



# Developing a Social Media Data Based Post-Occupancy Evaluation Method: New Understandings of Social and Physiological Attributes of Designed Waterscapes

---

**Bo Zhang**, Oklahoma State University, [zhangboarch@gmail.com](mailto:zhangboarch@gmail.com)

**Yang Song**, North Dakota State University, [yang.song.space@gmail.com](mailto:yang.song.space@gmail.com)

**Yiwen Zheng**, Shaoxing University, [evenzheng89@gmail.com](mailto:evenzheng89@gmail.com)

## WHY **INSTAGRAM** AS DATA SOURCE?

**75**daily , **813** Monthly Million active users

**53%** US adult(18-29)users daily

**90%** of instagram users are younger than **35**

**106,200,000** users in the USA in2018

Users base has grown by **over 300%** in two years

**75,000,000 photos** shared each day

Social media supplies of huge, efficient, and ever-growing data which can be taken advantage of by researchers to better understand landscape design.

This project uses Instagram, by far the most popular free online service, as the major data source to explore the usage and perception of Fort worth water gardens



# RESEARCH QUESTIONS

---

## RQ 1

What is the popularity of the different areas, with and without water features?

## RQ 2

How do people behave in response to surrounding water features?

## RQ 3

What are the emotional ties people have to different water features?

# STUDY ANALYSES

---

## ANALYSIS 1

The number of Instagram posts were counted reflecting nine different locations. To understand how designed waterscapes engaged people, this analysis separated posts into two categories, photos with human beings, and scene-only photos.

## ANALYSIS 2

Human behaviors in different areas of the park were counted.

## ANALYSIS 3

First, hashtags that reflected people’s emotional ties to the built environments were grouped into four themes, including attachment, social interactions, sense of discovery, and sense of design. The distribution of these themed-hashtags was analyzed across the park. Second, human facial expressions presented in the Instagram photos were counted for different areas in the park. Two analyses were conducted to answer Question 3

# STUDY PURPOSE

---

To evaluate people’s usage of different areas in an open space

To evaluate people’s perception of different areas in an open space

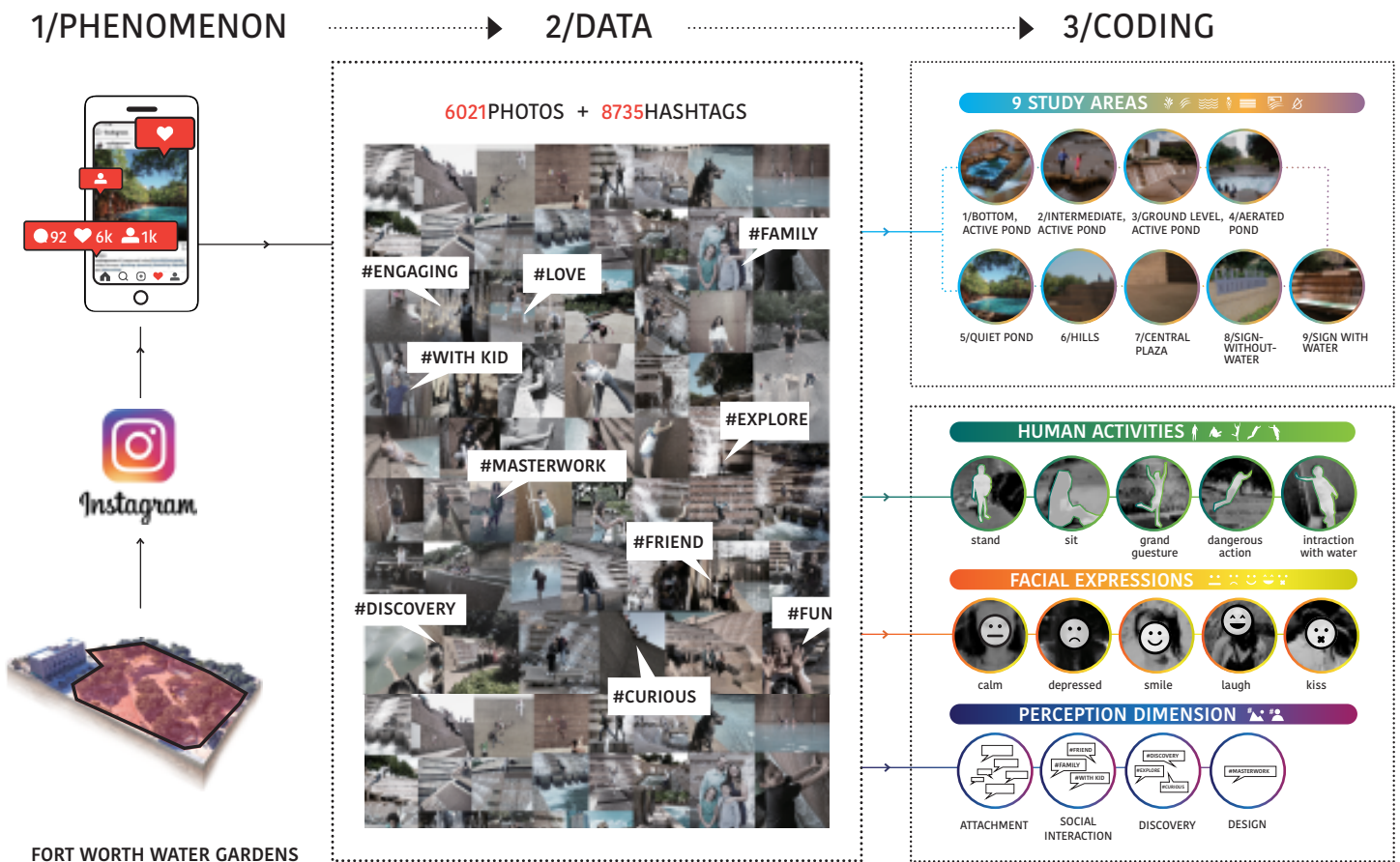
To develop a research method using social media data to understand site-scale landscape project

# RESEARCH PROCESS

A total of 6021 Instagram posts from 4447 users for one year (April 1st, 2017- March 31st, 2018) were mined. The researchers coded 6021 photos and 8735 hashtags into three themes respectively, including: (1) activities, (2) objects/scenes, and (3) experiences/facial expressions.

