

Massive stress or sustainable entertainment – Perceived sensory dimensions to combat stress and to enhance the sustainable city. A case study of Massive Entertainment.

ANDREAS JOHANSSON 2018
MVEM12 EXAMENSARBETE FÖR MASTEREXAMEN 30 HP
MILJÖVETENSKAP | LUNDS UNIVERSITET



Andreas Johansson
MVEM12 Master thesis for master's degree 30 hp, Lunds universitet
Internal supervisor: Helena Hanson, CEC, Lunds universitet
CEC – Centre for Environmental and Climate Research
Lunds universitet
Lund 2018



LUNDS
UNIVERSITET

WWW.CEC.LU.SE
WWW.LU.SE

Lunds universitet

Miljövetenskaplig utbildning
Centrum för miljö- och
klimatforskning
Ekologihuset
223 62 Lund

Abstract

More and more people around the world are feeling stressed, and the consequences have become a global burden. At the same time, cities are growing both spatially and from within, creating competition for land which sometimes comes at the cost to our access to nature. Natural settings provide people with stress relief, and some of the feelings we perceive in nature are more efficient at this than others. The proximity to nature has also been found to be of great importance for our creativeness and ability to recover from mental exhaustion.

In this study a survey ($N=95$) based on the 'eight perceived sensory dimensions' was conducted at Massive Entertainment, a big gaming company in Malmö Sweden, to understand how employees at a gaming company perceived their level of stress, affinity with nature and how they assess that these two factors correlate.

The results showed that stress is affecting a share of the responding employees and that this influence their ability to work. Some of the employees even flag for the risk of being affected by more serious mental health issues in the future. At the same time, a need for nature is prevalent and a majority of the respondents seek out urban nature content with the purpose of finding relief from stress. However, the move of the company to a new part of the city may reduce access to nature since the new location Eden is in a part of Malmö where very little nature is to be found.

By bringing nature content into the city, through a green roof designed to utilise the strengths of the planned garden at Eden, there seems to be benefits for both the company and their staff, as well as Malmö at a society level. Benefits in terms of a better working environment for the staff with potential to positively effect creativity and mental health, company publicity and possibly a reduction in sick-leave, and societal benefits stemming from better storm water management and less air pollutants. If these benefits were to be translated into corporate value, this may be enough to show that a green roof is a sound investment.

Keywords: Perceived sensory dimensions, stress, green roof, nature content, Massive Entertainment, sustainable urban development

List of contents

1.	Introduction	1
1.1.	Purpose	2
1.1.1.	Delimitations	3
2.	Theory - Eight perceived sensory dimensions.....	4
3.	Method	5
3.1.	Case; Massive Entertainment	5
3.2.	Literature review and spatial data collection	6
3.2.1.	Green area data.....	6
3.2.2.	Noise data.....	6
3.3.	Survey.....	7
3.4.	Analysis of survey results.....	9
3.5.	Interviews	9
4.	Results	10
4.1.	Location: amount of green space within 300 metres	10
4.2.	Location - Traffic noise.....	12
4.3.	The survey	13
4.3.1.	Preference for the different perceived sensory dimensions of nature.....	13
4.3.2.	Stress and nature.....	13
4.3.3.	Importance of urban nature	14
4.3.4.	Experienced levels of stress at work	14
4.3.5.	Stress-induced sick leave.....	15
4.3.6.	View on responsibility.....	15
4.4.	Green roofs	16
4.4.1.	Different types of green roofs.....	17
4.4.2.	Green roofs to improve mental health	18
4.4.3.	A green roof on Eden	18
5.	Discussion.....	22
5.1.	Massive stress?.....	22
5.2.	Increased greenery as value for Massive Entertainment?	23
5.3.	Will a green Eden be beneficial in a sustainable city perspective?	25
5.4.	Limitations.....	27
6.	Conclusion.....	28
	References	30
	Graphic references	35
	Appendix - Survey.....	36

1. Introduction

Stress-induced illnesses are a huge global health problem and the World Health Organization (WHO) expect that by 2020 mental health disorders and cardiovascular diseases are going to be two of the major causes for illnesses globally (WHO, 2017a). Stress is one of the largest causes of disability with more than 300 million people suffering worldwide (WHO, 2017a). Our bodies react in many different ways to stress (Aldwin, 2007), and if stress is sustained for a prolonged time the vital organs as well as the neuro-hormonal systems, can be seriously and harmfully effected (ibid.). Stress can also lead to depression, which is sometimes even fatal (WHO, 2017b). In many industrialized countries, work-related stress has become a major problem (Hasard et al., 2017). In Sweden, sick leave due to psychiatric concerns have increased, and the reported cases in 2010 were 82.000 compared to 139.000 in 2015 which represent an increase of 69% (Försäkringskassan, 2016). Since 2014 psychiatric diagnoses has been the most common reason for sick leave, but this was already the case for women in 2011 (ibid.).

To avoid the most serious threats to health which sustained periods of stress give rise to, people need to find the time to rest and recover. Nature has stress-reducing effects on people (Hartig & Evans, 1993) and just being able to see nature has been found to give relief from stress (Kaplan, 1993). According to Kaplan (2001), nature has a positive effect on recovery even without the participant being aware, due to the mind's ability to take in the surroundings subconsciously. Research points towards the fact that humans have an inherent preference towards undifferentiated and peaceful areas (Grahn and Stigsdotter, 2009) and a primal preference for surroundings that include natural content (Nisbet & Zelenski, 2011). During the past three decades research have pointed to urban green spaces as a resource for promoting public health by restoring mental fatigue (Kaplan, 2001), improve visual attention (Zijlema et al., 2017), concentration (Wallner et al., 2018), short-term memory and even people's empathy towards one another (SLU, 2017). Studies have shown that people even get more relaxed and concentrated at work, while feeling less stressed, if there is visible nature (Kaplan, 1993). The availability of nature might therefore be very valuable for the people who live and work in cities.

Maybe these areas can be used to reduce the stress of employees at a large computer game producer, like Massive Entertainment in Malmö?

According to the UN (2016), 60% of the world's population is estimated to live in urban settlements by 2030. In Sweden, this figure is 86% already (World Bank, 2018). While more and more people are moving into cities, it follows that cities expand in size and or density. A city grows either by spreading spatially, which in Sweden usually come at the cost of agricultural land (Statistics Sweden, 2003), or it grows by going through a densification process where the city becomes more compact (Pauleit & Golding, 2005). But densification also risk bringing side effects such as reduced accessibility to green space which reduces the opportunities for stress relief (Pauleit & Golding, 2005; Haaland & van den Bosch, 2015; Miljömål, 2015) and an increased problem with traffic noise (Miljömål, 2016). Westman and Walters (1981) urged already in the early 80's that measures against noise must be taken due to its negative effects on human health. It disrupts sleep and rest, creates stress (ibid.) and has detrimental effects on the cardiovascular systems (van Kempen, 2011; Gatukontoret, 2013).

According to Miljöförvaltningen (2017) the traffic noise in Malmö during 2014 was estimated at a societal cost of 520 million SEK/year.

The importance of a short distance to green areas for city dwellers has been acknowledged by the UN (United Nations, 2015). In Agenda 2030, one of the goal targets to achieve “Sustainable cities and communities”, specifically states the importance of peoples’ access to green space for a sustainable urban development (UN, 2017). Currently, a 300 metres standard is being used by governments around the world, including Sweden’s (Prop. 2007/08:110). It is understood that 300 metres is the distance within which people, in general, are willing to walk to visit a green area (Boverket, 2007). Boverket (2007) makes a distinction they call Nature Close to Residence, NCR, which includes both nature- and cultural landscapes as well as managed green areas like neighbourhood yards and parks. (ibid.).

Apart from planning to avoid the exploitation of green areas when densifying a city, various kinds of green infrastructure (GI) can be brought into the city (Haaland & van den Bosch, 2015). Green roofs are such GI, where roofs are designed to host nature in various forms, and for different means (ibid.). Another example of GI, which also may be of interest in cities where space is scarce but the need for nature is evident, is green interior where office walls are clad in vegetation and plants are used as wall dividers (Gou, 2015).

Jansson, Persson and Östman (2013) writes in their rapport that the availability of GI in cities, both from vegetation and water, ‘green and blue elements’, affects a city in a variety of ways. Ecosystem services (ES), in short; the benefits which arise for us through the functions that the ecosystems create, stems from water and vegetation (MA, 2005). Green and blue elements are vital to approach a vision towards a sustainable city which rests on ecological, economic and social pillars as its foundation (Dreiseitl, 2015; Jansson et al., 2013).

Malmö is a hub for technological innovation and several computer game companies are based in the city, one of which is the Ubisoft-owned studio Massive Entertainment (The Local, 2017). The computer game industry is a huge business and the global revenues for 2017 reached approximately 149 billion dollars, which made it on par with sports (Gamesindustry, 2017). In the gaming industry, “crunching” is a term for incredibly intense periods of work, usually in the later stages of a project with workdays reaching 20 hours (NY Times, 2017). Crunching, or crunch time, has been found to increase the levels of stress amongst employees (Edholm et al., 2017). In a survey done by the International Game Developers Association, over half of the respondents stated they ‘crunched’ at least once a year (Weststar & Legault, 2016). David Polfeldt, CEO of Massive Entertainment, (Feber, 2017) explains that a game can take five years to produce of which the first three years may mostly consist of conceptualising extensive ideas. Then comes the much more demanding period where all these ideas must be converted into something tangible. Massive Entertainment implemented a new code of conduct in 2018, in which they vow to provide a safe workplace where the risks of stress is kept at a minimum (Massive Entertainment, n.d.).

Maybe producers of games have reason to consider their role in the sustainable city?

1.1. Purpose

The aim of this master thesis is to understand how employees at a gaming company experience stress and how they perceive and use nature to combat stress.

The intention is to discover the potential of using a framework based on the eight perceived sensory dimensions (Grahn & Stigsdotter, 2009) connected to urban green spaces, and to apply this framework to discuss measures to combat stress by using nature content, based on the experienced levels of stress amongst the employees at Massive Entertainment. Massive Entertainment is of interest since they have recently acquired a whole city block to which they are moving their business, and this is located in a part of the city with less access to nature compared to where they move from.

The following research questions are asked:

1. What does the employees at Massive Entertainment have to say about their experiences of stress at work?
2. Which perceived dimensions of nature does the employees at Massive Entertainment appreciate when visiting nature?
3. How do the employees at Massive Entertainment experience nature in regard of finding relief from stress?
4. Can the move to new locations mean a change in access to green areas within 300 metres and levels of noise?
5. Can building green fulfil the needs of the employees at Massive Entertainment, based on the results from the survey?

There will in the discussion also be a certain focus on: *will there be any additional benefits from such a measure, seen from a sustainable city perspective* and/or if this: *can translate into value for Massive Entertainment as a company?*

1.1.1. Delimitations

Since no information on the carrying capacity of the roof frames of the building in Eden could be provided, an approximation was done with the help of experts, on what kind of green roof the building can support.

2. Theory - Eight perceived sensory dimensions

The theoretical framework of the study is based on the ‘eight perceived sensory dimensions’ (PSDs) developed by Grahn and Stigsdotter (2009). In their study, they identified and described eight PSDs in urban green spaces: Serene, Space, Nature, Rich in species, Refuge, Culture, Prospect and Social (Table 1). They based their study on a questionnaire divided into pre-coded questions regarding personal data, preferences for natural quality and self-estimations of health status, answered by 953 randomly selected respondents representative of the Swedish population (ibid.). Grahn and Stigsdotter (2009) writes that their results are similar to those of several other prior studies (for example, Grahn & Sorte, 1985; Kyttä & Kahila, 2005; van Herzele, 2006; Stockholms regionplane- och trafikkontor, 2001) ranging from between 1985 to 2007. In general, the most popular dimension perceived by the respondents is Serene, followed by Space, Nature, Rich in species, Refuge, Culture, Prospect and Social.

Table 1.

Short in-depth descriptions of the eight perceived sensory dimensions. Interpretations are based upon the study by Grahn & Stigsdotter (2009).

<i>Culture</i>	<i>Nature</i>	<i>Prospect</i>	<i>Refuge</i>
“This can be explained in terms of people’s need to understand the surrounding environment in terms of nature or culture.” Myths and symbols can play a major role in how people form their values of the environment.	“An experience of the inherent force and power of nature, designed and manifested on nature’s own terms.” [...] “the presence of nature is perhaps the most essential experienced dimension of urban green spaces: the degree to which ‘nature’ is perceived in contrast to ‘non-nature’”	“Summarized as having a content of open and plane areas with a prospect, i.e. vistas over the surroundings.” Can be traced back to theories about how our ancestors preferred certain environments when they were looking for a place to settle. Open areas with a view could be such a location, since it promoted survival by allowing them to detect danger.	“An enclosed and safe environment, where people can play or watch other people being active.” Can perhaps be traced back to the time our ancestors tried to find a safe place to hide.
<i>Rich in species</i>	<i>Serene</i>	<i>Social</i>	<i>Space</i>
“The importance of finding a wide range of expressions of life: many birds, butterflies, flowers, etc”. This is a conclusion based on the “Biophilia hypothesis” (Wilson, 1984; Kellert & Wilson, 1993, referred through Grahn & Stigsdotter, 2009). The hypothesis suggests that people have a strong and inherent interest in finding signs of life in their environment, as manifested by multiple species.	This factor can be interpreted as a safe and calm environment where people can experience silence. A kind of retreat for those who wish to be undisturbed.	“Environment that is equipped for social activities”. Earlier research (Gehl & Gemzøe, 1996, referred through Grahn & Stigsdotter, 2009) claims that easily accessible places, where people can meet, amuse themselves and watch one another, are of utmost importance when we aim to build sustainable and successful cities.	This factor can be understood as the experience of a spacious and free green environment, which has a certain amount of connectedness.

To detect the connections between each of the eight perceived dimensions and level of stress respectively, Grahn and Stigsdotter (2009) analysed their informants’ responses statistically and found that reduced levels of stress were related to Space, Refuge, Nature and Serene. The two dimensions most strongly related to reduced stress levels are Refuge and Nature, which indicates that we have a need for finding the most restorative environment (ibid.).

