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University UNIVERSITY OF GRONINGEN
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IMPROVING CHILD-FRIENDLINESS OF TEMPORARY HOUSING

EVALUATING CURRENT TEMPORARY HOUSING PARKS WITH A FOCUS ON PERCEIVED IMPORTANT PLACES, ACCESSIBILITY, AND SAFETY IN THE EEMSDELTA MUNICIPALITY

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Reading Guide

Abstract

The municipality of Eemsdelta in The Netherlands faces the challenge of frequent earthquakes caused by regional gas extraction, which results in a significant number of houses requiring renovation or reconstruction, and inhabitants forced to move to temporary housing parks. These parks are created with a temporary vision in mind, resulting in a less deliberate neighbourhood design compared to permanent housing, putting a vulnerable group of primary school children in an extra vulnerable position. This research aimed to evaluate the child-friendliness of temporary housing locations within the themes of places perceived important, accessibility, environmental quality, and safety. Previous research to these temporary housing locations is non-existent, making the evaluation of child-friendliness for these locations more important. With a mixed-method approach involving objective GIS-mapping from available datasets and an empirical photovoice method, including data collected by children themselves, the evaluation is done using multiple perspectives. Multiple locations lack nearby quality places to play, safety is at stake since materials from temporary houses cause danger, and infrastructure next to temporary housing parks is unpleasant, since it is considered unsafe. Consequences of insufficient child-friendly elements can contribute to a lower well-being of children living on temporary housing parks, while they are already experiencing psychological problems to due to the moving process. Future research can be done by incorporating more stakeholders, or evaluating more factors, or taking themes that are important to children as a starting point. For parks that will be planned in the future, it is suggested to start with an environmental scan involving themes considered important by children, most importantly taking places suitable for play and safe infrastructure into account, with a preference to improve already existing facilities.

1. Introduction

1.1 Background

In the Netherlands, a new and unknown type of housing development is emerging in the northeast of the province of Groningen. Since 1991, the region is exposed to earthquakes induced by gas extraction from the Groningen Gas Field, which was discovered in the late 50's and from which its gas production started in 1963 (**van Thienen-Visser, 2015)**. Since the region is not originally familiar with earthquakes -there are no nearby fault lines-, the built-up area is not constructed with earthquake-proof measures in mind. Because of this, the recent earthquakes are causing a notable amount of damage to the built environment.

While large parts of the housing in the area are damaged by recent earthquakes, a significant part of the built-up area needs to be renovated or demolished and rebuilt. This does not only affect the physical shape of the areas, but people moving to other places in the area also influences the social structure of neighbourhoods. At the same time, in neighbourhoods damaged by earthquakes, social cohesion is high (**Hoekstra, 2016)**.

While people are being forced to move temporarily until they can move back to their renovated or rebuilt house, two options are presented: (1) A temporary house for no extra cost arranged by the Nationaal Coördinator Groningen (NCG) **(FIGURE 1)**, -the government institution responsible for the execution of the renovation and rebuilding processes- and (2) a temporary house found by inhabitants themselves for extra costs **(NCG, 2022).** However, the temporary housing solutions arranged by the NCG result in a lot of negative feedback. Frequent critiques by inhabitants concern the length of stay, a decreased quality of living and lower built quality than what is to expect **(Ekker & Start, 2023).**

Figure 1 ***Temporary Housing Location in Appingedam (author, 2023)***

Most families are dealing with stress becauseof the earthquake situation, which brings children into a vulnerable situation. Especially for younger children (category primary school), which are considered an extra vulnerable demographic group (**Ketefian, 2015)**, and to which healthy development during these age years is crucial.

With children and their parents dealing with earthquake stress, the need to be moved to a temporary location and having a house but no home -temporary houses are also pre furnished-, it can be argued that the children of relocated families -from a demographic group that is already considered more vulnerable- are put into an extra vulnerable position. Since this housing situation is a new phenomenon for the Netherlands and local resources are limited, there is no existing research involving child-friendliness and this specific type of temporary housing. Thus, planning these temporary housing locations with careful consideration for this demographic group is a priority and evaluating existing locations is needed.

1.2 Research Aim & Questions

This research focuses on the child-friendliness of the direct environment of temporary housing parks. Research into this phenomenon can lead to policy changes improving the child-friendliness of parks with temporary housing and thus the well-being of the children living there.