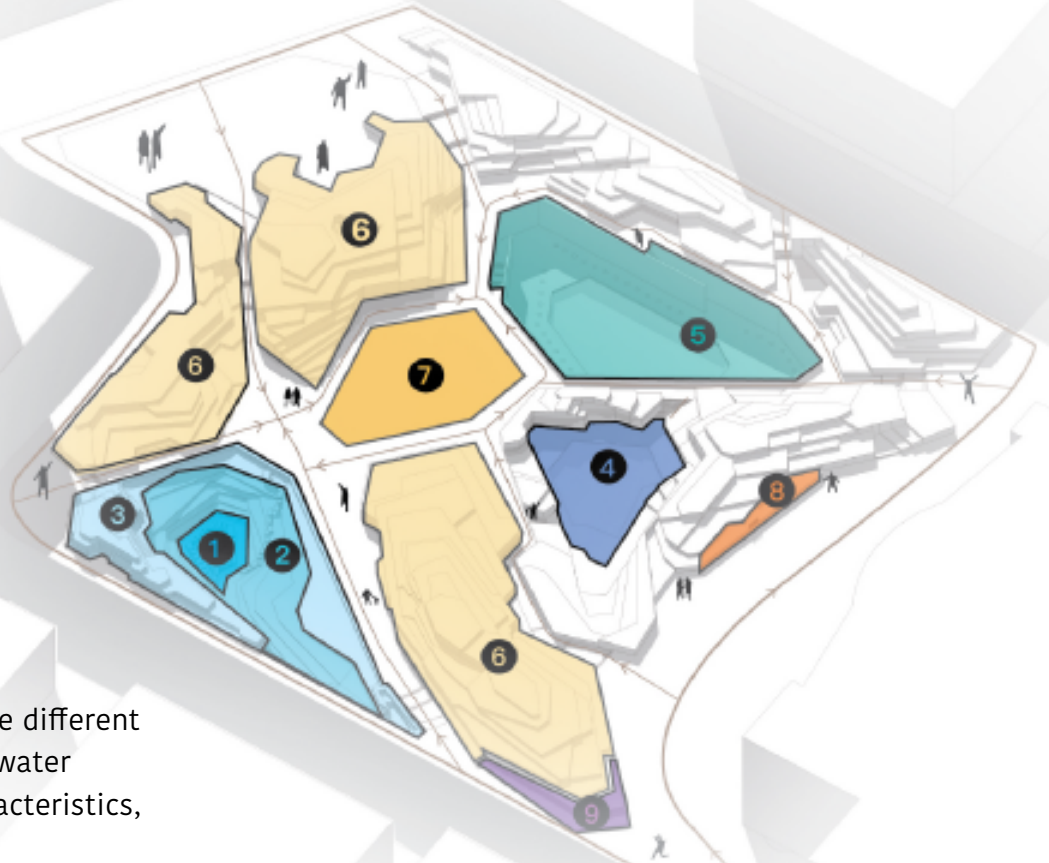
The park was divided into nine different study areas, according to the water characteristics, acoustic characteristics, and spatial characteristics. The study conducted four separate analyses for nine study areas, including:

(1) popularity; (2) human gestures and activities; (3) human facial expressions; and (4) human emotions reflected in hashtags.





# THE FORT WORTH WATER GARDENS



## 9 STUDY AREAS




























The park was divided into nine different study areas, according to the water characteristics, acoustic characteristics, and spatial characteristics.

The Fort Worth Water Gardens is a beautiful and refreshing oasis adjacent to the Fort Worth Convention Center. Designed by Philip Johnson, the Fort Worth Water Gardens is an architectural and engineering marvel to be enjoyed any time of the year. Visitors can experience a variety of water features as they wander through this relaxing urban park.

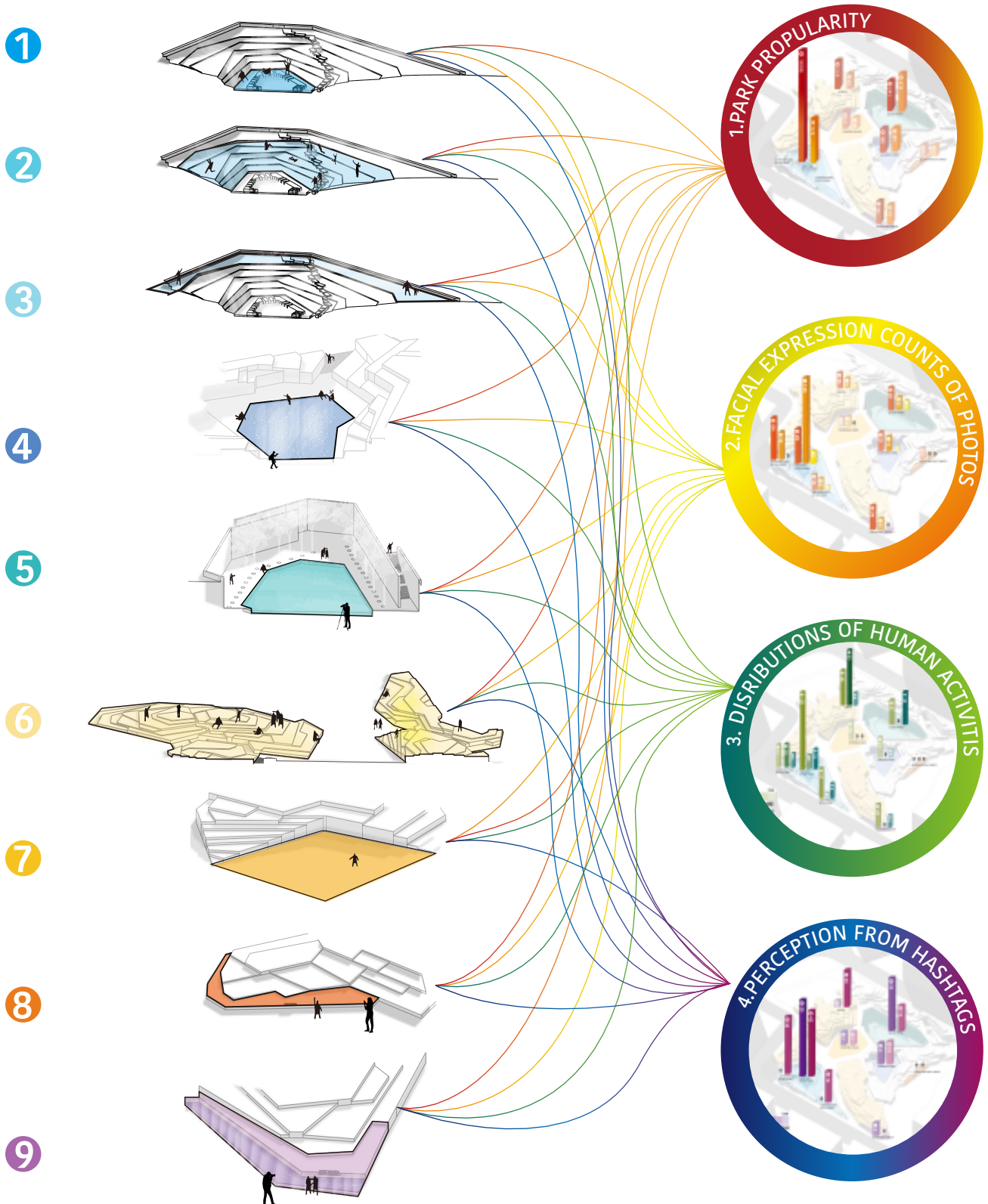
This park is also unique because of safety concerns created when four people drowned in the active pond in 2004. The park was closed afterwards. It was reopened in 2007 after the depth of the bottom pond was reduced.

