shan on a weekend two weeks after Lunar New Year). More typical was around 3 users/day per 1,000 on weekdays, and around 5 users/day per 1,000 on weekends.

To Fung Shan had by far the highest utilisation rate because it attracted a large number of users while having a small catchment population. With several hundred to over a thousand visitors a day but just 35,000 people living within 15 minutes' walk of its trailheads, it saw between 11.4 users/day and 45.8 users/day per 1,000 population. To Fung Shan's walking distance catchment is small due to its limited pedestrian connectivity—train tracks divide the trail from Sha Tin New Town. However, To Fung Shan is home to well-known tourist attractions including the 10,000 Buddhas Monastery and the Lutheran seminary. The monastery in particular attracts large numbers of visitors at certain times of year—over 4,000 presences were detected on the path to the monastery over one weekend in early

26 The definition of countable open space encompasses public parks managed by LCSD, open recreational spaces within public housing estates, the communal gardens of large private residential estates, and privately managed public open space.

27 Carine Lai, "Unopened Space: Mapping Equitable Availability of Open Space in Hong Kong", February 2017, Civic Exchange, https://civic-exchange.org/wp-content/uploads/2017/04/20170224POSreport_FINAL.pdf (accessed 4 June 2023) The government is planning to raise the standard to 3.5m² per person in the future.

28 15 minutes' walking distance was calculated based on actual distance travelled along the pedestrian network. Walking speed was assumed to be 5 km/h for horizontal distance and 0.6 km/h for vertical distance. Population figures were derived from the 2016 by-census at the Tertiary Planning Unit level.

February. Its actual catchment is therefore much broader than those who live within 15 minutes' walk. Leaving aside the monastery, To Fung Shan also provides an important connection between Sha Tin or Tai Wai MTR stations and Shing Mun Country Park for hikers.

Wu Tip Shan also stands out as a very highly utilised backyard trail, attracting 11.9 users/day on weekdays and 14.3 users/day per 1,000 population on weekends. It is a sizeable trail that lies within 15 minutes' walking distance of 107,000 residents and provides a connection to Lam Tsuen Country Park. The fact that it is well-utilised on weekdays as well as weekends demonstrates its importance to the community.

Hammer Hill has the next highest utilisation rate, with 5–6.3 users/day per 1,000. Its catchment population is also substantial, at 101,000 residents. Together with Ngau Chi Wan Park, it functions as an important green space for the neighbourhood. It also seems to provide a key pedestrian route connecting the two sides of Fung Shing Street.

Most of the rest of the backyard trails had utilisation rates of between 2 and 4 users/day per 100 on weekdays, with certain ones such as Sir Cecil's Ride & Mount Parker and Fu Yung Shan attracting substantially more visitors on weekends.

Fu Yung Shan provides a connection to Tai Mo Shan Country Park, while Sir Cecil's Ride and Mount Parker are just part of a large network of trails spanning most of the middle of Hong Kong Island, including Tai Tam Country Park.

It should be noted that the estimate for Sir Cecil's Ride/Mount Parker is a serious underestimate because the Mount Parker Green Trail, one of the main entrances/exits into Quarry Bay could not be monitored for both technical and jurisdictional reasons. Tuen Mun Trail's figures are also seriously underestimated due to sensor theft. The true figure is probably 1.5 to 2 times as large.

Mount Davis stands out as having both one of the lowest utilisation rates (1.5 users/day per 1,000 on weekdays) and the highest (7.9 users/day per 1,000 on the weekend). It probably receives few weekday visitors due to limited accessibility from Kennedy Town. The one staircase linking the top of Mount Davis to Kennedy Town is closed due to public housing construction on the north slope, so visitors must either use a not-very-safe informal route, or make a detour to the south side of the hill. In spite of these barriers, it does appear to be a popular space on weekends, and as discussed in Section 6, was used until quite late at night, probably by wargamers or barbecuers.

TABLE 49: TRAIL UTILISATION RATE

	Estimated trail users on weekdays*	Estimated trail users on weekends*	Catchment population within 15-minute walking distance**	Weekday utilisation rate users/day per 1,000 residents[a]	Weekend utilisation rate users/day per 1,000 residents[b]
Duckling Hill	500–650	700–850	189,000	3.1	4.1
Fu Yung Shan	200–250	350–550	61,000	3.6	7.7
Hammer Hill	450–600	600–700	101,000	5.0	6.3
Mount Davis	50	250–300	33,000	1.5	7.9
Shum Wan Shan & Ping shan	500–600	600–750	251,000	2.2	2.7
Sir Cecil's Ride and Mount Parker+	750–1,000	1,450–1,800	247,000	3.6	6.6
To Fung Shan	400 (Jul) 1,000 (Feb)	750 (Jul) 1,600 (Feb)	35,000	11.4 (Jul) 28.0 (Feb)	21.7 (Jul) 45.8 (Feb)
Tuen Mun Trail+	200 (Jul-Aug) 400 (Jan-Feb)	350 (Jul-Aug) 750 (Jan-Feb)	90,000	2.2	3.9
Woh Chai Shan & Garden Hill	800–850	900–1,150	324,000	2.6	3.2
Wu Tip Shan	1,200–1,350	1,500-1,600	107,000	11.9	14.3

*Rounded to the nearest 50 persons
**Calculated in "Backyard Trails Pilot Project Part 1: Exploring the Urban Fringe"
a Calculated based on middle of weekday estimated range before rounding
b Calculated based on middle of weekend estimated range before rounding
+ Underestimated by a wide margin

14.5 | CONCLUSION

This project provides preliminary evidence that backyard trails are well-used by communities, hosting several hundred to well over a thousand visitors a day. These visitor numbers are not much lower than those for gazetted beaches, and about half of the average daily number of visitors to country parks, despite the latter being much larger. Some backyard trails are used by hikers as part of longer routes that also traverse country parks. Others, with shorter, self-contained trails, provide valuable access to nature in densely-populated urban areas.