The theoretical framework has previously been used in the context of urban green areas, such as urban parks. For this master thesis, the underlying concept will however be applied to the

potential for greenery in the close surroundings to the case study (i.e. block Eden). Mainly, it will be applied to a theoretical green roof for the block “Eden” in Malmö, and the potential benefits it may have in addressing high levels of stress, and other hypothetical positive effects it may give rise to.

3. Method

In this section, the methods used throughout the thesis will be described

3.1. Case; Massive Entertainment

The video game studio Massive Entertainment (formally named Ubisoft Entertainment Sweden AB) started in 1997 and is a fully owned subsidiary of Ubisoft Entertainment SA based in Paris (Massive Entertainment, 2017). It is located in Malmö (Drottninggatan number 34) and as of April 30th, 2018, Massive had 518 employees whereof 19% were women (Alf Condelius, personal communication, 28th May 2018).

In October 2016, a subsidiary named “Ubisoft Fastigheter AB” was acquired, with a real estate (assumed to be..) the city block Eden in Malmö to expand their business. Eden is situated in a different part of Malmö as compared to its current facilities on Drottninggatan (Fig 1). There are also plans to open a new office in Stockholm (Massive, 2017).

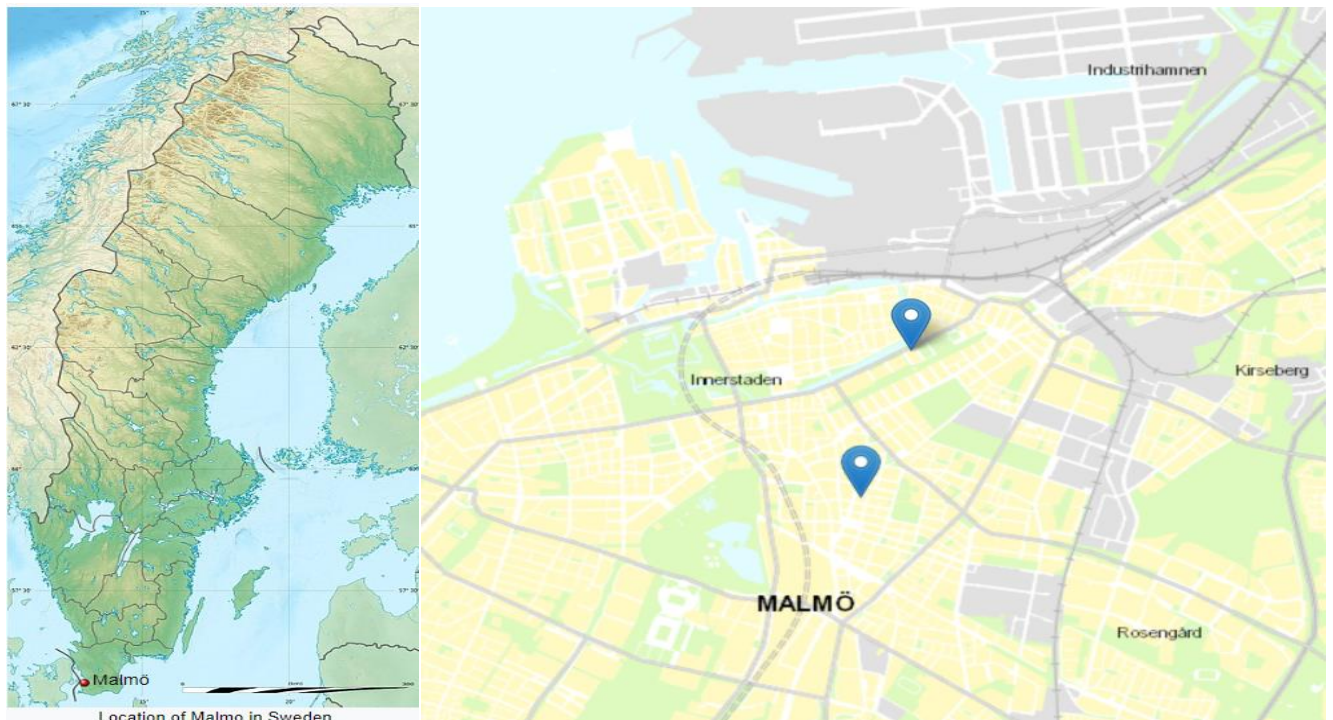


Figure 1. Left: Malmö is in the southwest of Sweden. Right: Topmost marker shows Massive Entertainment's current location and bottommost marker shows Eden, their coming localisation.

Massive Entertainment's project 'Tom Clancy's the Division', sold more copies in 24 hours than any game in Ubisoft's history. Overall, it was the fastest selling new game franchise in its first week of release (Massive Entertainment, 2018). 'The Division' has today ca 20 million registered players.

In 2018, Massive released a new code of conduct (Jenny Berg Nilson, personal communication, 26th January, 2018). and in the very first paragraph, the company express a

commitment to reduce the social and environmental impacts of their rapidly expanding business. The code of conduct is divided into seven areas of responsibility; some of these directly refer to employee health issues and environmental concern. Area three (3), concerning the workplace says: *“Massive is committed to providing all employees with a safe and secure work environment. We will continue to strive to optimize our workplace to both eliminate health risks and minimize stress.”* (Massive, n.d. p2). In area five (5) and six (6) which cover product responsibility and the supply chain, Massive promises to commit to both human rights and environmental concern. Partners are expected to be in full compliance with both domestic and international laws governing these matters and if a supplier fail to comply with the Code and fail to address the issue even after assistance have been offered to them by Massive, then the cooperation shall be terminated.

3.2. Literature review and spatial data collection

The literature used in this report has been found through database searches, the snowball effect and recommendations from people well informed in the subject such as my university supervisor and/or professionals working within relevant fields of expertise.

The tools used for finding literature were the discovery service LUBSearch (the Lund University search engine), databases (Web of science core collection, Science Direct freedom collection) and the search engine, Google Scholar. Additional information of value has been gathered through websites from companies and organisations deemed trustworthy and knowledgeable. Interviews and email-correspondence has also been used as a source of information.

For information on green roofs, search phrases such as “green roof ecosystem services”, “green roof benefits” and “green roof cost benefit” were used. The option “peer reviewed” were ticked. To narrow down the search results into a manageable number of publications, a second step was taken. All titles, abstracts and keywords of each search were scanned, to find those which seemed of most relevance for the case-study. For determining the relevance, consideration was given to studies who were conducted in areas similar to Malmö. This weeding out process was performed to obtain a literature basis upon with an overview of the field could be achieved. For deciding when to stop actively trying to add new literature, Bryman (2011) argues that when the material collected doesn’t raise any new aspects and when similar themes are repeatedly encountered, it can be regarded as a “theoretical saturation”.

3.2.1. Green area data

Maps over Malmö and relevant areas has been acquired by using online tools available at Eniro (<https://kartor.eniro.se/>) and Malmö Stad (<https://malmo.se/Bo-bygga--miljo/Lantmateri/Webbkartor.html>). The latter have been used to measure sizes of different areas, like green areas and rooftops. The 300-metre radius was visualised at Malmö Stad’s website ‘Stadsatlas’ – ‘Rita och mät/cirkel’. These maps were produced for comparative reasons between the current and the new localisation of Massive Entertainments’ facilities.

3.2.2. Noise data

Malmö Stad also provides noise maps over the city and these were used to show levels of noise at Eden’s location. To use it, one simply enters the address of choice, in this case ‘Barkgatan’, while making sure “Vägbuller” is active.

3.3. Survey

To gather empiric knowledge of how the employees at Massive Entertainment experience stress, and what their thoughts on nature content in cities are like, an e-survey was conducted. The construction of the e-survey followed recommendations in Bryman (2011), and two pilot runs was performed prior to the actual survey. The purpose of the pilot runs was to gather information on how to make the questions easier to understand. The participants for the pilot run were volunteers from the authors' network and none of them were affiliated with Massive Entertainment.

In the social sciences, surveys are regarded as being very similar to interviews (Bryman, 2011). For the purpose of this master thesis, a survey was chosen as they -compared to interviews -are faster to conduct, easier to fit into the respondents' time schedule and there is no risk for the answers to be affected by the interviewer (ibid.).

Shortcomings with surveys (in comparison to interviews) are the inability to ask follow-up questions; shallowness of questions and answers and the risk of the responder becoming tired of answering questions and rapidly answer a number of questions to get it over with. Another important shortcoming is the fact that there is usually a larger portion of absentees compared to interviews which can potentially endanger the representativeness of the survey (ibid.). By careful planning and pilot runs, the shortcomings of surveys were considered.

When designing the survey questions, some considerations were taken into account to increase the chance of improving the response frequency. In their book "Persuasion; Psychological insights and perspectives", Brock and Green (2005) asks the question "Which are the most powerful principles that motivate us to comply with another's requests?". The answer to this question is that there are six pervasive principles of influence that people seem to be susceptible to; *reciprocity*, *social validation*, *commitment/consistency*, *friendship/liking*, *scarcity* and *authority* (ibid.). In regard to the principles presented in the book, and with the experience (referring to the author of this master thesis) from being part of the 'gamer community' since childhood, an approach was taken which differs somewhat too many other surveys found in scientific contexts. The idea at mind was that the response frequency would increase if the responders would not find the questions too dull and boring, and if the questions could appeal to the respondents' interests they would be received well and an interest for answering the survey could, perhaps, be spread by word of mouth, too.

Of the six pervasive principles, two main principles were of interest, and a third was identified as being a passive outcome if the survey was well received (see Table 2). Efforts were made to try and incorporate important parts of these principles when designing the survey.

Table 2.
Summary of pervasive principles (Brock & Green, 2005) used in construction of the survey questions and information.

Relevance	Principle	Short explanation
Main	Friendship/liking	We like people who are similar to us, and we are more favourably inclined toward the needs of those we like.
	Authority	"One should be more willing to follow the suggestions of someone who is a legitimate authority."
Secondary	Social validation	"The more people who are performing a behaviour, the stronger is our likelihood of doing it as well."

Since some of the questions concerns mental illness and absence from work, it was important to try and ensure a true sense of anonymity. This was done by leaving out questions concerning which department of Massive Entertainment the respondent belongs to. After consulting with a Massive Entertainment employee about the age groups represented, it was decided to use only three age categories with the highest age denomination “34-ancient”. This was done to make sure no one felt they could be singled out by deductive reasoning, which else might have been perceived as being possible (Markus Holmberg, personal communication, April 4, 2018).

For some of the survey questions, an explanatory text preceded the question. For example; after a brief introduction of how stress affects both society at large and the affected person and its family specifically, the question was asked “Have you ever, due to stress, or stress-induced illness, been forced to stay home instead of going to work?”

One of the questions asked the respondent to tell, by using a slider ranging from 0 to 100, how stressful they experienced work. There are, to the knowledge of this author, no similar attempts to draw upon and as such, a definition was provided to help the responder to interpret the scale. The definition of the scale was “Imagine 0 as being totally fine and 100 as a stage where you have crossed the border to mental unhealth; panic attacks, insomnia, depression, "enter the wall" etc.”. The choice to include a slider to represent levels of experienced stress, with no backing from earlier studies, was done on the premise that stress is a highly personal feeling and what was important was to allow the respondent a chance to express their own feelings.

In an attempt to reduce the risk for preconceptions towards the established terms concerning the perceived sensory dimensions, these were presented by their descriptions instead of established terms. These are presented in table 3.

Table 3.

The PSDs with their corresponding description relating to the survey matrix. The survey presented the descriptions along with five answering options arranged as a Likert scale with answers of varying degrees of agree/disagree. The descriptions are taken from Grahn and Stigsdotter (2009) and was used, instead of the PSD name, in an attempt to eliminate the risk of personal interpretation and to get a more unified understanding as a base from which to answer the survey question.

PERCEIVED SENSORY DIMENSION	SURVEY DESCRIPTION
Culture	To experience where nature meet human culture, and how history, myth and symbols are found and understood.
Nature	The inherent force and power in nature. It's awesome, because it's nature!
Prospect	A desire to be able to see far and wide. Like our ancestors' desire to have a clear view of the surroundings to avoid dangers.
Refuge	To enjoy a safe and enclosed environment. Also, a place where we can play, or watch other people being active.
Rich in species	In finding signs of life in my environment, and the richer the variety of colours, sounds and scents, the better!
Serene	An environment for retreat. Silent, undisturbed and calm.
Social	Nature as an environment for social activities. A place where we can meet, amuse ourselves and watch one another.
Space	The feeling of a green, spacious environment, preferably large enough to also give a sense of connecting with surrounding areas.

To conduct the survey, ‘Sunet Survey – a survey tool’ was used, which is available through Lund University. It is a survey tool designed for online surveys within quality assurance and research (Lund University, 2017). Sunet Survey is a commercial IT system that has been procured in accordance with the Swedish Public Procurement Act. For the complete survey, see Appendix 1. The survey was open between 2018-04-13 and 2018-05-04. Reminders was

sent out both formally through the HR-department at Massive and informally through acquaintances to the author, working at Massive.

The definition of ‘nature’ was deliberately broad and contained not only visual experiences like seeing birds, flowers, trees etc from where they work, or if the respondent can reach a green urban area during a lunch break, it also included sensations of sound and smells too.

3.4. Analysis of survey results

To discover which of the eight PSDs was the most preferred when visiting urban nature areas, the arithmetic means was calculated. “Essential, I require it for my wellbeing” was chosen as a tiebreaker due to its presumed positive impact on the responders.

3.5. Interviews

Three interviews were conducted. One semi-structured interview with the sustainability manager at Massive Entertainment and two more open interviews with two experts, one landscape architect with experience of PSD’s and one green roof-expert from the Scandinavian Green Roof Institute. The aim with the two more open interviews were to find out what kind of green roof Eden could support and how PSDs could be utilized when designing urban nature content. From the interview with Massive’s sustainability manager, information was collected on the company’s view on sustainability matters, code of conduct and plans concerning Eden. Unfortunately, the sustainability manager resigned close after our meeting and no new contact was available to follow up on the first meeting.