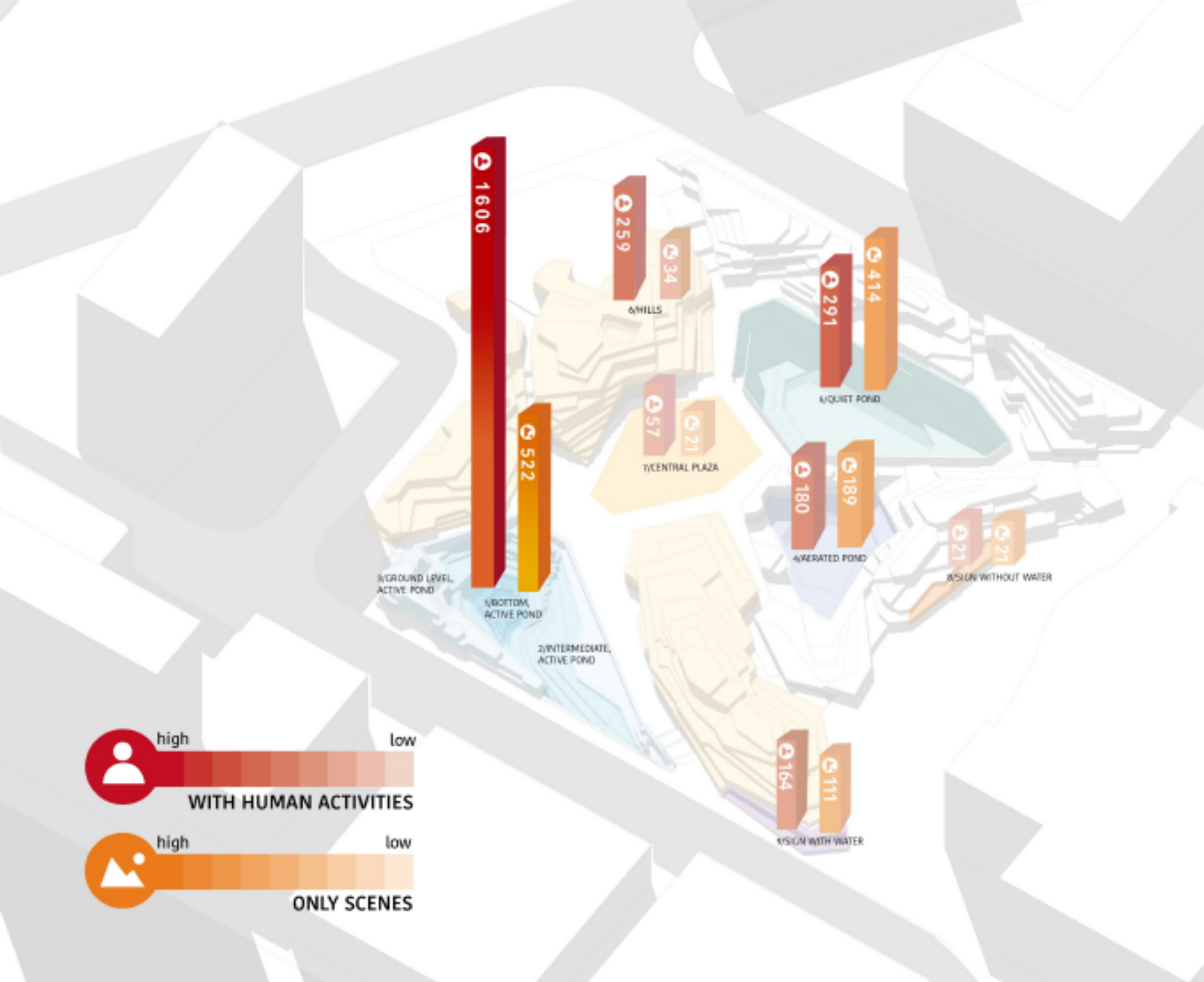


## 9 STUDY AREA CHARACTERS ANALYSES

AREAS	ACOUSTIC	SPATIAL	WATER
1 <b>BOTTOM, ACTIVE POND</b>	 very noisy	 enclosed	 crashing water
2 <b>INTERMEDIATE, ACTIVE POND</b>	 noisy	 semi-enclosed	 running water
3 <b>GROUND LEVEL, ACTIVE POND</b>	 street noise	 open	 flowing water
4 <b>AERATED POND</b>	 quiet	 enclosed	 aerated mist
5 <b>QUIET POND</b>	 very quiet	 enclosed	 reflecting water
6 <b>HILLS</b>	 quiet	 enclosed	 no water
7 <b>CENTRAL PLAZA</b>	 quiet	 open	 no water
8 <b>SIGN WITHOUT WATER</b>	 street noise	 open	 no water
9 <b>SIGN WITH WATER</b>	 street noise	 open	 running water