This research aims to evaluate the child-friendliness of temporary housing locations concerning the child-friendly indicators for quality, accessibility, and safety from locations perceived as important by children and to suggest policy and design improvements with a mixed-method approach on a neighbourhood scalar level. The main research question is as follows:

"How child-friendly are temporary housing locations in the municipality of Eemsdelta and how can this be improved?"

To structure this paper and help build a narrative, the following research sub-questions are presented, building upon the different themes selected that are researched:

1) "Which factors influence the child-friendliness of housing and its direct environment?"

2) "What is considered important places by children in temporary housing locations in Eemsdelta?

3) "What is the measured and perceived accessibility and quality of important places as considered by children?"

4) "How do children perceive the safety of temporary housing parks?"

1.3 Case introduction: Eemsdelta Municipality

Figure 2 ***Municipality Eemsdelta (2022)***

Eemsdelta is a municipality in the northeast part of the province of Groningen, the Netherlands, 2021 the municipalities of Appingedam, Delfzijl and Loppersum (**Figure 2).** It has approximately 45.000 inhabitants of which around 3250 primary school kids (**Gemeente Eemsdelta, 2023**). The municipality exists completely above the Groninger Gas Field, of which its extractions are the main cause of the earthquakes in the region. As seen in **Figure 3,** most earthquakes occurred in the 2010s. As a result, thousands of buildings are damaged, of which 27.256 are part of the improvement task in April 2023 (**NCG, 2023).**

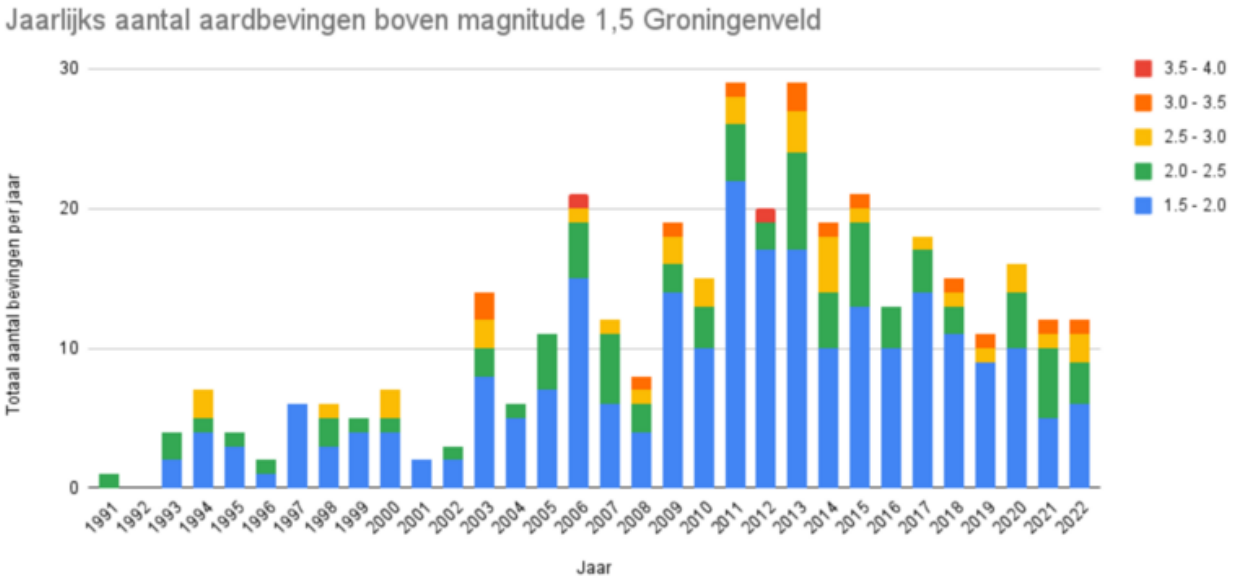


Figure 3 ***Yearly earthquakes in the Groninger Gas field with a magnitude higher than 1,5*** *(KNMI, 2023)*

Most temporary housing parks are in this municipality. This research will focus on those parks and will zoom in on a more in-depth case study, analysing parks in the town of Loppersum from the perspective of children.

1.4 Scientific and societal relevance

This study adds relevance in multiple ways in the scientific and societal fields. At first, it contributes to the overall research of children in the earthquake region, which is considered insufficient (**Zijlstra, 2019**) (**de Jong, 2017**). Also, the research uses a method that collects data from the child's perspective, which is also scarcely represented in literature, since most child-friendly research involves experts or children's parents (**Hume et al., 2005**).