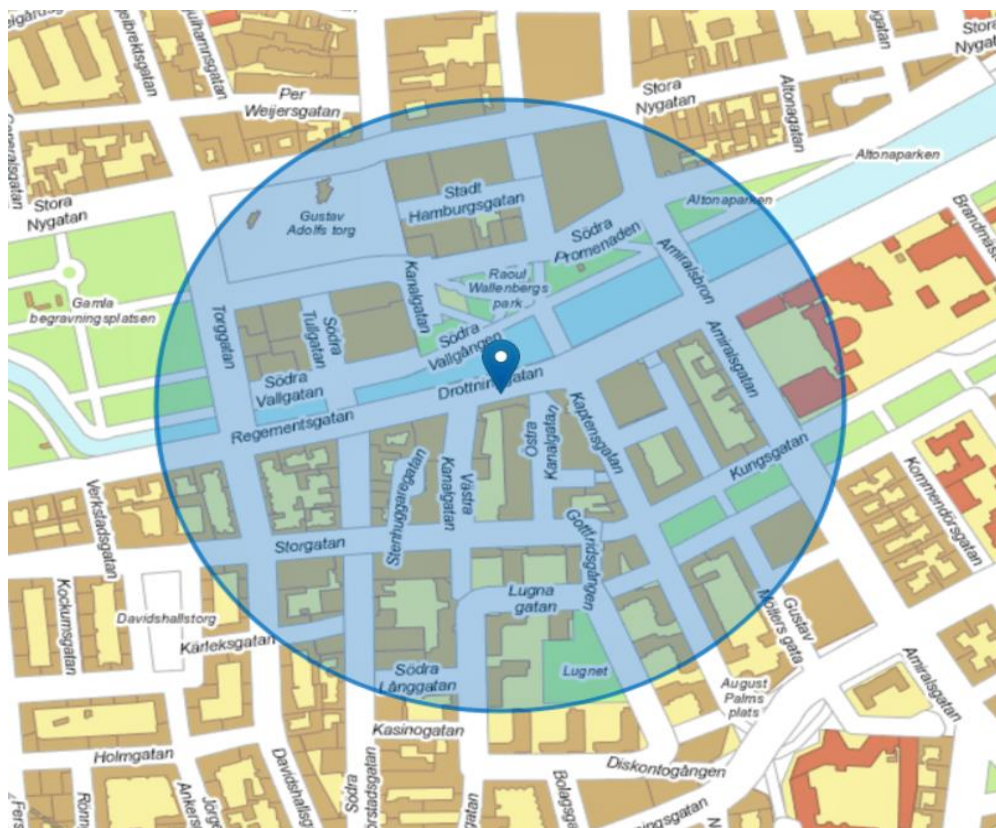
4. Results

This section will start with presenting the current- and future facilities Massive and the surroundings, focusing on access to green areas and noise from traffic. Thereafter the focus will be on the survey results, followed by the green roofs and the potential benefits they bring, as well as a few examples on what both green roofs and green interior may look like.

4.1. Location: amount of green space within 300 metres

Massive Entertainment's current localisation (hence after called "Drottninggatan", Figure 1), differs somewhat to the parts of the city where Eden is located.

Within 300 metres from Drottninggatan, the employees at Massive Entertainment can both access green areas (Table 4) and get close to water, in the form of the canal that runs through Malmö. This is also the view from the windows facing north where Raoul Wallenbergs park lies in close vicinity to Altonaparken, only separated by Amiralsgatan. To the south lies Lugnet and to the south east is the green boulevard like area with Kungsgatan on either side. To the North west lies Gamla begravningsplatsen which partly is within the 300 metres radius. Although only ca 3000 m² is within the limit, it's generous size of connected nature content will be considered as an accessible green area.



Name and area of green areas within 300 metres to 'Drottninggatan'

Altonaparken
1986 m²

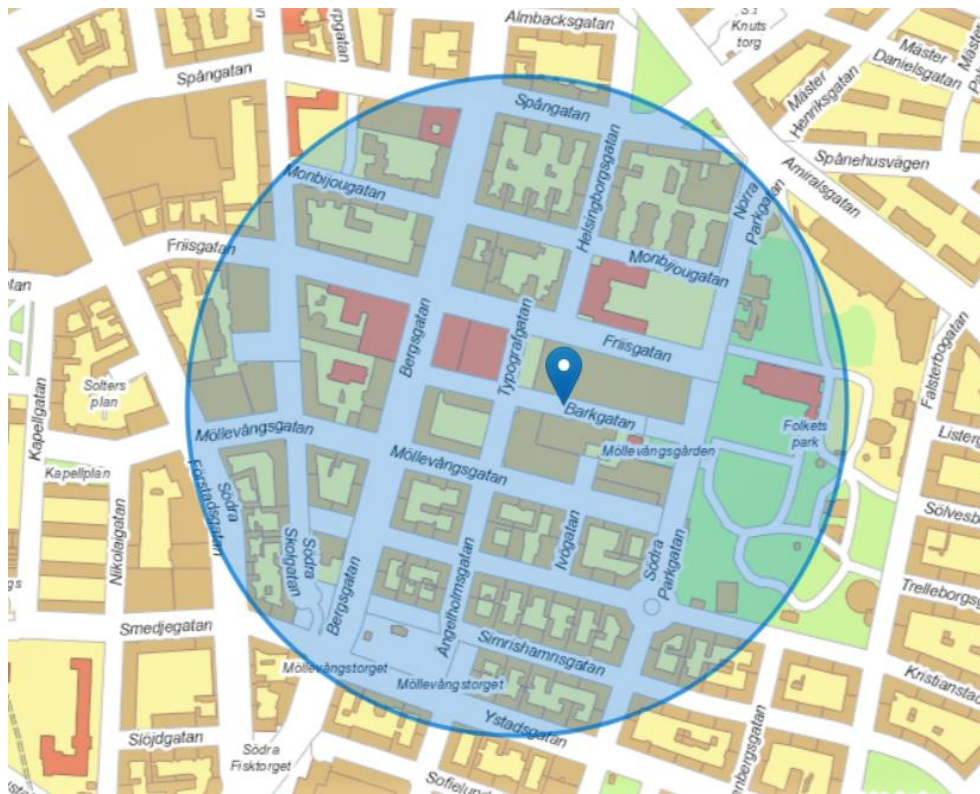
Gamla begravningsplatsen
3041 m² out of 32 447 m²

Kungsgatan
3142 m²

Lugnet
4273 m²

Raoul Wallenbergs park
6844 m²

Figure 2. Massive at Drottninggatan, with a 300-metre radius. Five different green areas are accessible within 300 metres and some of them are also located close to water (Malmö stad, 2018).



Name and area of green areas within 300 metres to 'Eden'
Eden roof 2268 m ²
Eden yard 1585 m ²
Folkets park 15 830 m ² out of 50 025 m ²

Figure 3. Massive at Eden, with a 300-metre radius. Eden is the block where Barkgatan reaches Bergsgatan. The only green area within 300 metres is a small part of Folkets park (Malmö stad, 2018).

The part of the city where Eden is located is different to Drottninggatan. Here, the only green area within 300 metres is Folkets Park. This is not a park mainly consisting of nature content. Due to its character of being a 'People's park', it is full of social activity features like bike rides for kids, playful dancing games, miniature golf and some of the lawns are not even natural grass, but plastic grass. Of the ca 15000 m² of the park that lies within the 300-metre radius, only a small portion actually consists of actual nature content.

At Eden, a yard is planned to replace the parking lot within the block, an approximation of its size is provided in table 4. The green roof is not being planned for and does not exist either but was included to show its potential as a green area.

Table 4.

Summary of green areas accessible within 300 metres from Massive Entertainments current (Drottninggatan, white colour) and future (Eden, orange colour) location. Rank is based on area size. Neither the yard or roof exists as of today, but there are plans for the yard, and the roof is an approximation by the author.

Ranking m ²	Name	Size	Location
1	Folkets park	15 830 m ²	Eden
2	Raoul Wallenbergs park	6844 m ²	Drottninggatan
3	Lugnet	4273 m ²	Drottninggatan
4	Kungsgatan	3142 m ²	Drottninggatan
5	Gamla begravningsplatsen	3041 m ²	Drottninggatan
6	Eden roof	2268 m ²	Eden
7	Altonaparken	1986 m ²	Drottninggatan
8	Eden yard	1585 m ²	Eden

4.2. Location - Traffic noise

Presented below are noise maps showing first Drottninggatan, then where Eden is located, in the corner of Barkgatan/Bergsgatan. Drottninggatan is measured to exceed 70 dB and the two smaller streets on each side of Massive's locales are in the 45-55 dB interval. Bergsgatan is measured to over 70 dB while Barkgatan can be interpreted as being within 55 to 65 dB. Both these levels are subject to regulations. In SFS 2015:216, a regulation governing traffic noise close to residences, the following is said:

3 § Noise from rail traffic and roads should not exceed

1. 60 dBA equivalent noise level at the façade of a residence, and
2. 50 dBA equivalent noise level and 70 dBA maximum noise level at a patio of such a one is to be provided in connection to the building.

Gatukontoret (2013) points out that noise can be harmful even below these benchmarks. Albeit these levels are developed for residences close to roads and rail roads, a work place is somewhere a person spends a lot of time and noise's disruptive effects on learning and performance (Malmö stad, 2013) can still be applicable.

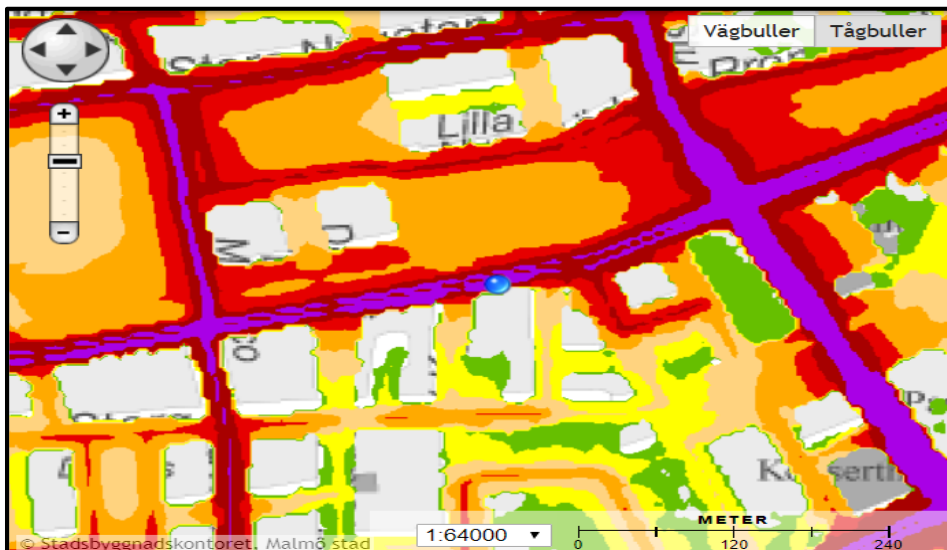
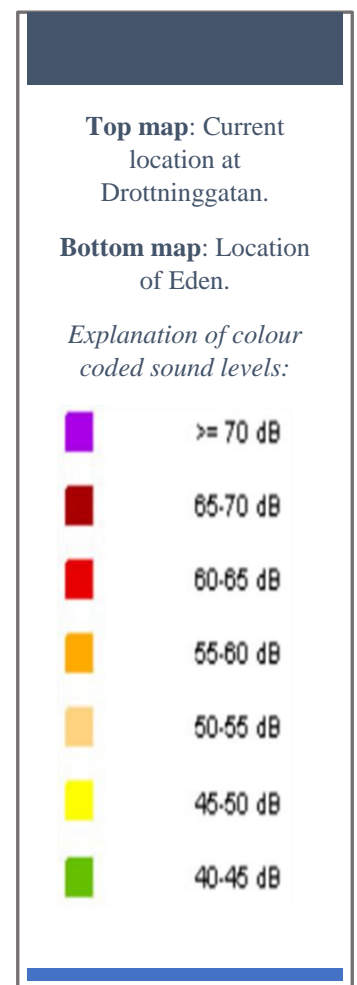


Figure 4. Noise map of Drottninggatan with surroundings. Massive is located at the blue dot (Malmö stad. Stadsbyggnadskontoret, 2018).



Figure 5. Noise map of area around Eden. Eden is located at the blue dot and the map is made on model calculations in 2017 (Malmö stad. Stadsbyggnadskontoret, 2018).



4.3. The survey

The total numbers of respondents were 95, constituting 18% of the 518 employees per the last of April, 2018. Out of the 95 respondents, 62 answered “male” (65%), 30 answered “female” (32%) and 3 answered “they” (3%). For the complete survey results, see Appendix 1.

4.3.1. Preference for the different perceived sensory dimensions of nature

The informants have the highest preference (“Essential, I require it for my wellbeing”) for the PSD Serene followed by Space and Rich in Species (Table 5).

Table 5

The preference for each PSD sorted by preference.

	Unwanted, I avoid this	Not important to me	Don't know/Haven't thought of it	Important, I enjoy it	Essential, I require it for my wellbeing
<i>Serene</i>	0 %	5 %	3 %	41 %	50 %
<i>Space</i>	1 %	5 %	20 %	45 %	28 %
<i>Rich in species</i>	0 %	9 %	19 %	47 %	24 %
<i>Prospect</i>	0 %	17 %	19 %	45 %	19 %
<i>Nature</i>	0 %	8 %	13 %	63 %	16 %
<i>Social</i>	3 %	26 %	16 %	42 %	13 %
<i>Refuge</i>	2 %	20 %	16 %	50 %	12 %
<i>Culture</i>	0 %	17 %	41 %	38 %	4 %

The ranking of PSDs is based on the arithmetic mean value. At the bottom, Culture is found, sharing the same population mean as Social but with only 4% of the responders giving Culture the highest preference as compared to 13% Social (table 6).

Table 6

The survey respondents' preference for the eight PSDs presented with arithmetic mean values. Rank based on population mean with “Essential, I require it for my wellbeing (N*)” as a tiebreaker.

<i>The eight perceived sensory dimensions</i>	N*	Population mean	S.D.	Rank
<i>Serene</i>	50 %	4.4	0.8	1
<i>Space</i>	28 %	3.9	0.9	2
<i>Rich in species</i>	24 %	3.9	0.9	3
<i>Nature</i>	16 %	3.9	0.8	4
<i>Prospect</i>	19 %	3.7	1.0	5
<i>Refuge</i>	12 %	3.5	1.0	6
<i>Social</i>	13 %	3.3	1.1	7
<i>Culture</i>	4 %	3.3	0.8	8

4.3.2. Stress and nature

The survey showed that 41% were being stressed in general while 88% experienced higher levels of negative stress at work (Figure 5).