## 9 STUDY AREAS CHARACTERS



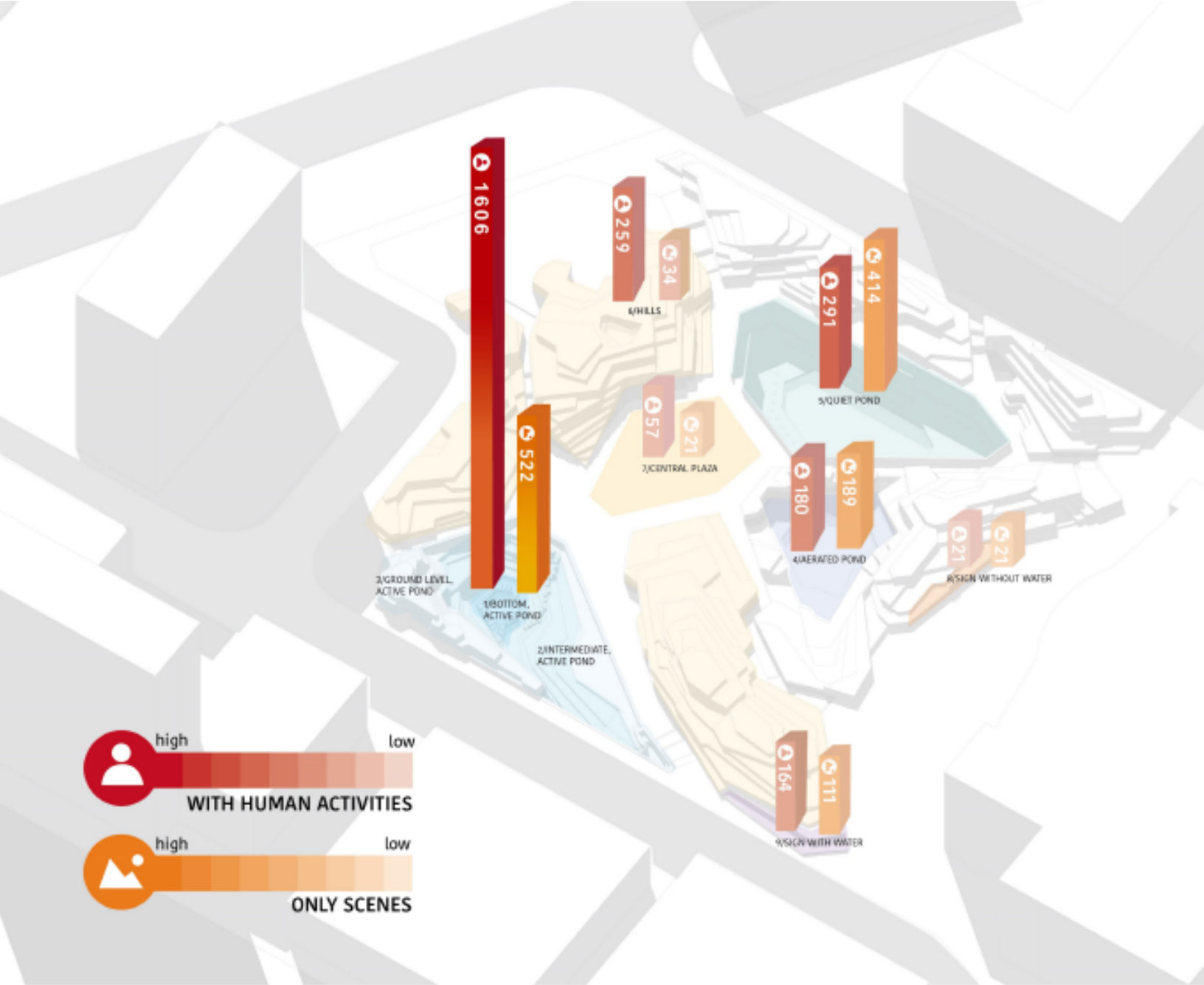


## UNDERSTANDING PARK PROPULARITY

The four water feature areas were captured by 87% of the “with human” photo posts. Among them, the active pond(1606) was the most popular location, followed by the quiet pond(291), the aerated pond(180), and the entrances with water feature(164).

Comparison the entrances with and without water features demonstrates the attractiveness of water features. The hills area was also a draw of the park(259). The central square and the entrances with no water features were the least popular areas.

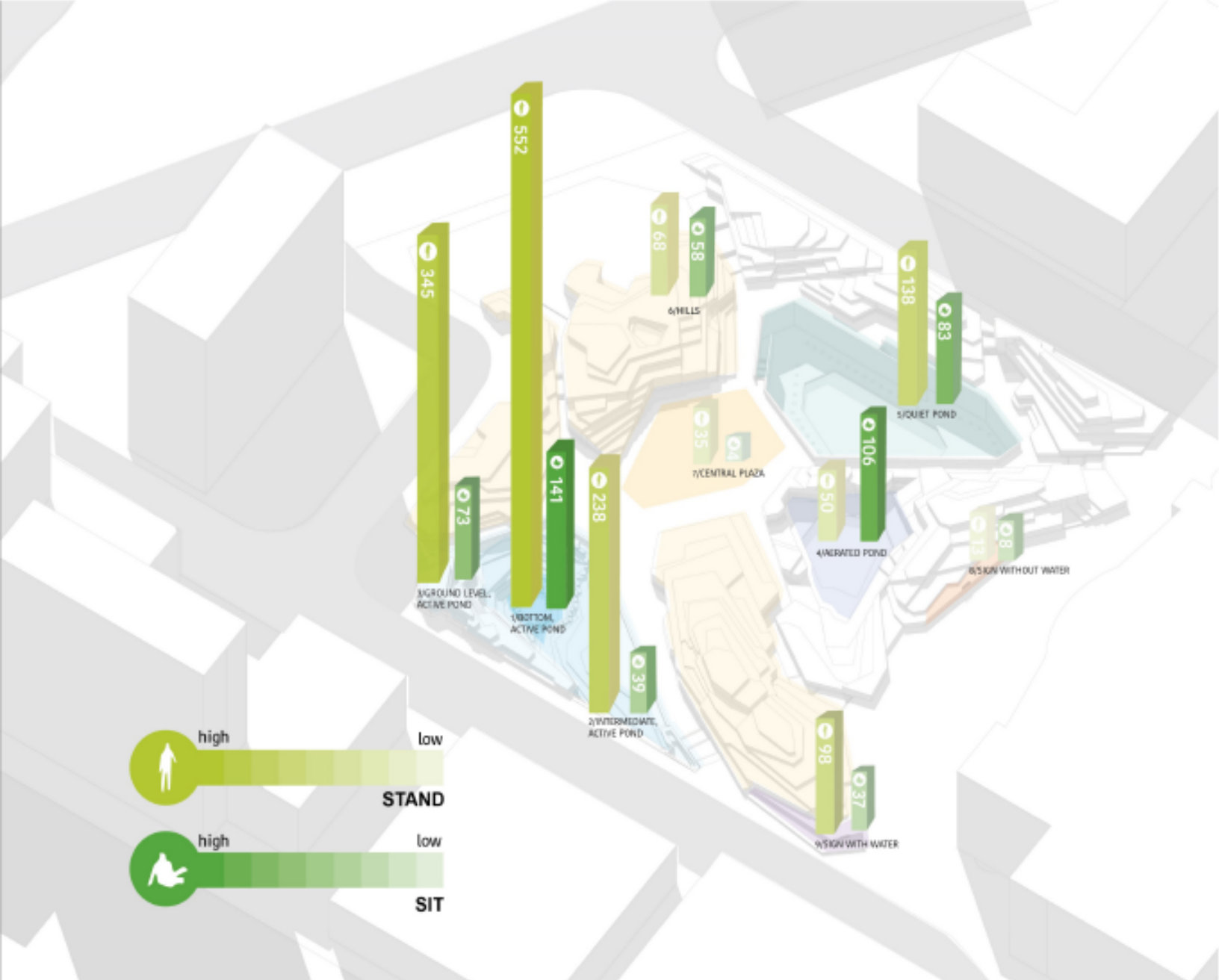




## UNDERSTANDING PARK POPULARITY

Comparison of the photos with and with no human beings explains how engaging different water features are. For active water features (such as the active pond and the entrances with running water scenes), people are more likely to have pictures “with” them rather taking scenery- only photos. And for the quite water features, such as the quiet pond, people are more likely to take a picture of the scenery(414), rather than being part of it (291).