Then, there is no known research on liveability and this type of temporary housing situation. Since these parks are built with a temporary vision in mind, a less deliberate neighbourhood design is created, making them fragile locations. The availability of hiring a nearby plot has the most importance, making it a less integral choice.

The outcomes of this research could lead to suggestions for improvements for temporary housing parks, stressing what is going well considering child-friendliness and what can be done better. Implementing suggestions could increase the child-friendliness of temporary housing locations, making them more pleasant places for children to live, and making overall more liveable places.

1.5 Structure

To build a research context and explain definitions and important parameters, this research will follow with a theoretical framework. Then, the mixed-method approach is described in relation to the research questions. What follows is the results of the research, analysed and linked back to the theoretical framework. Then, conclusions are drawn, and future research and policy propositions are given.

2. Theoretical Framework

This theoretical framework provides literature concerning previous conducted research on the effect of earthquakes on children living in the Groningen earthquake region. It addresses literature defining child-friendliness and its parameters, and places which are perceived as important by children. After, parameters for this research and will be selected and will be explained thoroughly, concluding with a conceptual model of the parameters and themes selected for this research.

2.1 Effects of earthquakes on children in Groningen

According to research conducted by **Zijlstra et al. (2019)**, for some children living in the earthquake region, the act of moving causes psychological damage in the form of grief and homesickness. Children also observe the stress and sadness that the earthquake renovation/reconstruction situation puts on their parents, which influences their own behaviour negatively. They also experience nuisance in the form of noise, a lack of privacy and the length of the renovation and relocation process, with some children even moving multiple times between temporary houses **(de Jong, 2017)**, and are dealing with stress because of the earthquakes and insecurities over the rebuilding and renovating processes, and young children experiencing more fear than teenagers.

Another research by De Kinderombudsman (**de Jong, 2022**) states that,1 out of 5 children in the province of Groningen gives the life an insufficient grade, which is relatively the highest number of all the provinces in the country. Not enough research has been conducted to directly link this to the earthquakes, but it does however reflect on the state and vulnerable position these children in Groningen live in.

Zijlstra et al. (2019) and **de Jong (2017)** state that the amount of research done to children in the Groningen earthquake area is limited. Children that lived in the earthquake region should also be monitored, since phycological effects of the earthquakes can even pop-up years later (**Zijlstra et al., 2019**). **De Jong (2017)** adds that that local projects concerning the earthquakes also lack the involvement of children.

This research on children in Groningen growing up with earthquakes will be used to put the participants of the empirical research in a context specific perspective.

2.2 Definitions of Child-Friendliness and planning

The basis for involving children in planning comes from the 1989 United Nations Convention on the Rights of the Child (UNCRC), which stressed that children should be heard as much as any other age group, by participation, research, and other forms of representation **(Freeman & Cook, 2019)**. After an increase in child-inclusive developments in the early 1990s, in 1996, the UNICEF network of Child Friendly Cities

Initiatives (CFCI) was launched, providing a framework and tools for municipalities to develop and communicate their own initiatives **(UNICEF, 2018)**. The municipality of Eemsdelta is also connected to the Child-Frienldy Cities Initiative trough their JongGOUD department, involving children in decision making processes (**Gemeente Eemsdelta, 2023**).

Broberg et al. (2013) argue that there are too many broad definitions and extensive criteria for what a child-friendly environment is, however, most definitions of child-friendly environments (CFE) are based on the UNCRC and CFCI standards **(Jansson, 2022)**.

Thus, this research will maintain the definition of child friendly environments according to the CFCI, which is practically, a city, town or community in which children can grow up healthy, safe, and fair with a quality social life and environment (**UNICEF, 2018**). Focusing specifically on the environmental elements, the definition states that it includes living in a "safe secure and clean environment with access to green spaces […] [and] places to play and enjoy themselves" (**UNICEF, 2018)**.