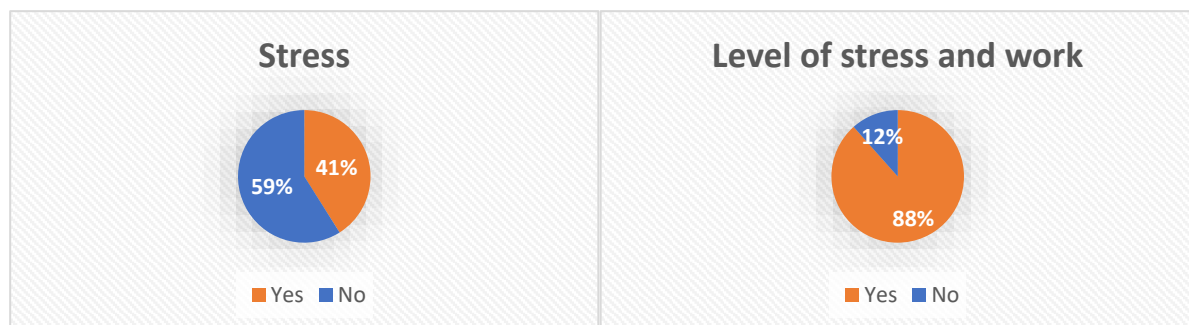


Figure 6. A comparison of experienced stress. The respondents were asked both “In general, would you describe yourself as being stressed?” [left diagram] and “Do you feel work can make you experience higher levels of negative stress?” [right diagram].

4.3.3. Importance of urban nature

Most respondents agreed completely with the statement “I need nature content in cities to feel good”. Only 4% stated they disagreed, either completely or somewhat while 94% agreed either completely or somewhat (Figure 6).

Most responders (90%) answered that “yes” they feel better if they can experience nature during a workday (Figure 7, left bar). The bar to the right in Figure 7 shows that almost 77% of the responders has the habit of visiting city areas due to its content of nature with the purpose to feel less stressed, if even for only a little while.

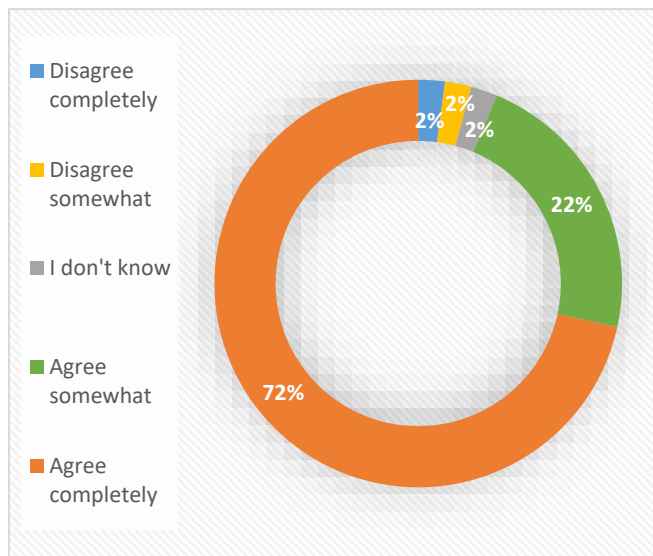


Figure 7. 72% agreed completely with the statement "I need nature content in cities to feel good. 22% agrees somewhat and remaining 6% either disagree or does not know.

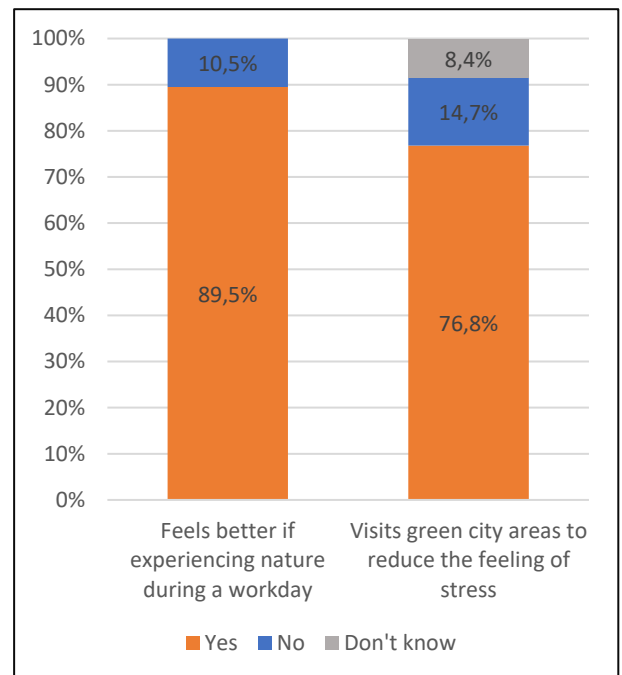


Figure 7. Almost nine out of ten respondents appreciate experiencing some sort of nature during a workday and approximately three out of four actively seeks out urban nature areas.

4.3.4. Experienced levels of stress at work

From the original 95 responders, 84 subjects answered this follow-up question on whether work made them experience higher levels of negative stress. Only one respondent answered in the range 0-10 on the scale and 14 respondents gave answers between the 90-100 range, which indicates that 17% of the responders are experiencing what can be a critical condition where they may suffer from severe mental unhealth. If looking at the lower third, 0-30, 17 respondents fall into this category while 37 respondents (45%) believes themselves to be in the upper third, 70-100 (figure 8). To answer the question, they were presented with a slider which they were instructed to use to show an interval of how stressful they experienced work would be. The lowest (0) and upper (100) limits, was exemplified as respectively “totally fine” and “a stage where you have crossed the border to mental illness; panic attacks, insomnia, depression, ‘enter the wall’ etc”.

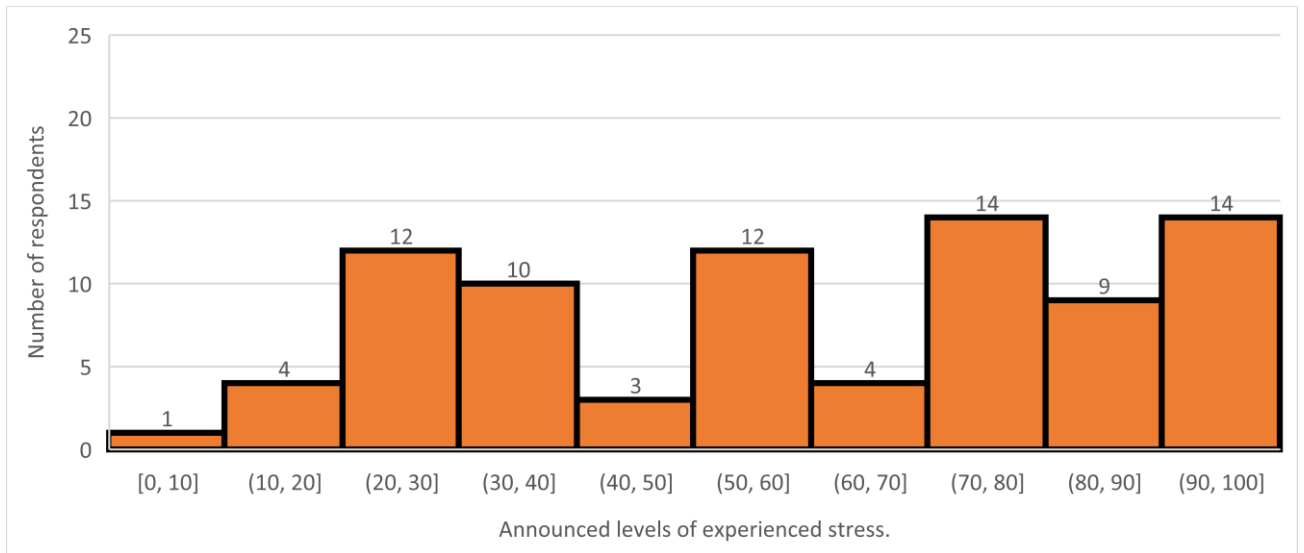


Figure 8. The number of responders that experience different levels of stress at work. The question was answered by using a slider where 0 represented 'fine' and 100 represents when 'mental unhealth is present and the respondent is faring ill'.

4.3.5. Stress-induced sick leave

The effects of stress manifests itself in the employees' ability to work. In all, 33% stated that they have called in sick due to stress-related illness, either for 'a longer period' (15%) or 'for a day or so' (18%) (Figure 9). Another 31% mean that they are currently struggling with stress-related health issues from time to time (6%) or that they probably should have called in sick in the past (25%). The remaining 36% announced that they have never been forced to stay home from work due to stress.

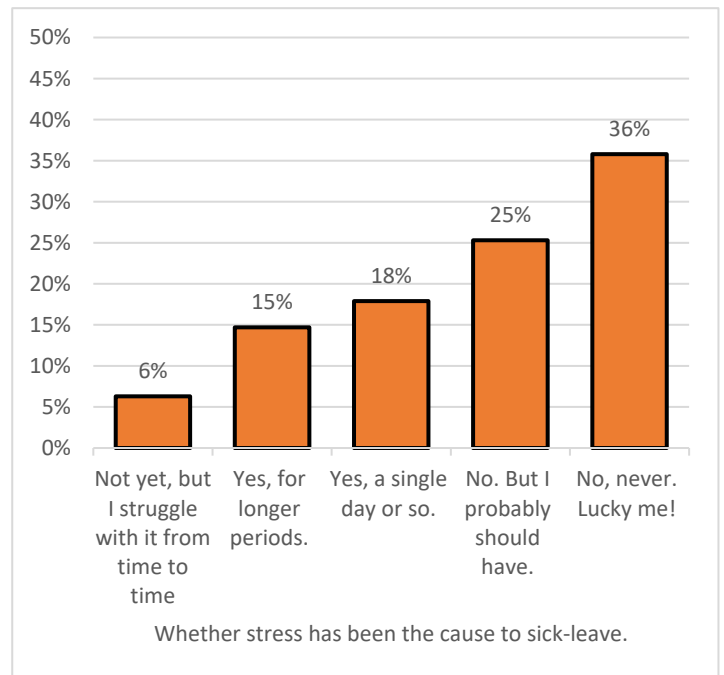


Figure 9. The response rate of the respondents in relation to sick leave.

4.3.6. View on responsibility

Almost 90% has some expectations or hope in that their employer will try and provide some nature content (Figure 10 A). There is a clear consensus regarding the expectations on management to combat stress; 93% expects it (Figure 10 B). Regarding information about stress and the offering of help to those in need, there is also a clear majority expecting this (75%) and another 22% hoping the managers *are open to the thought it* (Figure 10 C). In both these topics, not a single respondent believes that the company has no responsibility at all. Almost 8 out of 10 think the company does have some responsibility regarding remote impacts caused by the business, while 16% chose the option *No opinion/don't know* (Figure 10 D).

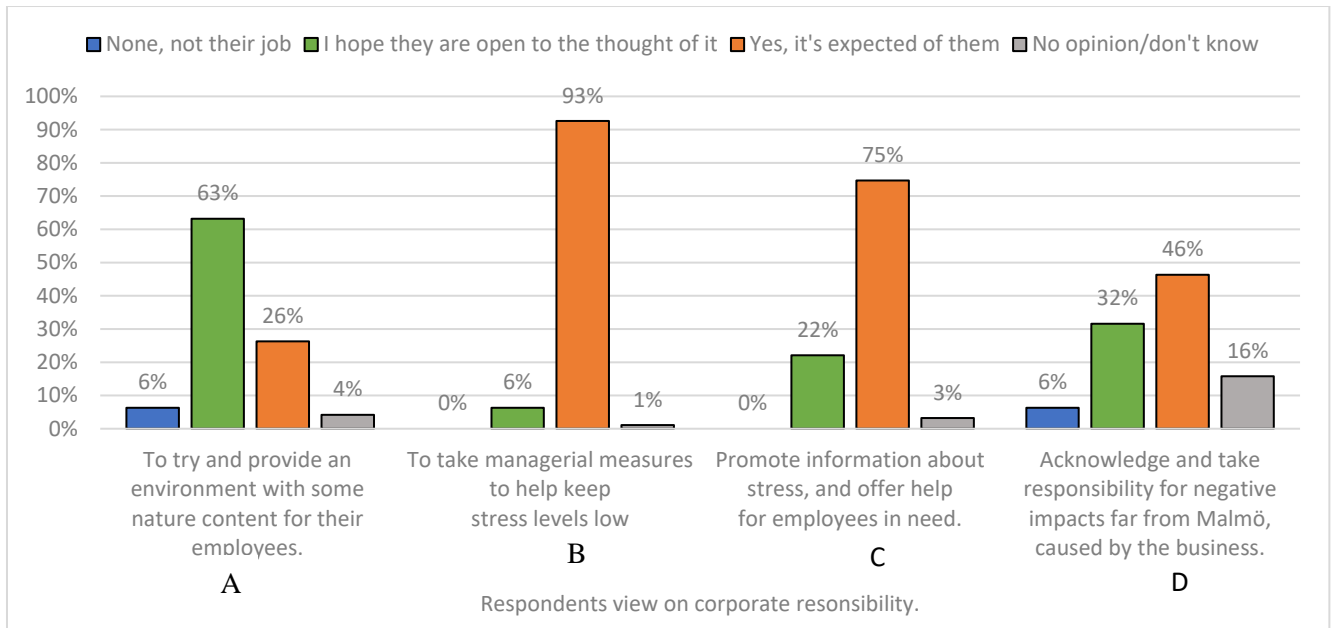


Figure 10. A majority hope that the company can consider providing a work environment with nature content. Opinions on stress related matters are very strong and consistent, 93% expect management to take measures against stress and 75% expects them to inform and offer help to those in need. If the business is the cause of concern far away, then this should be acknowledged.

4.4. Green roofs

A green roof is a term for all kinds of roofs covered in vegetation (Obendorfer et al., 2007), but a more precise description would be a superstructure of vegetation over a system of joists (Pettersson-Skog, Malmberg, Emilsson, Jägerhök & Capener, 2017).

A green roof is a construction made up of several different layers. These layers can be divided into, from the bottom up; waterproofing and system of joists, root barrier, geo textile, drainage, irrigation system, plant bed and vegetation (Pettersson-Skog et al., 2017).