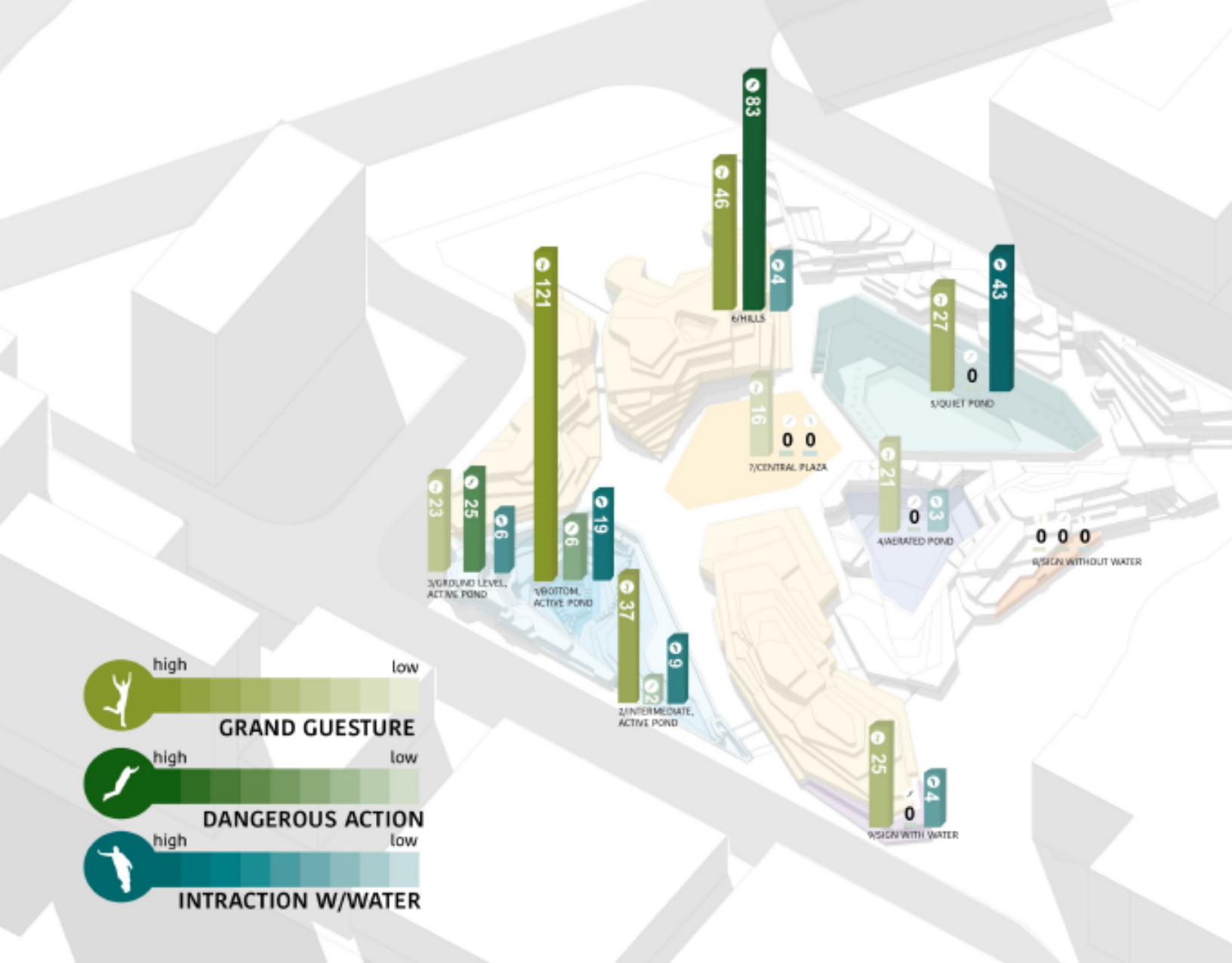
The aerated pond generated similar amounts of photos of with (180)and with no people (189). In the hill area, far more photos with human(259) were posted than scenery-only pictures(34). This phenomenon suggests the hill area is a popular area for human activities but not a draw for people to appreciate its scenery.



# UNDERSTANDING ACTIVITIES IN THE PARK

First, hashtags that reflected people’s emotional ties to the built environments were grouped into four themes, including attachment, social interactions, sense of discovery, and sense of design.

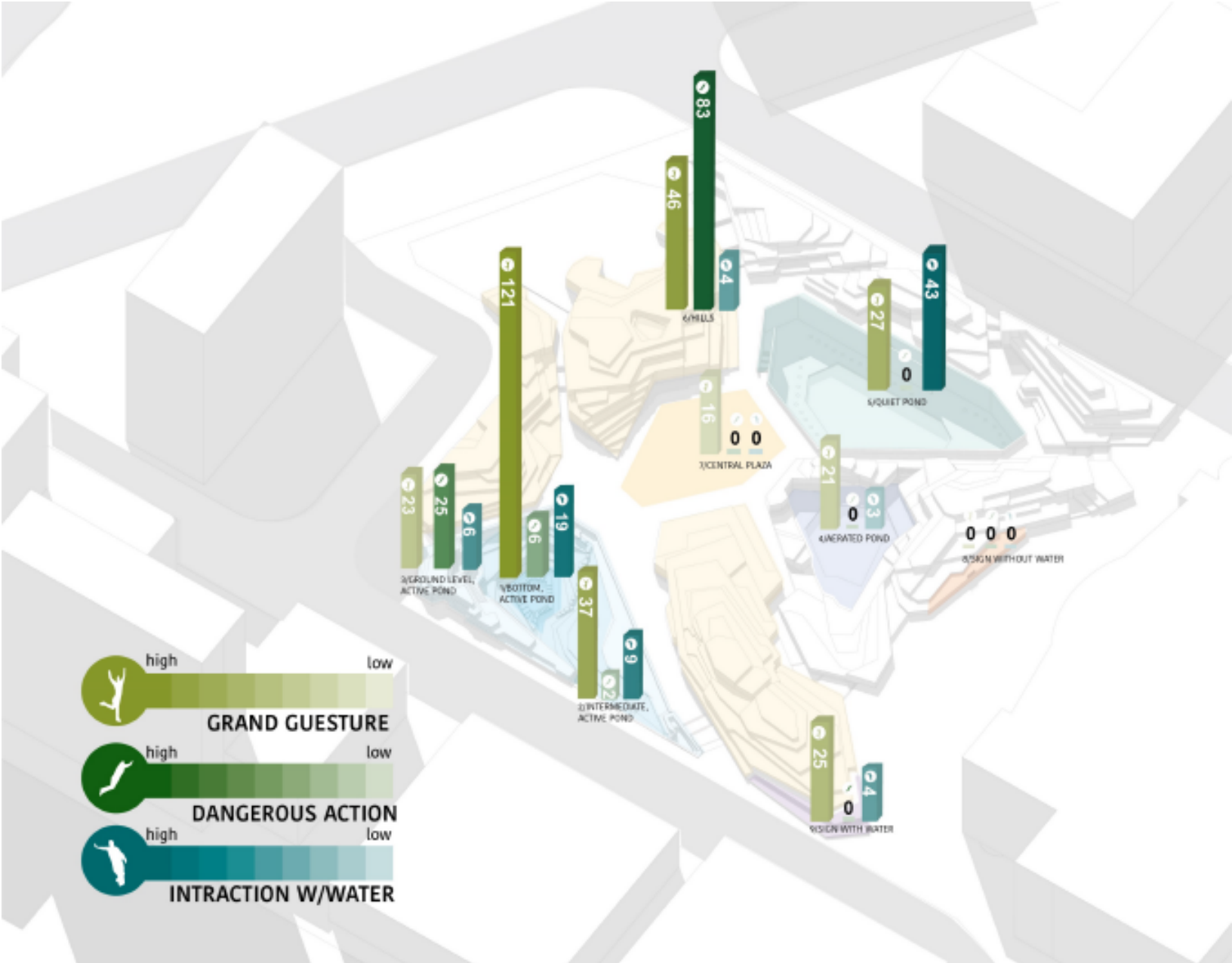
The distribution of these themed-hashtags was analyzed across the park. Second, human facial expressions presented in the Instagram photos were counted for different areas in the park.