Most backyard trails are used year-round; to avoid the summer heat, trail users visit early in the morning and later in the afternoon rather than choosing not to go. Most backyard trails are also well-used on both weekdays and weekends, although some are also more attractive to weekend visitors for various reasons. Those with lower utilisation rates were those with poorer accessibility, which highlights the importance of providing well-maintained and safe routes. Still, even in areas with unfriendly terrain such as the terraced cliff behind Shau Kei Wan, some people were detected using slope maintenance stairways. Even during T1, T3, amber rainstorm warnings and thunderstorms, several hundred people were counted.

Part 1 of the Backyard Trails Pilot Project explored the diverse ways in which people use backyard trails. In addition to routes for walking and running, they serve as venues for group exercise, socialising, drinking tea, growing vegetables, religious worship, and more. In a way, the lack of unified, consistent management and official attention has been a benefit as it allowed these spaces to develop into co-created community spaces with a unique character.

Green belt spaces are much more than leftover spaces. While they are usually appreciated for the ecological role they play in buffering protected country parks from urban areas, they have natural, recreational and social value in and of themselves. They provide easy access to nature, help residents maintain fitness, facilitate social connection, and give people room to exercise creativity and modify spaces to their own needs.

Yet backyard trails and green belts in general face a number of threats. Some of these threats are caused by the users, i.e. littering, vandalism and more seriously, the potentially unsafe construction of do-it-yourself walking trails on steep slopes. Other environmental threats come from excessive concretisation of walking trails, which exacerbate surface run-off and soil erosion. These problems are the downside of ad hoc management, which the Part 1 report argued should be addressed not by heavy government intervention—which would damage the unique character of the green belts—but through collaboration with the non-profit sector and community volunteers.

However, the biggest threats to green belts come from the intense development pressures they are subjected to from policymakers who view them as a convenient land bank. Since they are government land, they are considered easier to develop than brownfield sites where the government is likely to face a tangle of financially interested private interests. Since backyard trails are built and maintained on a district-by-district basis according to stakeholder demands, there is not even any legal obligation to reroute a trail that is disrupted by a construction project. This should be the bare minimum mitigation work conducted if green belt land is taken for development.

Backyard trails and green belts by extension deserve careful consideration in planning decisions. It is hoped that the findings and data collected by the Backyard Trails Pilot Project will go some way towards demonstrating the value of green belts in order to raise awareness and promote discussion of how to care for our green spaces in Hong Kong.

Appendix 1: Technical note

The validation process for the electronic people-counting sensors conducted in advance of the data collection is described below. The design of the sensor is illustrated in the Figure 11 below.

The millimetre-wave proximity sensor can detect approaching objects of a certain size from either side of the trail. That will wake up the thermal camera and trigger the pedestrian counting process. In outdoor areas, pedestrians usually have a minimal yet observable deviation from the ambient temperature. From the low-resolution heat energy map provided by the embedded thermal camera, a pattern can be observed. However, the way to learn these patterns remains as the main technical challenge up to this stage.

To overcome this, the engineering team has conducted 3 5-day experiments to collect the data for parameter tuning and validate the counting accuracy.

For the sake of generality, these 3 sites where the systems were deployed are not specially chosen and are varied in terms of the background temperature, trail width, shading from nearby trees, etc.

From that, over 1.5GB data of was collected. 70% of the data was used for model training and the remaining data was kept for validation testing. Human technicians manually labelled their observations from the thermal camera output. The team then used these data to adjust the decision logics of i) how it segmentises a mesh of data points into numbers of pedestrians, ii) how it identifies the moving direction of heat objects and iii) how it prevents double-counting the same pedestrian.

Once the system was fully calibrated, the team made use of the other one-third of the data to validate the system performance.

FIGURE 11: SYSTEM FLOWCHART

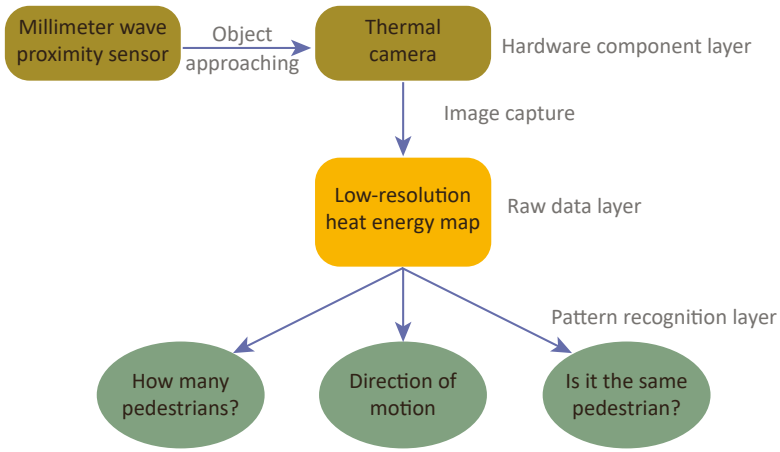


FIGURE 12: PEDESTRIANS PASSING THE THERMAL CAMERA FROM RIGHT TO LEFT (SYSTEM VIEW)

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