Green roofs are divided into categories, for example; ‘extensive’, Semi-intensive and ‘intensive’ (Pettersson-Skog et al., 2017; SGRI, 2018). The definition is based upon aesthetics and the need for maintenance, not on the depth of the plant bed; which is the driving factor for both the construction and the plants chances of survival (ibid.). A plant bed 200 mm deep can be described as either extensive, if it is designed as a meadow rich in variation or intensive, if the design is a perennial planting. Intensive plantations have a design and conformation which requires maintenance efforts to preserve its function, form and design several times a year (ibid.).

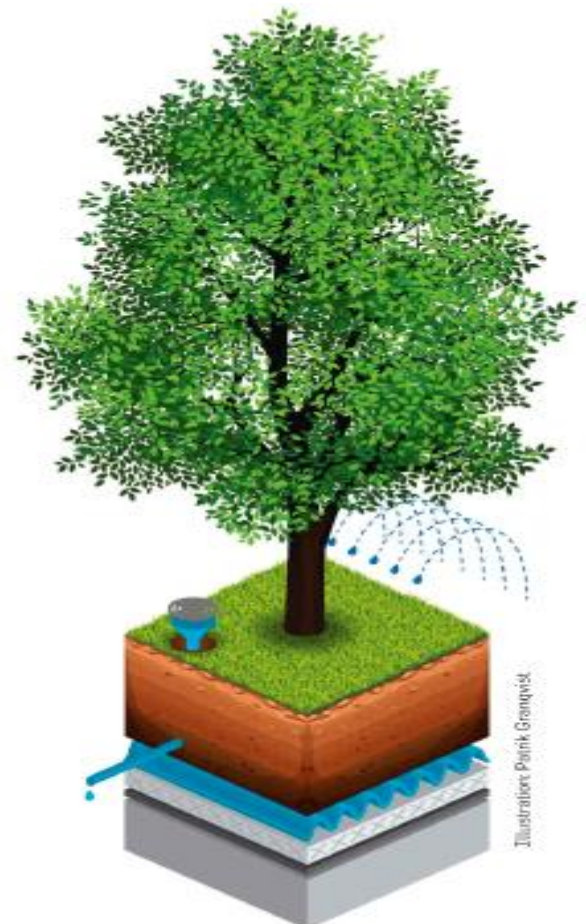


Figure 11. Illustration of green roof layers. Illustration by Patrik Granqvist. (Pettersson-Skog et al., 2017).

4.4.1. Different types of green roofs

The following descriptions follows the guidelines and explanations from the Scandinavian Green Roof Institute [SGRI] (2018).

Extensive green roof: An extensive green roof is made up of various kinds of sedum plants, succulents, mosses, onion plants and hardened wild flowers. The depth of the substrate/plant bed is usually between 30-150 mm, depending on the type of vegetation and desired diversity. When fully saturated, this depth implies a load from the green roof in the range 50-250 kg/m². For extensive roofs, annual supervision is recommended.

Semi-intensive green roof: A semi-intensive green roof offers a slightly wider selection of plants, including woody herbs, ornamental grass and some bushes. Irrigation and supply of fertilisers are required but may only be applied on the driest summer periods. Semi-intensive green roofs have a substrate depth of ca 120-350 mm, which fully saturated weighs between 150-500 kg/m². Semi-intensive plantings make beautiful plantations possible next to a roof deck, for recreational purposes. More care is required compared to an extensive roof but is still significantly lower than for a common garden or park-like environment.

Intensive green roof. If the desire is to add gardens and parks to the city skyline, then an intensive green roof is the alternative. This kind of roof offers lawns, perennial plants and trees to be planted. They demand the same kind of care as the nature which is being imitated, including pruning, irrigation, cutting, removal of dead material etc. The depth of the plant bed varies widely, ranging from approximately 300 mm to over 1000 mm. Perennial plants and lawns require much shallower substrate than does bushes and trees. This also means the carrying capacity of the supporting structure is by far the most important factor. The load from an intensive roof ranges between a few hundred kilos to two ton per m². In addition to this, the roof must also uphold the weight from people visiting the green roof. The intensive green roofs require a considerably stronger structure than extensive or semi-intensive green roofs.



Design	Sedum & meadow-roof	Lawn, perennial- and grass garden, cultivation beds	Lawn, garden with lower vegetation	Garden or park environment with smaller trees	Garden or park environment with bigger trees
Depth	30-150 mm	150-300 mm	300-600 mm	600-1500 mm	>1000 mm
Vegetation	Mosses, sedum, herbs, some grasses etc.	Grass, woody perennials, herbs, vegetables	Shrubbery, grass, woody perennials, herbs	Trees, shrubbery, grasses, woody perennials, herbs	Trees, shrubbery, grasses, woody perennials, herbs

Figure 82. Vegetation by depth of substrate and plant bed (Pettersson-Skog et al, 2017).

The cost to install a green roof varies a lot. In a case study from Malmö (Selander, 2015) an example is given ranging from 320 – 1887 SEK/m², depending on type of roof. The lowest

cost is for a green roof sown and grown *in situ* and the highest cost is for an intensive roof (ibid.). This is mainly for materials, not including machines or possible alterations of the roof itself. Additionally, maintenance is needed which for extensive roofs are valued at 0.20 SEK/m² and for intensive roofs 5.50 SEK/m² per year (ibid.).

4.4.2. Green roofs to improve mental health

Depending on its design, a green roof has the potential to create different ecosystem services. The vegetation in itself and the habitats it can provide increases the biological diversity (Capener, Edwards & Malmberg, 2017), improves the ability to handle storm water, enhances resilience towards both climate change and urban heat islands and can even function as a space for social activities or a chance for recreation (ibid.). It is especially recreation and biodiversity which are of interest for Massive Entertainment, in light of the survey results concerning stress and want for nature. Biodiversity is a reinforcing factor in the aspect of mental recovery (Kaplan, 2001).

Green areas are beneficial for both plants and animals, not only within the city but also at the city's periphery (Capener et al., 2017). Green roofs have the potential to create connectivity to other green areas, reinforcing the strengths of these areas and adding to the ability of pollinating bees, butterflies and bumblebees to spread (ibid.). Pollinating animals are in rapid decline all over the world. Between 20% and 27% of Swedish butterflies, bees and bumblebees are considered to be in danger (Regeringen, 2017). The decline is even larger in Europe, averaging 30-40% (ibid.).

Most people state they experience reduced levels of stress when visiting nature and that this reduction is even greater the richer the area is in biological diversity (Grahn & Stigsdotter, 2009). Vegetation also reduce noise, which further can strengthen the recreational value. Considering the change in venue with the move from Drottninggatan to Eden, the recreational potential from a green roof is possibly both appreciated and valuable.

Cities are considerably warmer than the surrounding countryside due to the vast amount of land covered with hard surfaces, such as rooftops, streets and public spaces covered with bitumen. The difference in temperatures is in average 3-10°C (UGBG, n.d). Green roofs have also proven able to remove particular matter from the air and the American Environmental Protection Agency (EPA, 2008) informs of a study done in Toronto in which 18 kgs of particular matter were removed by a green roof of 92 m².

4.4.3. A green roof on Eden

The carrying capacity of Eden's roof is not known by the time this thesis is written. By qualified estimates based on the age of the building and by comparisons of similar buildings, it is estimated that the roof is not strong enough to support the deeper plant beds as well as lots of people visiting the area (Stina Linder, personal communication April 16, 2018; Jonatan Malmberg, personal communication April 27, 2018). It was also estimated that the best way to implement the perceived sensory dimensions onto the roof of Eden was to identify the strongest parts of the underlying supportive structures and use these as either areas for people to visit the roof, or for deeper plant beds to support more demanding vegetation which then can be viewed from another part of the roof that can carry the weight of humans (ibid.).

The design could be inspired by Urban Deli in Stockholm, where the visitable area is divided from the edge of the house by a wooden fence (Figure 13), which also acts as a windshield

while providing a view over the city. On the other side of the fence, vegetation could be planted with a clear purpose to its design, for example to bolster biological diversity or to manage storm water (Jonatan Malmberg, personal communication April 27, 2018). In Eden's case, a fence would need to be erected both towards the street and the inner yard (Jonatan Malmberg, personal communication April 27, 2018).



Figure 13. At Urban Deli in Stockholm, a green roof has been built which offers both social spaces and the ability to see far. A security fence with a 'natural' look keeps the visitors on safe distance from the edge of the building while also allowing vegetation to grow on both sides of the fence (Mynewsdesk, 2017).

This inner yard is planned to support various trees and large bushes (Jenny Berg Nilson, personal communication, January 23, 2018). To further enhance the perception of nature, the design of the visitable roof area could connect with the park that is planned on the inner yard of Eden Stina Linder, personal communication April 16, 2018; Jonatan Malmberg, personal communication April 27, 2018). By allowing visitors on top of the roof to look out over the treetops and bushes etc, the shortcomings of the weaker roof structure could be overcome somewhat. It would also make areas of a more secluded character possible, appealing to those who desire the PSDs *serene*, *space* and *rich in species* - the three most desired PSDs according to the survey (Stina Linder, personal communication April 16, 2018). Examples for this to draw inspiration from can be found in Augsburg (Figure 14) and in Berlin (Figure 15).



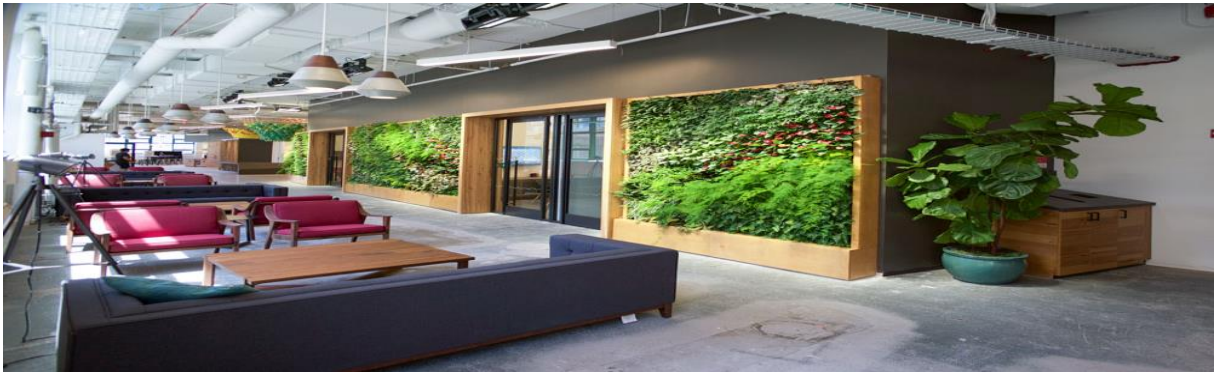
Figure 14. The roof garden of the Diakonissen-Klinik in Augsburg which both visually enhances the yard and improves stormwater management and the climate (Optigrün, 2013).



Figure 15. The Wiegmann clinic in Berlin features a parklike environment on its roof where one can walk around or sit and contemplate while looking at a wide variety of plantings (OPTIGRÜN, 2005).

As Kaplan's (1993) conclusion goes, people concentrate better and find it relaxing to see nature through the windows at work, it would make sense to capitalise on this opportunity. To further add to the sense that nature is present, nature can be brought into the office space itself. Examples of this is evident in the headquarters of TED Talks and Etsy in New York (Figure 14).





*Figure 16. **Top two:** At TED HQ, the employees are always close to plant-life, efficient both in air purification and potentially beneficial for creativity as well. Pictures and botanic installation by Greenery NYC (Greenerynyc, n.da).**Bottom two:** Etsy HQ has over 11000 plants within the office space, watered with the help of an irrigation system utilising rainwater. Pictures and botanic installation by Greenery NYC (Greenerynyc, n.db).*

It is impossible to know in advance the exact effects that can arise from bringing nature to the insides of Eden. But combined with the park planned on the yard and a green roof on top of the buildings, it would certainly increase the amount of nature content in this part of the city. Nature content which evidently seems to be both wanted and appreciated by the staff.

5. Discussion

Stress seem to be prevalent amongst the Massive Entertainment employees and a majority of the respondents claim both a habit of visiting nature to find relief from stress, and a claim towards the importance of nature content in urban environments.

This section will first cover stress amongst the employees, followed by benefits for Massive Entertainment as a company, and on to potential societal benefits from measures turn Eden greener. In the end will follow thoughts on the survey population and a brief notice on the premises for the study done.

5.1. Massive stress?

The result indicates that employees at Massive Entertainment does experience a high degree of negative stress from work, and that this results in health issues. This is important to acknowledge since the company faces absence from work and the employees requires a chance to recuperate. The negative stress may also be the reason behind past sick leaves, both of shorter and longer kinds. Considering the numbers of respondents who stated that they had not *yet* called in sick due to stress, but that they probably should have, or that they are currently struggling with stress, there is reason to suspect that this is a situation that will continue.

In light of the problems related to ‘crunching’ and the interview with Feber (2017) where ‘crunching’ is mentioned as an unwanted situation, incentives to take measures in finding out how, where and when the high levels of stress are coming from, may be warranted. According to the survey, 17% believes themselves to be close to what was described as “have crossed the border to mental unhealth”. Seen from a responsibility perspective, 93% expects that the company takes measures to keep stress levels low.

The survey also indicates that a clear majority of its respondents appreciates nature content because they find it helpful in relieving them from stress, which is in line with previous studies on how nature in the surroundings positively affects people’s health (Dadvand et al., 2016; Maas et al., 2006). Considering the reduced access to nature that the surroundings of Eden will provide as compared to Drottninggatan, it is also advised that Massive examines the possibility to improve access to nature, and especially of the Serene character since it has been found sought after, due to scarcity, by the residents of Malmö (Skärbäck, Björk, Stoltz, Rydell-Andersson & Grahn, 2014). According to the survey, a clear majority expressed thoughts indicating this is a responsibility which their employer should consider.

When asked “Do you think there's support and help to get, if you or your colleagues at Massive are in the danger zone for suffering negatively from stress?” one in four replied they didn’t know and a few even said ‘no’. It can prove beneficial to take steps in creating an atmosphere where talking about stress, mental health and its implications on life is accepted and welcome.