2.3 Places considered important by children.

Places for play are considered the most important by children themselves, making playgrounds and schools the most important designated child-specific places. In research papers in which children are asked to draw perceived important places, places for play appear the most important, along with green places (**Hayball, 2018**) (**Hume et al., 2005**). **Hume et al. (2005)** conducted research involving 10-year-old children in Australia that were instructed to draw and map their favourite places, which resulted in 6 main places, of which 4 specific places in the outside environment -and 3 of them are places for playing-: (1) Opportunities for physical activity and sedentary pursuits, including areas around home and playground facilities in the neighbourhood; (2) Food locations; (3) Green space and outside areas, including yards at home and parks; (4) the school, for learning and playing. A study by **Jansson et al. (2022**), reviewed themes in child-friendly environment literature, green and open spaces was the most occurring theme (85%), which includes designated child-specific facilities such as schools and playgrounds. Concerning facilities, greenery often has the most overlap with playgrounds.

This research will use the two defined child-specific perceived important places as input for the objective analysis and will explore if these places are also considered important by the participants of the empirical data collection.

2.4 Child-Friendly environment parameters

As argued by **Broberg et al.**(2013), there is a wide variety of criteria for child-friendly environments mentioned across the scientific literature.

The themes accessibility and safety are two of the most frequently mentioned child-friendly environment parameters in literature, a lot of broad criteria can be listed in overarching themes. In a literature review of child-friendly environments, a parameter list based on appearances in literature was created by **Agarwal et al. (2021)**, naming the following factors: (1) safety; (2) diversity; (3) social interaction (4) accessibility; […]. In research to CFE literature by **Jansson et al. (2022**), the following parameters where most present in literature: Access (82%); Safety (82%); and Fairness and Inclusion (57%), including a fair distribution of physical qualities. Environmental quality is a factor that is mentioned broadly as an influential factor within different themes, such as fairness and inclusion, accessibility, and open space (**Jansson, 2022**), making it another important parameter to consider.

Safety is considered a basic right. According to the Convention of the Rights of the Child by the **United Nations (1989)**, children should be allowed to experience a safe outside environment, stressing the importance of this factor.

The selected parameters for child-friendliness will be used to explore to what extend children in the analysis experience its effects.

2.4.1 Accessibility

According to **Jansson et al. (2022)**, accessibility in child-friendly environments often means proximity, walkability. Where walkability is the most relevant mode of transport for children in most countries, the Netherlands holds an exceptional position because of its strong cycling culture (**Kuipers, 2012)**, making cycling as important as walking.

The preferred proximity for walking and cycling to selected important places are approached differently. The Dutch context is relevant specifically, since the independent mobility of a child varies widely between countries (**Shaw, 2015)**. In the Dutch context, the action range of primary school kids is considered max. 1km to a school location, where cycling distance is considered max. 2km **(Masoumi, 2020).** In the Netherlands, 90% of primary school kids live within 1km walking distance to a school, and 97% of kids live within cycling reach **(CROW-KpVV, 2016)**. In the case of playgrounds, a maximum distance of 400 meters to playgrounds is desirable, as based on a policy analysis from multiple municipalities in the Netherlands (**Gemeente De Ronde Venen, 2008) (Gemeente Rotterdam, 2016) (Van der Plas et al., 2019)**.

Concerning walkability, a child's willingness to walk outside is influenced most by a feeling of safety (**Brussoni, 2020)**. The presence of traffic is the biggest factor influencing this parameter (**Jansson, 2022)**.

2.4.2 Safety

The topic of safety in CFE-literature is most common in two varieties: (1) places in the environment that are free from danger -which is strongly connected with environmental quality factors-, and (2) the perception or feeling of safety (**Jansson, 2022**). Concerning the built environment, safety can be accessed through using safe materials, which are danger free.

Concerning the perception of safety, children often share the same attitudes with their parents towards safety, since parents are actively shaping the perceptions of their child, with parents teaching their children what is safe and what is not safe (**Côté-Lussier, 2015**).

2.4.3 Physical quality

Quality is a broad term, within this context, quality is referred to the physical environment, which includes urban forms and shapes -buildings, roads, natural environment, and open spaces- (**Han, 2018**).

The most important factors for playgrounds are variety and inclusiveness, since successful play spaces are the ones providing choice and variety (**Little, 2010**). A place for play needs to be challenging and accessible for different interests and abilities, thus needing to be inclusive.

An important factor concerning the quality of the physical environment, is safety. In the context of playgrounds, children should be able to safely explore without risking big injuries (**Little, 2010**).