# UNDERSTANDING ACTIVITIES IN THE PARK

The “big gestures” are body languages that convey excitements, such as waving, stretching arms, and gymnastic actions. The bottom of the pond had the greatest number (121) of “big gesture” photos. Also, in the active pond, the percentages of big gesture presented a decreasing tendency from the bottom (15.0 %), to the middle part (11.4 %), then to the ground level (4.9 %), showing different levels of excitement.

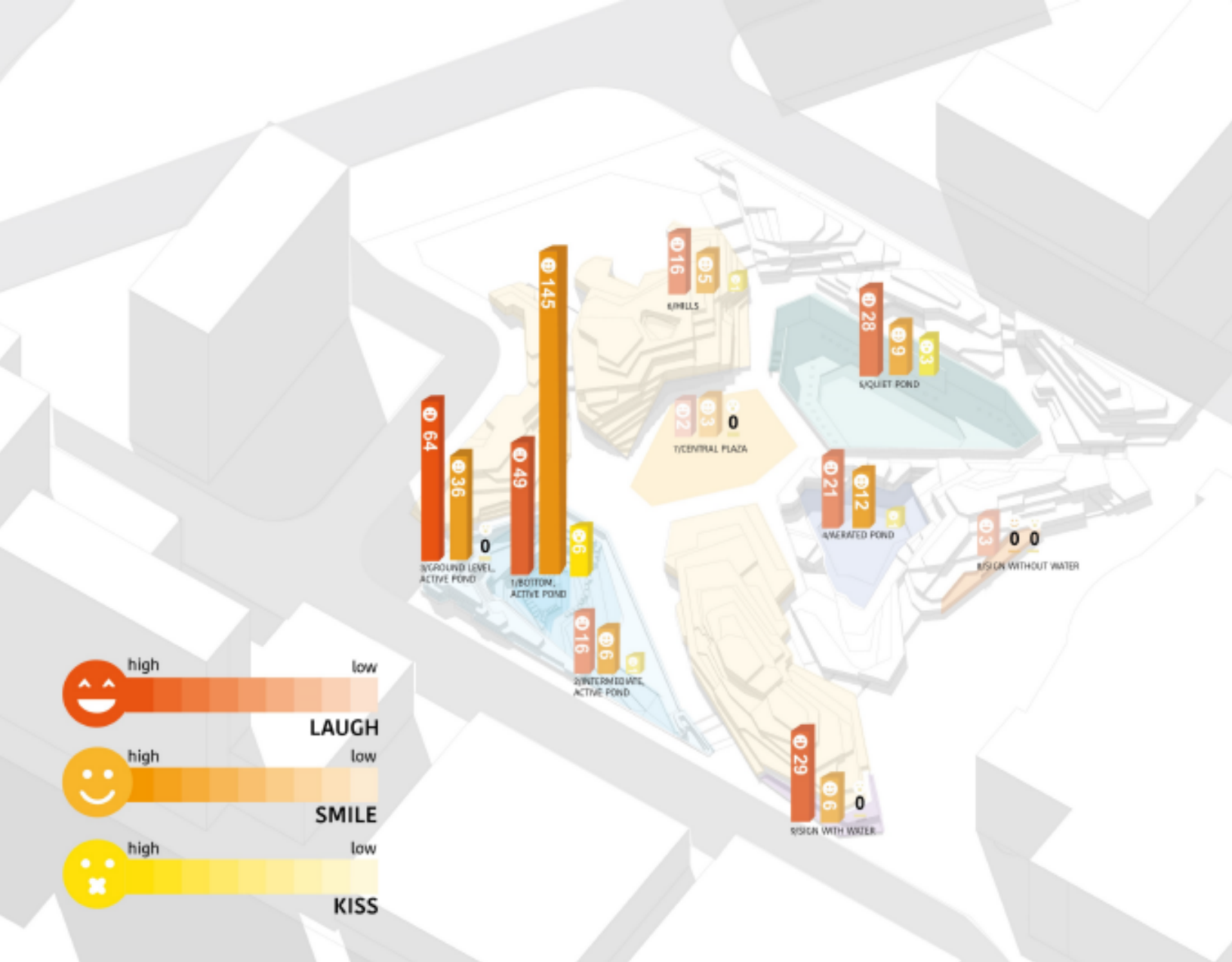
The hills area also had a significant amount (46) of “big gesture”. For the following five areas, such as the ground level of the active pond, the aerated pond, the quiet pond, the central plaza, and the entrances with water features, about 20 “big gesture” photos were found.



## UNDERSTANDING ACTIVITIES IN THE PARK

The quiet pond had both the greatest number (43) and the highest percentage of photos recording human interactions with water (14.8 %). The active pond had the second greatest number (34), in which the bottom area has more interactions (19) than the middle (9) and ground (6) levels.

The dangerous activities are those suggest potential falling, slipping, that may hurt park visitors, such as wading the prohibited areas and jumping between two concrete hills. Most dangerous activity photos (70.3 %) were captured in the hill area, followed those in the up ground area (21.2 %). Only 6 photos reflected dangerous activities at the bottom of the active pond, raking the third. The interactions with water include touching, holding, and dipping water.