At the same time, three out of four is of the opinion that it is the company’s responsibility to inform about stress (no one answered “no” to that question). From this statement one can draw the conclusion that Massive can do better in regards of information about both the consequences of stress and how to prevent it and also where to turn if the need for help arise and how to approach the subject within the company.

It is important to point out that the costs and negative effects of stress and depression does not only lie in the economic burden it can bring, but also in the toll it takes on the sufferers' emotional life and relationships. However, the economic aspect is vast, and it affects the ill persons ability to work, as well as their caregivers' (Luppa et al., 2007; WHO, 2003). The financial burden is thus not constricted to the one individual, it incorporates both their families, as well as society as a whole, which impairs on the productivity at the workplace and the company's contribution to the national economy. Productivity related loss were responsible for 70 to 90% of the total cost from work related stress, which in primarily Europe was estimated to as much as 187 billion dollars (Hasard et al., 2017). WHO (2003) says that the cost of mental health problems in developed countries, answer to between 3% and 4% of their GDP. Seen in comparison with the average worker, the annual costs may be 4.2 times higher for an employee suffering from depression, including medical, pharmaceutical and disability costs,. However, there are many effective treatments (WHO, 2017b) and the cost of treatment is often completely offset when the number of days absent from work is reduced, and the productive ability is restored (WHO, 2003).

One question which raised awareness on the stress amongst the employees is the follow-up question which was answered by using a slider. As detailed in the Method, the scale was designed by the author with the purpose to provide the respondent with a chance to express the perceived level of stress at work. The question did not provide a given time frame or a certain point in time. Since there is a defined '0', which means 'work is fine', these numbers can be interpreted as a ratio scale and as such, a value of 60 may be twice as stressful as a value of 30. However, to answer this question in the survey, the respondent had first to pick 'yes, I experience higher levels of negative stress at work' in the previous question. Further, this isn't a universally agreed upon scale. It is solely based on the respondents' own approximation of how stressful they experience work. The value between the numbers is still meaningful, each individual experience and handle stress at their own capability, and only they may know their limits. The question itself did not specify stress experienced explicitly from work, and therefore other factors of stress can be present. The respondent may, perhaps, be a parent who may face lack of sleep commonly associated with very young children. No specific factors of stress like 'crunching' are mentioned or issues related to their health status in general. One possible connection however lies between the experience of stress at work shown, and the need to call in sick due to the detrimental effects on health posed by stress.

5.2. Increased greenery as value for Massive Entertainment?

According to the CEO, David Polfeldt (Feber, 2017), the difficult part, as an employer, is to make the employees stay, which is very important in the computer-game business due to the long time-span of game production. To their help, Massive is looking at what science says about the subject and their approach to this matter is broad. A lot of work has been put into creating an atmosphere of familiarity, and to see to the employees' needs to feel as they really do contribute and are trusted as professionals (ibid.). They have also begun efforts in developing both value-systems and an equality plan (Motivation.se, 2015).

“Just like we have an obligation to the players to make the greatest games, we have an obligation to each other to create a fantastic workplace. No man is an island and at Massive it is all about the team and the project.” (Massive Entertainment, 2016).

The quote above is found on Massives' homepage and indicates that the company has put their name to the obligation in insuring a good workplace. Considering the vast time-span it takes to produce a game and the success they've had, on top of the new cooperation with James Cameron to create games based on the Avatar franchise, perhaps measures to bring nature onto, and into, Eden is valid? The desire among the staff for more nature suggests so. The benefits regarding stress relief and improved creativity and concentration may prove valuable. Perhaps will it even improve the reputation of Massive when recruiting new assets. Highly-skilled professionals looking for job in Sweden and Malmö, with all the competing game producers, might view Massive as even more attractive doing what they can to create a healthy, creative and successful working environment. With consideration to the top three PSDs in the design and planning of more nature content at the workplace, such positive outcomes could be expected.

Massives' mother company, Ubisoft, also shows similar ambitions in their yearly report: "Ubisoft regularly carries out renovation work on its buildings in response to operational requirements, endeavouring to make them more energy efficient while creating a pleasant and comfortable environment for its employees." (Ubisoft, 2017, p.110.). Eden seems to be a rare opportunity to combine the will and resources to create something which doesn't exist in Sweden, or seemingly anywhere, today.

'Value' is a word with many dimensions. As Bonnedahl (2012) argues, every economic actor is part of the economic discourse and as such, an influencer in its development, although with varying degrees of legitimacy or authority. A prevalent view on value in the economic discourse is one where humans and nature has been clearly separated. As an example of this, Bonnedahl writes "Every value is decided and created by humans and everything of economic significance happens as a result in society" (ibid. p. 223). This means that it is the farmer or oil company that is seen as creators, and consequently makers of value when producing bacon or gasoline, not the pigs or sun and soil. And even though every economic actor is a potential contributor to the discourse on value and that value happens in society (ibid.), it seldom reflects human health or healthy ecosystems, even though they provide us with everything we need.

There are some alternative ways of measuring value and growth, apart from the GDP. Larsson, Bratt and Sandahl (2011) gives 'Genuine Progress Indicator' [GPI] as an example. It focuses on measuring economic activity that contributes to human well-being. In GPI, income is one factor, but it also includes anthropogenic air pollution, social injustice and depletion of natural resources. For using a reference point, the GPI for the USA in the years 1950-2004 was less than half that of their GDP (ibid.). This opens the possibility to add value too; by including social justice, ecosystem preservation and measures to combat climate change.

Together with the cost that might be required in order to strengthen the roof, or parts of the roof, enough to sustain the weight from vegetation and people, it may be a costly affair. In the case study by Selander (2015), the conclusion is that a green roof is economically very viable from a societal perspective but not from a business perspective. However, other cost-benefit analyses have been made too, and Perini and Rosasco (2016) concludes that the results differ depending on several factors such as:

- what type of green roof is designed
- if both a green roof and a green façade is installed

- available subsidies
- if the increase in the estate value is included and
- the costs for maintenance, to name some (ibid.).

Reduction in noise can also contribute since market values of properties can decrease with higher noise levels (Claus & Rousseau, 2012) and a green roof can, in various degrees, lower noise meaning the reduction in value is partially mitigated (ibid.). The reduction in energy used for heating and ventilation also matters. Green roofs, and especially intensive green roofs, have shown themselves efficient in cooling down the underlying structure, reducing energy needed to cool the building during hot periods and to warm it during cold periods (SMHI, 2018; EPA 2008). The difference between a conventional roof and a green roof has been observed as exceptionally evident during warm periods when the energy demand to remove heat flowing through the green roof was 75% lower than that of a conventional roof. This reduces the stress on the materials, thus prolonging the life expectancy on the roof itself (SMHI, 2018).

Returning to Bonnedahl's thoughts, 'value' can be subjective to what the economic actor puts into it. If Massive was to highlight the positive effects spilling out from a green roof, like say the potential in noise reduction (70 dB is valued to a societal cost of 41486 SEK per person and year by ASEK, 2018), the biodiversity increase and its soothing effect on a stressed person's mind, or the reduced amount of storm water now entering the sewer system which Malmö is very unfortunately familiar with; then a new dimension to 'value' might seem more attractive. Considering their employees' apparent want for nature content in a city, it would also clearly go well with both Ubisoft's and Massive's own expressed ambition to create the best workplace possible as well as their obligation towards a more sustainable enterprise. One can imagine a greening of Eden, from the inside and out, would attract a lot of attention in the media; what would this be worth? The limited space available has shown not to be that determinant in the stress relief a person may experience if the area is designed with the PSDs 'serene', 'space' and 'rich in species' in mind (Peschardt & Stigsdotter, 2013). Imagine that other landlords follow their example and Bergsgatan slowly gets a skyline full of nature instead of nothing but bricks and concrete, with the visual sense of connected nature and bolstered biodiversity spreading out for many blocks combined. Massive Entertainment would certainly answer up to their core values; *Family, Craftmanship, Responsibility* and by no means least, *Courage*.

5.3. Will a green Eden be beneficial in a sustainable city perspective?

Can a greening of Eden benefit Malmö, seen from a sustainable city perspective? - Short answer could be 'yes'. As mentioned above, the proximity to nature areas are part of the international agreement in Agenda 2030 (United Nations, 2015). In a compacting city, scarce on space for larger nature areas to be introduced, it may be regarded as an ethical obligation for those with sufficient resources to act upon the needs of their fellow employees, on which they depend upon.

Bringing nature into cities, or even into offices, introduces ecosystems into our immediate environment along with their inherent values. Potschin and Haines-Young (2011) talks about an ecosystem services approach to encourage people to re-examine the links between human well-being and ecosystems in a more pragmatic way. These links and benefits are seen from an anthropocentric perspective, which means that the focus is on what the ecosystems

provides us humans with or as TEEB (2010), the global initiative on ‘The Economics of Ecosystems and Biodiversity’ puts it, namely “flows of value to human societies as a result of the state and quantity of natural capital.”. We humans are absolutely dependant on healthy ecosystems and the services they provide (MA, 2005). Ecosystems, in turn, are directly dependent upon a rich biological diversity and their viability is weakened when species disappears (Keane et al., 2014).

In the context of green urban settings, the contribution towards nonmaterial benefits (so called ‘*cultural services*’) we get from healthy ecosystems are dominant (Jie et al, 2017; Camps-Calvet et al, 2016). In the report “Valuation of cultural ecosystem services based on their contribution towards life quality” by Pedersen, Johansson and Weisner (2017), the authors conclude that we humans have pronounced needs which are, in various degrees, satisfied when we have access to green areas close by. That means that a value can be assigned to the cultural ES which arise when people get in contact with the ecosystems (ibid.). Cultural ES should be therefore be given plenty of consideration in analyses of urban green areas, especially close to the city core (Jie et al, 2017).

An ES of great importance for a sustainable city, and one which is very evident in need of strengthening, is the ability to delay storm water. Malmö is susceptible to flooding with events occurring in the last decade alone in 2007, 2010 and 2014; the 2014 episode has been estimated to have cost the city over 300 million SEK (Karras & Read, 2016). Another ES to mention is air purification. A conservative estimate (Gustafsson et al., 2018) of the total socio-economic cost in Sweden for exposure to air pollution from NO₂ and PM_{2.5} sums up to 56 billion SEK in 2015. Just absence from work and studies can be estimated to cause socio-economic costs of ~0.4% of GDP in Sweden. (ibid.).

A prerequisite for the ecosystems ability to build up resilience is biological diversity (Capener et al., 2017). The vegetation doesn’t only provide habitats but do, through the photosynthesis, bind CO₂ and thus act as a carbon sink. In contrast to hard surfaces, which absorbs heat and raise temperatures in cities by creating urban heating islands, a green roof help to lower temperature by the evapotranspiration (the total sum of water vapor released into the atmosphere) that takes place (Capener et al., 2017; Francis & Jensen, 2017). An additional cooling effect occurs though the shadows vegetation causes and the naturally better albedo. A green roofs’ ability to reflect sunlight are higher than that of traditional roof constructions. There are indications this might prove beneficial to real estate owners through the decreased need for cooling from energy sources, but it is dependent on the design of the green roof and can thus not be taken for granted (Capener et al., 2017.). The surface temperature of a bitumen roof heats up to around 70°C during summer, while a green roofs’ temperature stays at around 27 °C (EPA, 2008).

Cities are considerably warmer than the surrounding countryside due to the vast amount of land covered with hard surfaces, such as rooftops, streets and public spaces covered with bitumen. The increase in temperatures is on average 3-10°C (UGBG, n.d). Green roofs have also proven able to remove particular matter from the air and the American Environmental Protection Agency (EPA, 2008) informs of a study done in Toronto in which 18 kgs of particular matter were removed by a green roof of 92 m². The ability to purify air from pollutions was also demonstrated by Francis and Jensen (2017) in their systematic review of green roof benefits.

Cost-benefit studies done on green roofs in both Malmö and Flanders have shown that they, from a societal perspective, are economically sound (Selander, 2015; Claus & Rousseau, 2012).

The benefits which comes from bringing nature into the city will not create a sustainable city on its own accord, but a sustainable city can only be shaped when many actors come together. In taking the initiative of greening Eden, both Massive Entertainment and Ubisoft could show themselves to take these matters seriously. It could also be a real step away from what Hannigan (2007) describes as a way capitalist development sheathes its ambition in beneficial discourses, such as ‘sustainable development’, while continuing to capitalise on nature.

Building green comes with easily identified short-term costs, and harder-to-establish long term benefits. But the goals to successfully develop a sustainable city requires long timespans. Could they perhaps conjunct with the need to get employees to stay for a long time too?

5.4. Limitations

The survey was answered by 95 respondents, which is 18.5% of the total number of employees. According to Bryman (2011) the larger the share of respondents, the better. In the case of this thesis, close to one in five is acceptable but a higher percentage would have been even more satisfactory.

What is of some notice is that 31.5% of the respondents are women, while only 19% of the employees at Massive are. If part of the explanation is that women are for various reasons, in a higher degree than men, affected by depression WHO (2017b) or that women perhaps are more open to talk about issues related to mental illness, or maybe that they are more concerned and caring about their working environment and how it affects both them and their colleagues, is beyond the limits of this thesis. It will just be acknowledged here that this seems to be a fact, at least as far as concerning the population consisting of the survey respondents.

It is of some importance to keep in mind that the survey is solely based on the respondents’ own experience. What can be experienced as very stressful for one person may be much less stressful for someone else. Neither is there a scientific foundation on which to draw conclusions considering where a certain perceived level of stress becomes intolerable or harmful. The survey was completely anonymous and there is no way of cross-referencing one answer to another in order to find out whether the answers are consistent or if say, the same respondent states that a) they don’t feel stressed at all, and at the same time state that b) they have been on sick-leave due to stress-induced illness for longer periods.

6. Conclusion

In cities where available space is scarce, nature content can be introduced onto roofs to gain numerous benefits. One such benefit of significant importance is to remedy stress. If a green roof on Eden would be designed with the PSDs *serene*, *space* and *rich in species* in mind, which would also build upon the greenery planned for the inner yard, then there might be possible to offer the employees at Massive Entertainment a chance to find relief from stress during a work day.