2.4.4 Conceptual model

As mentioned, all three selected parameters influence each other, thus, overlapping factors are discussed in this paragraph, and as seen in the conceptual model (**FIGURE**). Safety overlaps with both parameters for accessibility and quality. Concerning safety of the physical environment, the quality of a place is a variable for safety. For example, the quality of materials used in a playground influences the level of safety (**Tandogan, 2013**). Also, safety and accessibility overlap, mostly in themes as traffic safety (**Jansson, 2022**), speed limits, street light standards and road conditions can contribute to a feeling of safety. To combat traffic problems for children, measures are often focused on (1) the separation of traffic; (2) decreasing the quantity and speed of traffic and (3) creating safe crossings (**Jansson, 2022**). These measures are not only concerning the quality and safety of the physical environment, they can also make it more pleasant to walk or cycle, increasing walkability, a factor of accessibility. Concerning the relation between safety and quality of the physical environment, children themselves “draw inferences of safety from basic social and physical cues such as the number of trees, amount of lighting, […]” **(Côte-Lussier, 2015, p.18).**

2.5 Conceptual Model

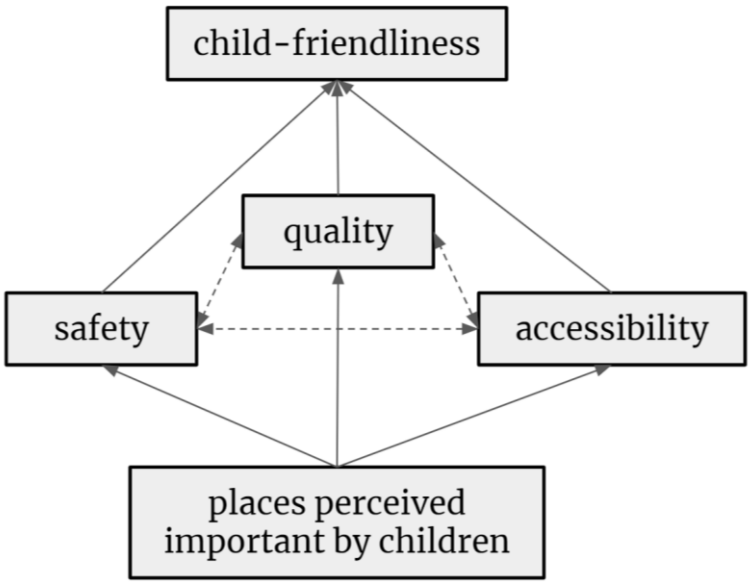


Figure 4 ***Conceptual Model (author, 2023).***

3. Methodology

This research is conducted with a mixed method approach, based on the different factors and parameters as stated in the research sub-question **(Table 1).**

Table 1 ***Methodology table (author, 2023)***

Research Question	Data type	Research objects	Research area	Output
"Which factors influence the child-friendliness of housing and its direct environment?"	Qualitative literature study, secondary data	Earthquake effects on children, perceived important places, accessibility, safety, environmental quality	International and National	Theoretical Framework
"What are considered important places by children in temporary housing locations in Eemsdelta?	Qualitative photovoice & focus group, primary data	Perceived important places	Municipal	Photos, spoken opinions
"What is the measured and perceived accessibility and quality of important places as considered by children?"	Qualitative photovoice, focus group, primary data. Quantitative GIS-mapping, secondary data	Accessibility (proximity, walkability), quality, important places Accessibility (proximity, walkability), important facilities	Municipal Town	Photos, spoken opinions. Maps
"How do children perceive the safety of temporary housing parks and perceived important places?"	Qualitative photovoice & focus group, primary data	Safety (safe environment, perceived safety): safe materials, traffic safety, temporary housing, perceived important places	Municipal	Photos, spoken opinions

3.1 Assessing Measured Accessibility

For the Quantitative Analysis, the focus is on the child friendliness parameter for measured accessibility of important facilities, based on proximity and walkability. As stated in the literature review, playgrounds and schools are perceived the most important designated child-specific places. Used data layers are shown in **Table 2.**

Table 2 ***Used shapefile layers (author, 2023)***

Layer	date	Institution	Availability
Wegvakken/NWB	05-2023	Rijkswaterstaat	public
Onderwijslocaties	2023	DUO	public
Speelplaatsen	2021	Gemeente Eemsdelta	public
Temporary housing locations	01-2023	Nationaal Coödinator Groningen	private

3.1.1 Network Analysis

A network analysis with GIS has been done to get insights on the accessibility (including the factors proximity and walkability) of facilities as perceived important by children from temporary housing locations (**Appendix 1**). The network analysis focused on the distance to a facility as perceived important, measuring proximity, and in the case of schools, makes a separation between accessible while walking and biking.