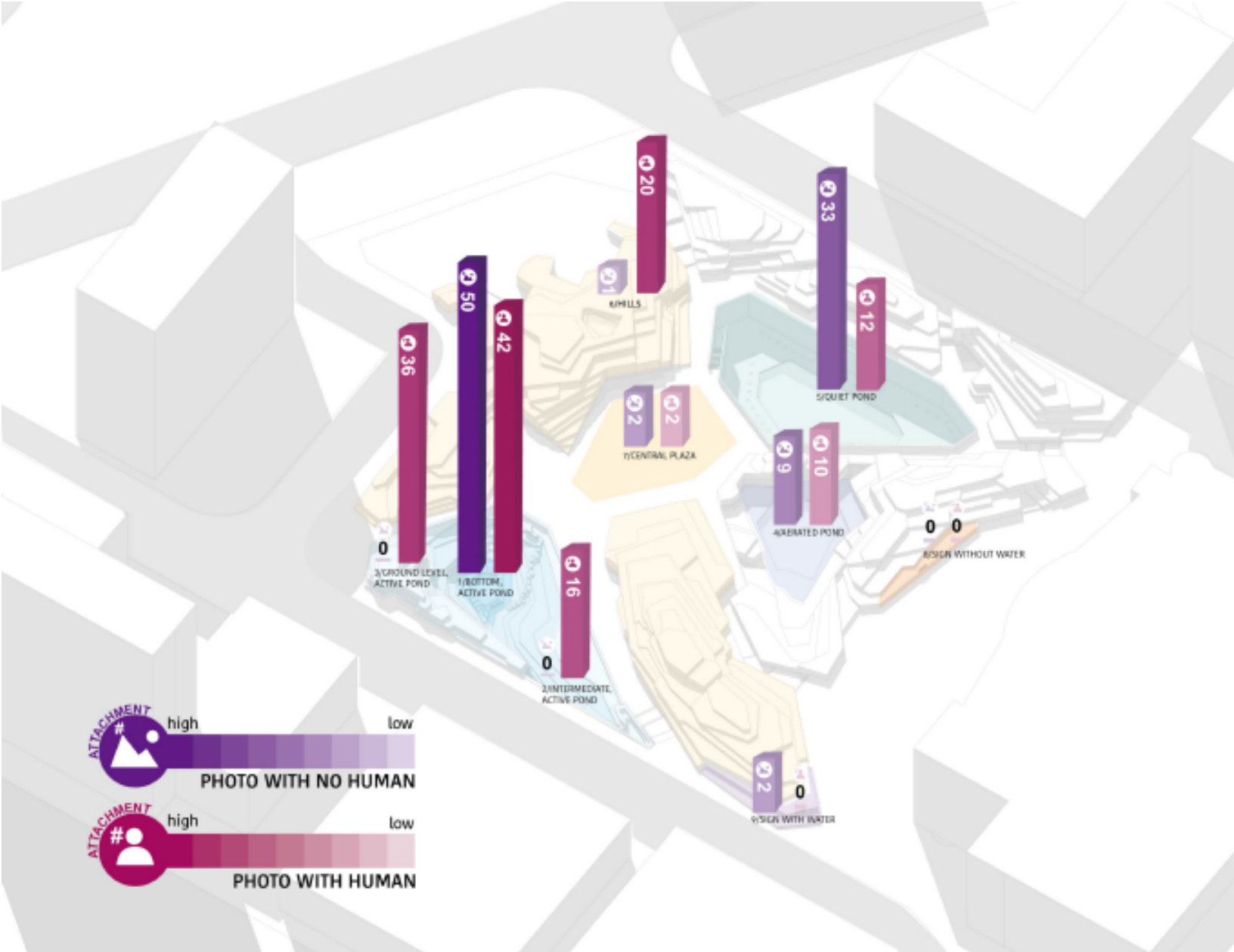


## UNDERSTANDING PERCEPTION OF DIFFERENT AREAS FROM FACIAL EXPRESSIONS

The facial expressions captured by Instagram photos, such as laugh and smile, revealed people's perceptions of different areas. Most recorded laughs (94%) and smiles (94%) were captured in the water feature areas. The large amount of laugh expressions (145) captured at the bottom of the pond indicated the excitement generated by the crashing water and enclosed space.

The hill area was the only area had a considerable number of laugh (16), indicating the climbing and panorama experiences were also exciting.

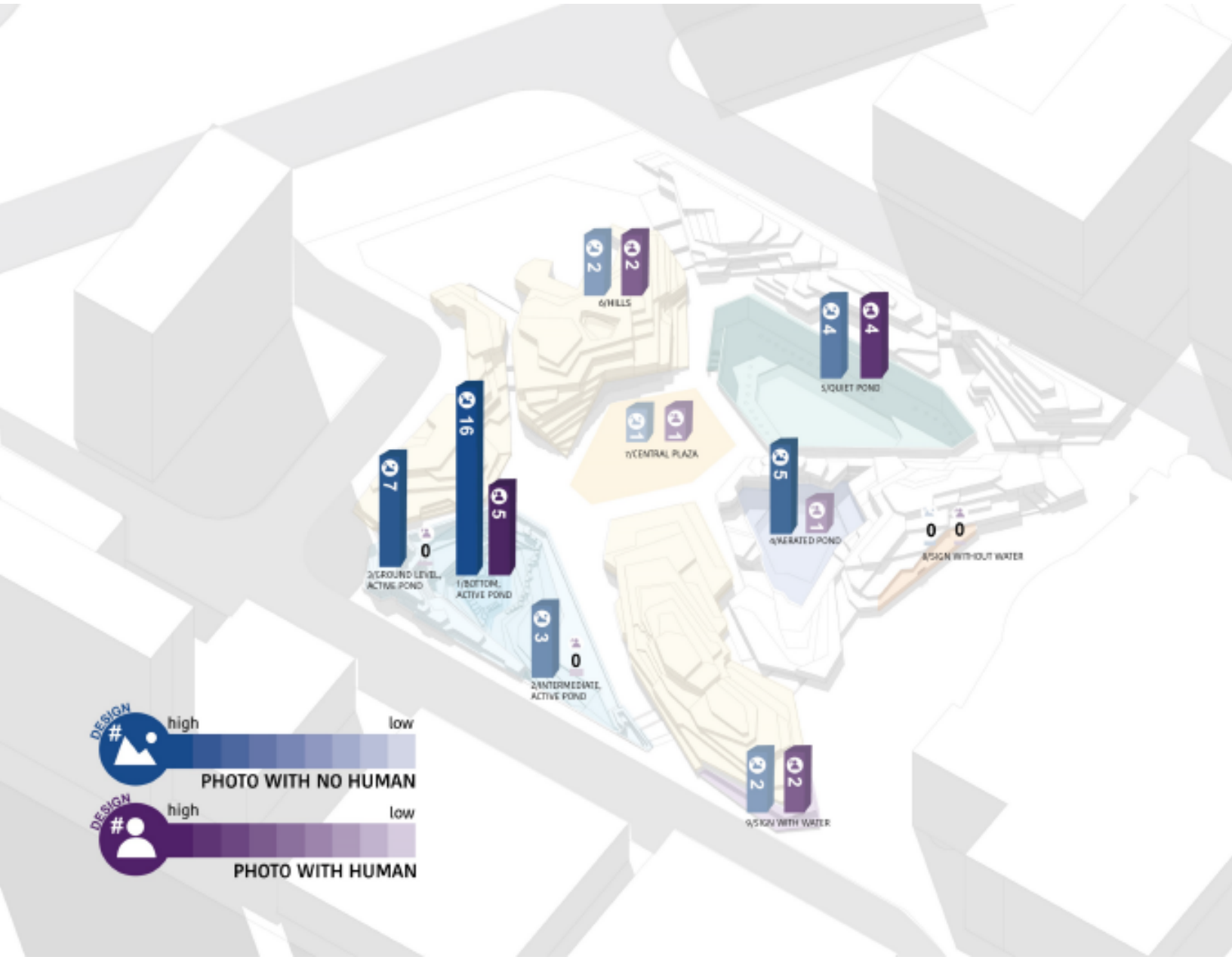




## UNDERSTANDING PERCEPTION OF DIFFERENT AREAS FROM GROUPED HASHTAGS EXPRESSIONS

The hashtags that revealed positive environmental emotions (such as # happy, #fun, #love) were categorized into Attachment Dimension. All water feature related areas showed high frequency of attachment, especially the bottom of the active pond (50+42), the quiet pond(33+12), the aerated pond(9+10), and the entrances with water features(16+10).