To really assess whether a green roof would be economically sound for Massive Entertainment, a thorough cost-benefit analysis should be made. If such an analysis is conducted, it is recommended that Massive Entertainment also consider the positive effects for the company, such as;

- remedy for stress
- reduced energy consumption
- reduced noise from outside traffic

as well as the societal effects, such as;

- storm water management
- reduced air pollution from noise and
- improved air quality.

Based on the survey on stress and mental wellbeing, there seems to be a need to gain more knowledge concerning where, when and how the peak amounts of stress are experienced. It is also advised to investigate which forms of nature is available to introduce into Eden, both as a mean to reduce the risk of experiencing those peak levels of stress, and also to remedy the negative effects of consistent stress. With the coming change of venue, with much less available nature within 300 metres, remedies might reap rewards both as health benefits but also as a way to yield good reputation and publicity, since similar urban greenings are very rare. Given the high percentage of women answering the survey and the statistics of women more often being the victim of negative health impacts due to stress and depression, it could prove the costliest to not do anything.

To provide entertainment which is sustainable for the staff, the massive stress needs to be reduced, and there is potential for this in turning Eden greener. This is sought after by the employees and has been also found in science to be effective as a way to remedy stress - while simultaneously increasing both creativity and the ability to concentrate.

Thanks.

I'd especially like to thank my supervisor at Lund university, Helena Hanson, for much needed encouragement and guidance. Also, a 'thank you' to my fellow classmates who shared well needed stories of despair and helpful critique, and Sabina Berntsson in particular.

I'm very grateful to the people at Massive Entertainment, who allowed me to conduct the survey and provided me with information. Jenny Berg Nilson brought me in and Alf Condelius carried on the good start.

And to Josefine; I don't know what I would have done without you. Thank you for all the loving patience and support.

References

- Aldwin, C. M. (2007). *Stress, coping, and development: An integrative perspective*. Guilford Press.
- Bonnedahl, K. J. (2012). *Från ekonomiskt till hållbart från exploatering till samexistens: En bok om att tänka om*. Studentlitteratur.
- Boverket. (2007). *Bostadsnära natur – inspiration och vägledning*.
- Brock, T. C., & Green, M. C. (2005). *Persuasion: Psychological Insights and Perspectives*. Thousand Oaks, CA: Sage Publications.
- Bryman, A. (2011). *Samhällsvetenskapliga metoder*. Stockholm: Liber AB.
- Camps-Calvet, M., Langemeyer, J., Calvet-Mir, L. & Gómez-Baggethun, E. (2016). *Ecosystem services provided by urban gardens in Barcelona, Spain: Insights for policy and planning*. *Environ Sci Policy*. 62: 14-23
- Capener, C-M., Edwards, Y & Malmberg, J. (2017). *Kvalitetssäkrade systemlösningar för gröna anläggningar*. Svenska byggingenjörers riksförbund.
http://www.husbyggaren.se/artiklar/2017_3_01.pdf
- Claus, K., & Rousseau, S. (2012). *Public versus private incentives to invest in green roofs: A cost benefit analysis for Flanders*. *Urban forestry & urban greening*, 11(4), 417-425.
- Dadvand, P., Bartoll, X., Basagaña, X., Dalmau-Bueno, A., Martinez, D., Ambros, A., ... & Nieuwenhuijsen, M. J. (2016). *Green spaces and general health: roles of mental health status, social support, and physical activity*. *Environment international*, 91, 161-167.
- Dreiseitl, H. (2015). *Blue–green social place-making: Infrastructures for sustainable cities*. *Journal of Urban Regeneration & Renewal*, 8(2), 161-170.
- Edholm, H., Lidström, M., Steghöfer, J. P., & Burden, H. (2017, May). *Crunch time: The reasons and effects of unpaid overtime in the games industry*. In *Proceedings of the 39th International Conference on Software Engineering: Software Engineering in Practice Track* (pp. 43-52). IEEE Press.
- EPA [U.S. Environmental Protection Agency]. (2008). *Reducing Urban Heat Islands: Compendium of Strategies*. United States.
- Feber. (2017). *Vi pratar studiokultur med Massive. Hur är det att jobba där egentligen?*
Retrieved April 4, 2018 from
http://feber.se/spel/art/371910/vi_pratar_studiokultur_med_mas/
- Francis, L. F. M., & Jensen, M. B. (2017). *Benefits of green roofs: A systematic review of the evidence for three ecosystem services*. *Urban Forestry & Urban Greening*.
- Försäkringskassan. (2016). *Sjukskrivning för reaktioner på svår stress ökar mest*.

- Games Industry. (2017). *Global gaming revenues on par with sports at \$149bn for 2017*. Retrieved June 12, 2018 from <https://www.gamesindustry.biz/articles/2017-11-28-global-gaming-revenue-on-par-with-sports-following-2017-estimates>
- Gatukontoret. (2013). *Malmö stads åtgärdsprogram mot buller 2014 – 2018*. Malmö stad.
- Gou, Z. (2016). *Green building for office interiors: challenges and opportunities*. *Facilities*, 34(11/12), 614-629.
- Grahn, P., & Stigsdotter, U. K. (2009). The relation between perceived sensory dimensions of urban green space and stress restoration. *Landscape and urban planning*, 94(3-4), 264-275.
- Gustafsson, M., Lindén, J., Tang, L., Forsberg, B., Orru, H., Åström, S & Sjöberg, K (2018). *Quantification of population exposure to NO₂, PM_{2.5} and PM₁₀ and estimated health impacts*. IVL Swedish Environmental Research Institute.
- Haaland, C., & van den Bosch, C. K. (2015). *Challenges and strategies for urban green-space planning in cities undergoing densification: A review*. *Urban Forestry & Urban Greening*, 14(4), 760-771.
- Hannigan, J. (2007). *Environmental sociology. Second edition*. New York.
- Hartig, T., & Evans, G. W. (1993). *Behavior and Environment - Psychological and Geographical Approaches*. *Advances in Psychology*, 96, 427-457. [https://doi.org/10.1016/S0166-4115\(08\)60053-9](https://doi.org/10.1016/S0166-4115(08)60053-9)
- Hassard, J., Teoh, K. R., Visockaite, G., Dewe, P., & Cox, T. (2017). *The cost of work-related stress to society: A systematic review*.
- Jansson, M., Persson, A., & Östman, L. (2013). *Varför urban natur: hela staden: argument för en grönblå stadsbyggnad*. Movium.
- Jie, C., Zelong, Q., Ronghua, R., Kaixuan, P., Bin, X., Yong, M., Yuan, R., Guofu, Y. & Ying, G. (2017). *Assessing the ecosystem services provided by urban green spaces along urban center-edge gradients*. *Sci Rep-UK*. 7: 11226.
- Kaplan, R. (1993). *The role of nature in the context of the workplace*. *Landscape and urban planning*, 26(1-4), 193-201.
- Kaplan, S. (2001). *Meditation, restoration, and the management of mental fatigue*. *Environ. Behav.* 33, 480-506.
- Karras, M & Read, K-E. (2016). *Kostnads-nyttöanalys av införandet av hållbar dagvattenhantering som riskreducerande åtgärd mot översvämning - med fokus på monetär värdering av ekosystemtjänster*. (Masteruppsats). Lunds universitet, institutionen för riskhantering och samhällssäkerhet.
- Keane, Å., Stenkula, U., Wijkmark, J., Johansson, E., Philipson, K. & Hård af Segerstad, L. (2014). *Ekosystemtjänster i stadsplanering: en vägledning*. C/O City.
- Larsson, M., Bratt, L., & Sandahl, J. (2011). *Hållbar utveckling och ekonomi inom planetens gränser*. Studentlitteratur.

- Lund University. (2017). *Sunet Survey – a survey tool*. <https://www.staff.lu.se/research-and-education/education-support/quality-enhancement/sunet-survey-a-survey-tool>
- Luppa, M., Heinrich, S., Angermeyer, M. C., König, H. H., & Riedel-Heller, S. G. (2007). *Cost-of-illness studies of depression: a systematic review*. *Journal of affective disorders*, 98(1-2), 29-43.
- MA [Millennium Assessment Report]. (2005). *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC.
- Maas, J., Verheij, R. A., Groenewegen, P. P., De Vries, S., & Spreeuwenberg, P. (2006). *Green space, urbanity, and health: how strong is the relation?* *Journal of Epidemiology & Community Health*, 60(7), 587-592.
- Massive Entertainment. (2016). *Life at Massive*. Retrieved January 29, 2018 from <http://www.massive.se/life-at-massive/>
- Massive Entertainment. (2017). *Årsredovisning för räkenskapsåret 1 april 2016 - 31 mars 2017*. Bolagsverket.
- Massive Entertainment. (2018). *Tom Clancy's the Division*. Retrieved April 4, 2018 from <https://www.massive.se/project/tom-clancys-the-division/#visuals>
- Massive Entertainment. (n.d.). *Code of conduct*.
- Miljöförvaltningen. (2017). *Rapport – kartläggning av omgivningsbuller 2017*. Malmö stad.
- Miljömål. (2015). *God bebyggd miljö. Planering grönstruktur och vattenområden – Skåne län*. Retrieved May 2, 2018 from <https://www.miljomal.se/Miljomalen/Alla-indikatorer/Indikatorsida/?iid=85&pl=2&t=Lan&l=12>
- Miljömål. (2016). *A good built environment*. Retrieved April 22, 2018 from <https://www.miljomal.se/Environmental-Objectives-Portal/Undre-meny/About-the-Environmental-Objectives/15-A-Good-Built-Environment/>
- Motivation.se. (2015). *Lösningar och utmaningar i en global arbetsplatskultur*. Retrieved 2018-01-29 from <https://www.motivation.se/innehall/losningar-och-utmaningar-i-en-global-arbetsplatskultur/>
- Nisbet, E. K., & Zelenski, J. M. (2011). *Underestimating nearby nature: Affective forecasting errors obscure the happy path to sustainability*. *Psychological science*, 22(9), 1101-1106.
- NY Times. (2017). *Video games are destroying the people who make them*. Retrieved April, 4, 2018 from <https://www.nytimes.com/2017/10/25/opinion/work-culture-video-games-crunch.html>
- Oberndorfer, E., Lundholm, J., Bass, B., Coffman, R. R., Doshi, H., Dunnett, N., ... & Rowe, B. (2007). *Green roofs as urban ecosystems: ecological structures, functions, and services*. *BioScience*, 57(10), 823-833.
- Pauleit, S., & Golding, Y. (2005). *The spatial impact of urban compaction: A fine-scale investigation based on Merseyside*. *Town Planning Review*, 76(2), 143-166.

- Pedersen, E., Johansson, M., & Weisner, S. (2017). *Värdering av kulturella ekosystemtjänster baserat på bidrag till livskvalitet*.
- Perini, K., & Rosasco, P. (2016). *Is greening the building envelope economically sustainable? An analysis to evaluate the advantages of economy of scope of vertical greening systems and green roofs*. *Urban Forestry & Urban Greening*, 20, 328-337.
- Peschardt, K. K., & Stigsdotter, U. K. (2013). *Associations between park characteristics and perceived restorativeness of small public urban green spaces*. *Landscape and Urban Planning*.
- Pettersson-Skog, A., Malmberg, J., Emilsson, T., Jägerhök, T & Capener, C-M. (2017). *Grönatakhandboken*. VINNOVA
- Potschin, M. B., & Haines-Young, R. H. (2011). Ecosystem services: exploring a geographical perspective. *Progress in Physical Geography*, 35(5), 575-594.
- Prop. 2007/08:110. En förnyad hälsopolitik. Available at <http://www.regeringen.se/rattsdokument/proposition/2008/03/prop.-200708110/>
- Regeringen. (2017). *Naturvårdsverket ska föreslå insatser för ökad pollinering i Sverige*. Retrieved June 9, 2018 from <https://www.regeringen.se/pressmeddelanden/2017/12/naturvardsverket-ska-foresla-insatser-for-okad-pollinering-i-sverige/>
- Selander, S J. (2015). *Gröna taks samhällsekonomiska nytta och kostnader - En fallstudie över ett bostadsområde med flerbostadshus i Malmö*. (Master thesis). Lund university, CEC Centre for Environmental and Climate Research.
- SFS 2015:216. *Förordning om trafikbuller vid bostadsbyggnader*. Stockholm: Riksdagen
- SGRI [Scandinavian Green Roof Institute]. (2018). *About green roofs*. Retrieved June 11, 2018 from <http://greenroof.se/en/about-green-roofs/>
- Skärbäck, E., Björk, J., Stoltz, J., Rydell-Andersson, K., & Grahn, P. (2014). *Green perception for well-being in dense urban areas - A tool for socioeconomic integration*. *NA*, 26(2).
- SLU [Swedish University of Agricultural Sciences]. (2017). *Mångmiljonbelopp till forskningsprojekt om avstressande arbetsmiljöer*. Retrieved May 10, 2018 from <https://www.slu.se/ew-nyheter/2017/11/vinnovabidrag/>
- SMHI. (2018). *Gröna tak, fördjupning*. Retrieved June 10, 2018 from <https://www.smhi.se/klimat/klimatanpassa-samhallet/exempel-pa-klimatanpassning/grona-tak-fordjupning-1.116956>
- Statistics Sweden. (2003). *Markanvändningen i tätorter 2000 och förändringar 1995 - 2000. Land use in localities 2000 and changes 1995 - 2000*. Statistiska meddelanden MI 14 SM 0201.
- TEEB. (2010). *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of*

Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

- The Local. (2017). *Why Malmö is the hottest gaming city in Europe*. Retrieved June 22, 2018 from <https://www.thelocal.se/20171227/the-real-reason-malm-is-the-gaming-capital-of-europe-malmostat-tlccu>
- Ubisoft. (2017). *2017 Registration Document and Annual Report*.
- UGBG [Urban Green-Blue Grids]. (n.d). *Urban Green-Blue Grids for Sustainable and Resilient Cities – Green Roofs*. Retrieved June 13, 2018 from <http://www.urbangreenbluegrids.com/measures/green-roofs/>
- United Nations. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. New York: United Nations.
- United Nations. (2016). *The World's Cities in 2016 – Data Booklet (ST/ESA/SER.A/392)*. Department of Economic and Social Affairs, Population Division.
- United Nations. (2017). *Sustainable development goal 11 – Make cities and human settlements inclusive, safe, resilient and sustainable*. Retrieved June 11, 2018 from <https://sustainabledevelopment.un.org/sdg11>
- van Kempen, E. (2011). *Cardiovascular effects of environmental noise: research in The Netherlands*. *Noise and Health*, 13(52), 221.
- Wallner, P., Kundi, M., Arnberger, A., Eder, R., Alex, B., Weitensfelder, L & Hutter, H-P. (2018). *Reloading Pupils' Batteries: Impact of Green Spaces on Cognition and Wellbeing*. *International Journal of Environmental Research and Public Health*.
- Westman, J. C., & Walters, J. R. (1981). *Noise and stress: a comprehensive approach*. *Environmental Health Perspectives*, 41, 291.
- Weststar, J & Legault, M-J. (2016). *Developer satisfaction survey 2016. Summary report*. International Game Developers Association (IGDA).
- WHO [World Health Organization]. (2003). *Investing in mental health*.
- WHO [World Health Organization]. (2017a). *Mental disorders*. Retrieved February 15, 2018 from <http://www.who.int/mediacentre/factsheets/fs396/en/>
- WHO [World Health Organization]. (2017b). *Depression*. Retrieved February 15, 2018 from <http://www.who.int/mediacentre/factsheets/fs369/en/>
- World Bank. (2018). *Urban population % of total*. Retrieved April 10, 2018 from <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>
- Zijlema, W. L., Triguero-Mas, M., Smith, G., Cirach, M., Martinez, D., Dadvand, P., ... & Masterson, D. (2017). The relationship between natural outdoor environments and cognitive functioning and its mediators. *Environmental research*, 155, 268-275.