For schools, only regular primary schools are selected, excluding schools for children with special needs. The service area is calculated with a 1km distance for walking and a 2km distance for cycling in the case of schools, as appropriate to the independent child mobility **(Masoumi, 2020)**. For playgrounds, a 400m distance is calculated, taken from various Dutch policy papers (**Gemeente De Ronde Venen, 2008) (Gemeente Rotterdam, 2016) (Van der Plas et al., 2019)**.

It is important to note that the results of the analyses will only show the objective distance to certain facilities. For schools, it does not mean that children will visit the school that is closest to them, which is

mostly relevant in the towns of Appingedam & Delfzijl where multiple schools exist that are more spread-out over the towns. The researcher tried to tackle this by using an 'overlapping' boundary type in the network analysis, so that the intensity of the yellow and blue colours corresponds with the number of schools that are in reach. For playgrounds, the map layer just shows locations marked by the municipality as playgrounds, this does not guarantee a certain size or quality.

3.2 Assessing perceived important places, accessibility, environmental quality, and safety in Loppersum.

For the qualitative analysis, the focus is on the child-friendliness indicators for perceived child-friendliness, including: (1) important places; (2) environmental quality; (3) accessibility and (4) safety.

For this method, the researcher only chose participants of the town of Loppersum (FIGURE) -which has 2164 inhabitants **(Gemeente Eemsdelta, 2023)**, zooming out from a municipal scalar level to a neighbourhood/small town scalar level. This is done to (1) focus on a specific location, for more in-depth results, (2) research children living on different parks, partly using the same facilities and (3) the efficiency of connecting with the children through one institution, namely a primary school.

Figure 5 ***Loppersum, primary schools, playgrounds and temporary housing (author, 2023)***

Loppersum (**Figure 5)** has 2 primary schools .), both clustered at the same location. The municipality has marked 15 locations with playground facilities ( ), with 5 locations around the two primary schools. The town has 4 temporary housing parks ( ): (1) Pelmolen & Mosterdmalerij; (2) Wirdumerweg (WOCO); (3) Wirdumerweg (JS) and (4) Zwarte Laan. Participants from the photovoice method live or lived at locations 1, 2 and 3.

3.2.1 Photovoice & focus group

In Loppersum, a photovoice method was conducted to obtain data directly from the experience of children from 7-12 years (**Table 3).** This method is selected for the following reasons: (1) data from the perspective of the participants directly; (2) suitable for the selected demographic group, since it doesn't obstruct verbal barriers and (3) suitable for a neighbourhood scalar level (**Wilderink, 2020**).

Ten participants got the instruction to take photos of their temporary housing parks and its surroundings, during a day, specifically of places they perceived as pleasant or unpleasant. This included places they would regularly come, like places for play. The maximum number of photos the cameras could take was 27 photos, no minimum was required.

The selection of participants included children currently living on temporary housing parks, and children that lived there previously. On April 26, 3 kids that previously lived on a temporary housing park but now live further away, were picked up and brought to their old location, after which they got time to walk around and take photos with the same instructions.

Table 3 ***Characteristics photovoice method (author, 2023)***

Factor	Explanation		Factor	Explanation
Participants	10		Locations	Loppersum, parks: Pelmolen & Mosterdmalerij, Wirdumerweg (WOCO) and Wirdumerweg (JS)
Age group	7-12		Time period	24-4-2023 until 9-5-2023

3.3 Ethical Considerations

Since the researcher is working with young children, a strong ethical argument is necessary to support this part of the research.

It has to be taken into account that the researcher himself has partly an insider's perspective, since he grew up in the same area, is exposed to earthquakes himself and has relatives still living there with houses that will be renovated. A positive side from this is that the researcher has a lot of knowledge about the area and is well known with the sensitivity of the subject among inhabitants, knowing how to handle with care. Concerning the cons, the researcher can be influenced by the sensitivity of the subject and can

already have shaped an opinion on the earthquake situation. To not interfere, the researcher took a mixed-method approach with a quantitative network analysis and a qualitative photovoice method, in which the participants themselves collect the data.