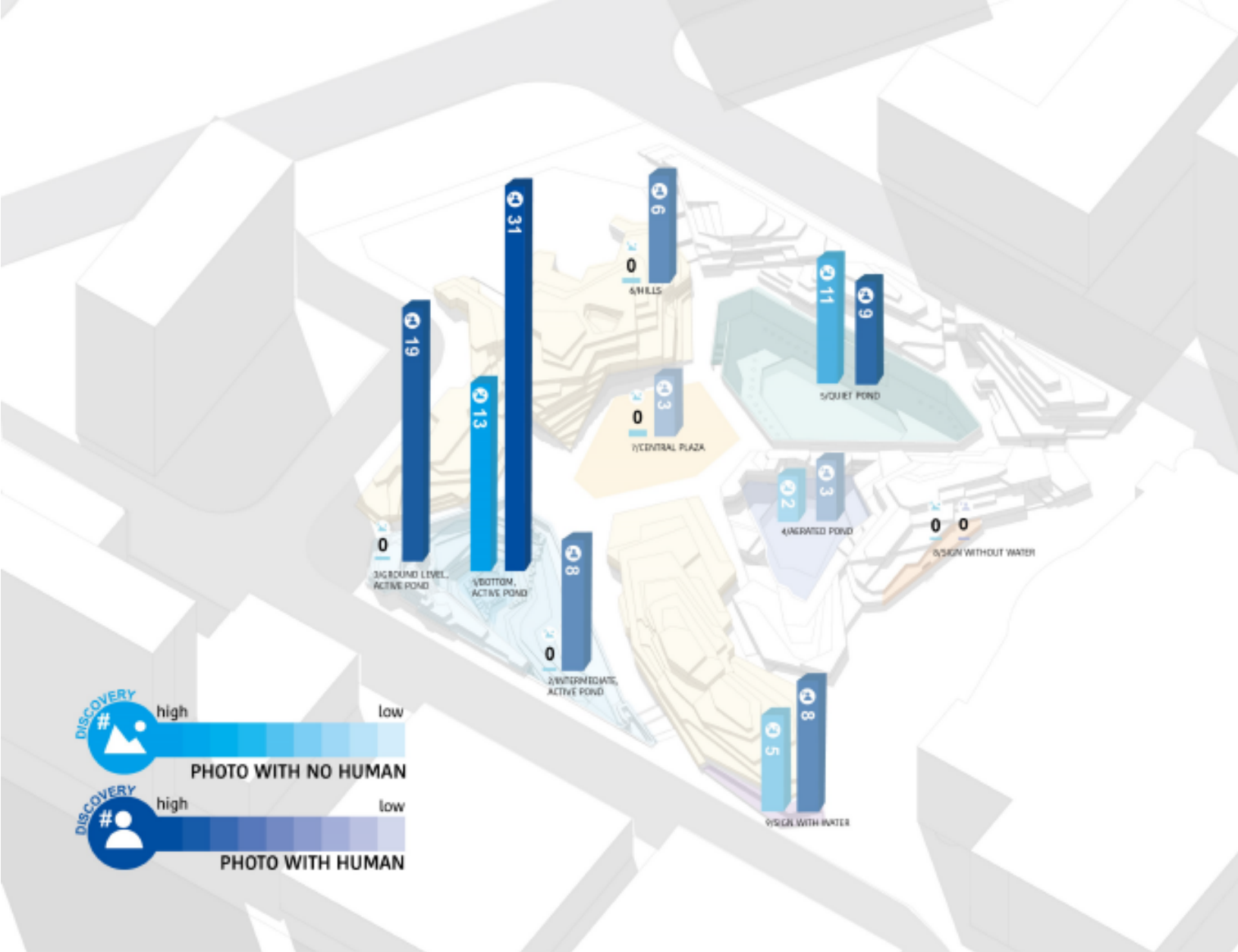
The great number of attachment hashtags in the hill area with the “with human” photos (20) and few of “scenery only” photos” (1) suggests that people like activities rather than scenery in this area. The zero number of attachment hashtags at the ground level active pond from “scenery only” photos indicates that few treated this area as a pleasing landscape image.



## UNDERSTANDING PERCEPTION OF DIFFERENT AREAS FROM GROUPED HASHTAGS EXPRESSIONS

The hashtags that revealed people's understanding of design (such as #architect, #design, #masterwork) were categorized into Design Dimension. The "Design" hashtags from the with-human photo posts indicate people's experiences of design were from activities in the area, mostly tagged in the active pond area(26), followed by the aerated pond(5), and quiet pond(4).

The "Design" hashtags from the scenery-only photo posts suggest people's experiences of design by looking at the scenery, tagged in the active pond(5) and the quiet pond areas(4).



## UNDERSTANDING PERCEPTION OF DIFFERENT AREAS FROM GROUPED HASHTAGS EXPRESSIONS

The hashtags that revealed people’s spatial exploration (such as #curious, #explore, #discovery, #engaging) were categorized into Discovery Dimension. The hashtags from the photo posts with human indicate the “real” discovery experiences, mostly tagged in the active pond area(31+8+19), followed by the quiet pond(9), the entrance with water features(8), and the hills area(6).

The hashtags from the photo posts with no human suggest the “anticipated” discovery experiences of people, tagged a lot at the bottom of the active pond(13) and the quiet pond areas(11).

# RESEARCH FINDINGS



The number of photos and hashtags indicated that water features are great landscape attractions.



The active pond was engaging to people and this was evident from the big gestures and smiling faces.



The steep terraced walls are far less safe, which should be avoided in future design.



They are associated with recorded activities, facial expressions, and stated emotions indicating water features help to generate engaging activities, and positive moods. This evidence demonstrates that water features are a big draw in city public space, which helps to enhance the vibrancy of city life.



The aerated pond had more seated activities, and generated surrealist perceptions.

The quiet pond attracted lots of human-water interactions, and people seemed to enjoy this feature as a landscape image with no human figures.

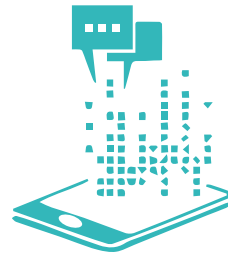


People often have a high sense of security or safety when they interact with water, though unsafe activities were still captured by Instagram images.

# RESEARCH SIGNIFICANCE

## USING **INSTAGRAM DATA** ABOUT FORT WORTH WATER GARDENS

- Huge and evergrowing data
- Financially economic
- Less time-consuming
- Meantime assessment
- Actively generated&self-posted data



1



2

## A NEW ANALYTIC PROCEDURE TO USE **CROWD-SOURCED DATA** TO RESEARCH SITE-SCALE LANDSCAPE PROJECT FROM:

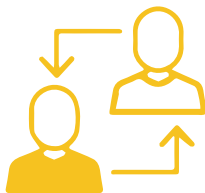
- Data mining and cleaning
- Coding and categorization
- Analysis
- Interpretation

## UNDERSTANDING **THE USE** OF FORT WORTH WATER GARDENS

- Popularity of 9 areas in the garden
- Human activities in the 9 areas
- Facial expression ties to the 9 areas
- Social dimension of the 9 areas



3



4

## AN ALTERNATIVE WAY TO **ACCESS AND MONITOR PUBLIC SPACES** FOR **PROFESSIONALS** SUCH AS:

- Landscape architects
- Garden managers
- Urban planners
- Urban geographers

## UNDERSTANDING **THE DESIGN** OF FORT WORTH WATER GARDENS

- Mindful of using different types of water features
- Give attention to the safety issues



5



6

## AN CREATIVE WAY TO **IMPROVE LA DESIGN**

- Confirm or disapprove of design claims
- Evaluate current landscape programs
- Rewrite design guidelines