Graphic references

Figure 1 & 2. Malmö stad. (2018). *Malmö stadsatlas*. Retrieved April 25, 2018 from https://kartor.malmo.se/rest/leaf/1.0/?config=../configs-1.0/malmo_atlas.js

Figure 3 & 4. Malmö stad. (2018). *Bullerkarta*. Retrieved April 25, 2018 from <https://malmo.se/Bo-bygga--miljo/Miljolaget-i-Malmo/Buller/Bullerkarta.html>

Figure 11 & 12. Pettersson-Skog, A., Malmberg, J., Emilsson, T., Jägerhök, T & Capener, C-M. (2017). *Grönatakhandboken*. VINNOVA

Figure 13. Mynewsdesk. (n.d.) *Takpark med ekologisk mångfald*. Retrieved April 27, 2018 from <http://www.sveavagen44.se/sv/Hallbarhet/Takpark-med-ekologisk-mangfald/>

Figure 14. Optigrün. (2013). *Artenreicher Dachgarten Ist Fbb-Gründach Des Jahres 2015*. Retrieved June 11, 2018 from <https://www.optigruen.de/aktuelles/download-presse/artenreicher-dachgarten-ist-fbb-gruendach-des-jahres-2015/>

Figure 15. Optigrün. (2005). *Wiegmann Clinic – Berlin*. Retrieved June 11, 2018 from <https://www.optigreen.com/references/garden-roof/project-gr-3/>

Figure 16. Greenerynyc. (n.da.). *TED Talks Headquarters*. Retrieved June 10, 2018 from <https://greenerynyc.com/ted-talks-hq/>

Greenerynyc. (n.db.). *Etsy Global Headquarters*. Retrieved June 10, 2018 from <https://greenerynyc.com/etsy-hq/>

Appendix - Survey

1. Gender

"What is the most accurate?"

Gender	Number of Responses
He	62 (65.3%)
She	30 (31.6%)
They	3 (3.2%)
Total	95 (100.0%)

2. Age

"Your time on Earth, in years."

Age	Number of Responses
18 - 25	17 (17.9%)
26 - 33	45 (47.4%)
34 - Ancient	33 (34.7%)
Total	95 (100.0%)

5. Stress

"In general, would you describe yourself as being stressed?"

Stress	Number of Responses
Yes	39 (41.1%)
No	56 (58.9%)
Total	95 (100.0%)

6. Level of stress and work

"Do you feel work can make you experience higher levels of negative stress?"

Level of stress and work	Number of Responses
Yes	84 (88.4%)
No	11 (11.6%)
Total	95 (100.0%)

7. A man gotta do what a man gotta do..

"If your answer on the previous question was "yes", you have unlocked this follow-up question.

Use this slider to show an interval of how stressful you experience that work can be. The upper limit will represent work when it's at its worse. Imagine 0 as being totally fine and 100 as a stage where you have crossed the border to mental unhealth; panic attacks, insomnia, depression, "enter the wall" etc.

Remember, no one can see who answered what and it's not possible to trace an answer back to a certain individual. Please feel free to answer as honest as you are comfortable with."

"A man gotta do what a man gotta do.." - To	Number of Responses
0 - 10	3 (3.6%)
11 - 21	5 (6.0%)
22 - 32	14 (16.9%)
33 - 43	6 (7.2%)
44 - 54	11 (13.3%)
55 - 65	7 (8.4%)
66 - 76	12 (14.5%)
77 - 87	10 (12.0%)
88 - 98	6 (7.2%)
99 - 109	9 (10.8%)
Total	83 (100.0%)

3. On the subject of Avatar..

"In the Avatar movie, who do you vouch for?"

On the subject of Avatar..	Number of Responses
Na'vi	70 (73.7%)
Humans	16 (16.8%)
"Avatar"..?	9 (9.5%)
Total	95 (100.0%)

4. Parental status

"One or more offsprings?"

Parental status	Number of Responses
Yes	23 (24.2%)
No	72 (75.8%)
Total	95 (100.0%)

8. Nature close to work

"Would you say that you feel better if there is nature to be experienced during a work day? For example, to see trees, birds, flowers through the windows where you work, or to be able to walk to/through a park on your lunch break, etc? (The definition here is quite broad and not only limited to the visual. Sounds and smells counts too!)."

Nature close to work	Number of Responses
Yes	85 (89.5%)
No	10 (10.5%)
Total	95 (100.0%)

9. Nature and stress levels

"Does it happen that you visit an area because its content of nature (trees, water, plantings etc) makes you feel less stressed, if even for a little while?"

Nature and stress levels	Number of Responses
Yes	73 (76.8%)
No	14 (14.7%)
Don't know	8 (8.4%)
Total	95 (100.0%)

10. Stress-induced sickleave

"The negative effects on health caused by stress are well documented and known. Stress can lead to both exhaustion, depression, physical means and more.

Mental illness is one of the major causes for sick leave (in "western" societies) and the total number of years lived with mental illness, per capita, is staggering, and continues to increase. The economic costs are huge, both for society at large, but also for the individual. And more importantly, the emotional toll for those suffering from it directly, and of those in their closest circle are often very tough to deal with.

Have you ever, due to stress, or stress-induced illness, been forced to stay home instead of going to work?"

Stress-induced sickleave	Responses
No, never. Lucky me!	34 (35.8%)
No. But I probably should have.	24 (25.3%)
Yes, a single day or so.	17 (17.9%)
Yes, for longer periods.	14 (14.7%)
Not yet, but I struggle with it from time to time.	6 (6.3%)
Total	95 (100.0%)

11. Availability for help

"Do you think there's support and help to get, if you or your colleagues at Massive are in the danger zone for suffering negatively from stress?"

Availability for help	Number of Responses
Yes	65 (68.4%)
No	4 (4.2%)
Don't know	26 (27.4%)
Total	95 (100.0%)

12. Responsibility

"As Ben Parker said "With great powers comes great responsibility".

Considering the combined resources of Massive Entertainment and Ubisoft; What is your opinion, if any, of their responsibility to ensure a good and healthy working environment for their employees?

Does this responsibility extend to also includes possible negative effects caused elsewhere, arising through the sheer existence of their

To try and provide an environment with some nature content for their employees.	Number of Responses
None, not their job.	6 (6.3%)
I hope they are open to the thought of it.	60 (63.2%)
Yes, it's expected of them.	25 (26.3%)
No opinion/don't know.	4 (4.2%)
Total	95 (100.0%)

Promote information about stress, and offer help for employees in need.	Number of Responses
None, not their job.	0 (0.0%)
I hope they are open to the thought of it.	21 (22.1%)
Yes, it's expected of them.	71 (74.7%)
No opinion/don't know.	3 (3.2%)
Total	95 (100.0%)

To take managerial measures to help keep stress levels low.	Number of Responses
None, not their job.	0 (0.0%)
I hope they are open to the thought of it.	6 (6.3%)
Yes, it's expected of them.	88 (92.6%)
No opinion/don't know.	1 (1.1%)
Total	95 (100.0%)

Acknowledge that the business may cause negative impacts far from Malmö, and take responsibility for these as well (just as positive impacts should be highlighted).	Number of Responses
None, not their job.	6 (6.3%)
I hope they are open to the thought of it.	30 (31.6%)
Yes, it's expected of them.	44 (46.3%)
No opinion/don't know.	15 (15.8%)
Total	95 (100.0%)

13. Do you have a garden?

Do you have a garden?	Number of Responses
Yes, a private garden.	11 (11.6%)
Yes, access through a sort of community garden	17 (17.9%)
Yes, both a private and a community garden	2 (2.1%)
No, no garden, but I would like to have one	51 (53.7%)
No, I don't have a garden and I don't want one either.	14 (14.7%)
Total	95 (100.0%)

14. Habits of visiting nature

I travel (by bike, car, bus, train, long walks etc) to visit nature areas	Number of Responses
Never	5 (5.3%)
Rarely, and not on my initiative.	12 (12.6%)
It happens, but to seldom for my liking.	39 (41.1%)
Quite often, I enjoy it too.	31 (32.6%)
As often as I can, it's very important to me.	8 (8.4%)
Total	95 (100.0%)

15. Nature content in cities is important

I need nature content in cities to feel good	Number of Responses
Disagree completely	2 (2.1%)
Disagree somewhat	2 (2.1%)
I don't know	2 (2.1%)
Agree somewhat	21 (22.1%)
Agree completely	68 (71.6%)
Total	95 (100.0%)

Visits to "green" urban nature areas (city parks, cemeteries, ponds, the beach etc)	Number of Responses
Never	1 (1.1%)
Rarely, and not on my initiative.	6 (6.3%)
It happens, but to seldom for my liking.	32 (33.7%)
Quite often, I enjoy it too.	43 (45.3%)
As often as I can, it's very important to me.	13 (13.7%)
Total	95 (100.0%)

16. Eight characteristics of nature.

"This question requires some background info. Please read the following and reflect a few seconds on what you appreciate to find/see /experience in your surroundings (not, say, in your bedroom, but more in a citylike context). Then answer, to the best of your ability. Over the last decades, scientists has identified a few characteristics in nature which people in general tend to appreciate, or shy away from. These characteristics are commonly categorised into eight distinct categories, or "perceived sensory dimensions". These might be the reason why someone would actively seek out an area where nature is present, or it could just be something which makes a person appreciate the area for various reasons.

One can imagine it's possible that some alternatives strongly correlate with others, and that you might feel that one of them is required for the other. For the purpose of this study, and the limited time frame at my disposal, I (unfortunately) don't have time to investigate all interrelationships and dependencies. So, please, try to ignore that shortcoming.

A brief description of what these characteristics are made up of are given on the left side and a possible opinion of them are presented as your alternative. Remember that it's all about your feelings in the matter, not the practical purpose like "having a picnic" or "walking my dog". But it could rather be the reason you choose that spot over another, or it could even be something you wish for, but which is not around."

To experience where nature meet human culture, and how history, myth and symbols are found and understood.	Number of Responses
Unwanted, I avoid this	0 (0.0%)
Not important to me	16 (16.8%)
Don't know, haven't thought of it	39 (41.1%)
Important, I enjoy it	36 (37.9%)
Essential, I require it for my wellbeing	4 (4.2%)
Total	95 (100.0%)

To enjoy a safe and enclosed environment. Also, a place where we can play, or watch other people being active.	Number of Responses
Unwanted, I avoid this	2 (2.1%)
Not important to me	19 (20.0%)
Don't know, haven't thought of it	15 (15.8%)
Important, I enjoy it	48 (50.5%)
Essential, I require it for my wellbeing	11 (11.6%)
Total	95 (100.0%)

The inherent force and power in nature. It's awesome, because it's nature!	Number of Responses
Unwanted, I avoid this	0 (0.0%)
Not important to me	8 (8.4%)
Don't know, haven't thought of it	12 (12.6%)
Important, I enjoy it	60 (63.2%)
Essential, I require it for my wellbeing	15 (15.8%)
Total	95 (100.0%)

In finding signs of life in my environment, and the richer the variety of colours, sounds and scents, the better!	Number of Responses
Unwanted, I avoid this	0 (0.0%)
Not important to me	9 (9.5%)
Don't know, haven't thought of it	18 (18.9%)
Important, I enjoy it	45 (47.4%)
Essential, I require it for my wellbeing	23 (24.2%)
Total	95 (100.0%)

A desire to be able to see far and wide. Like our ancestors' desire to have a clear view of the surroundings to avoid dangers.	Number of Responses
Unwanted, I avoid this	0 (0.0%)
Not important to me	16 (16.8%)
Don't know, haven't thought of it	18 (18.9%)
Important, I enjoy it	43 (45.3%)
Essential, I require it for my wellbeing	18 (18.9%)
Total	95 (100.0%)

An environment for retreat. Silent, undisturbed and calm.	Number of Responses
Unwanted, I avoid this	0 (0.0%)
Not important to me	5 (5.3%)
Don't know, haven't thought of it	3 (3.2%)
Important, I enjoy it	39 (41.1%)
Essential, I require it for my wellbeing	48 (50.5%)
Total	95 (100.0%)

Nature as an environment for social activities. A place where we can meet, amuse ourselves and watch one another.	Number of Responses
Unwanted, I avoid this	3 (3.2%)
Not important to me	25 (26.3%)
Don't know, haven't thought of it	15 (15.8%)
Important, I enjoy it	40 (42.1%)
Essential, I require it for my wellbeing	12 (12.6%)
Total	95 (100.0%)

The feeling of a green, spacious environment, preferably large enough to also give a sense of connecting with surrounding areas .	Number of Responses
Unwanted, I avoid this	1 (1.1%)
Not important to me	5 (5.3%)
Don't know, haven't thought of it	19 (20.0%)
Important, I enjoy it	43 (45.3%)
Essential, I require it for my wellbeing	27 (28.4%)
Total	95 (100.0%)