3.3.1 Network Analysis

Considering the Network Analysis, the researcher obtained a dataset with all temporary housing locations in the Groningen earthquake area. From those locations, only houses in parks and with more than one bedroom are selected and presented. These locations present where families with children could potentially live, but a guarantee does not exist. Houses are not owned by those families, and families rotate regularly, so by showing possible living locations, privacy is not at stake.

3.3.2 Photovoice & focus group

Using the photovoice method, directly working with young children, multiple strict privacy related measures are taken to protect attendees. The following measures are taken: (1) kids are being given disposable cameras, so that no privacy sensitive metadata will be saved; (2) parents received a clear briefing with information about the research and are given to option to sign a participation letter, in which their rights and the rights of the researcher are stated clearly and ; (3) obtained data (photos) will be saved in an encrypted folder; (4) recognizable and privacy sensitive elements in the photos will be photoshopped and made unrecognizable; (5) results will be anonymized and shown photos will not be linked to kids' names; (7) the focus group with the children is not audio-recorded, but the researcher made notes during this session.

4. Results

This chapter will discuss the results and analysis them with known theory as presented in the theoretical framework. It will be structured according to the research questions and themes as presented earlier, including: (1) Accessibility; (2) perceived important places (3) environmental quality and (4) safety.

This chapter will start with the child-friendliness parameter of accessibility, since it is part of the network analysis, involving all temporary housing locations in the Eemsdelta municipality. Then, the results from the photovoice analysis will be discussed since it zooms in on a particular town in the municipality.

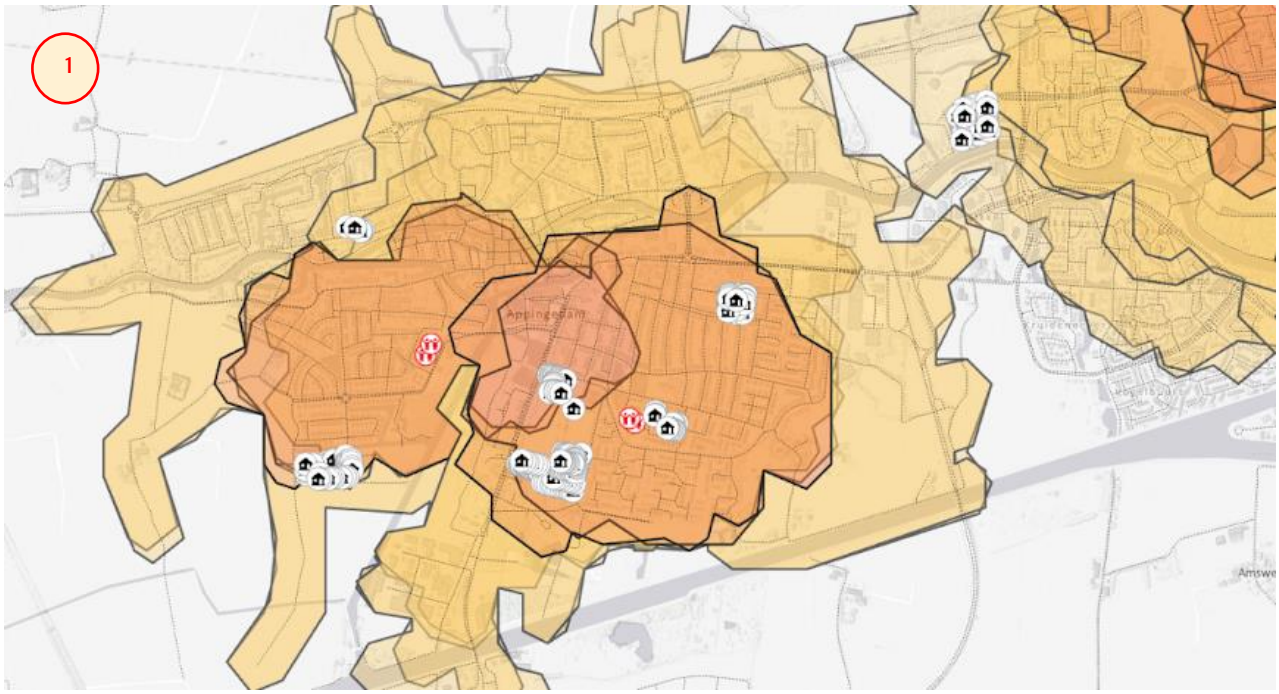
4.1 Accessibility of Facilities

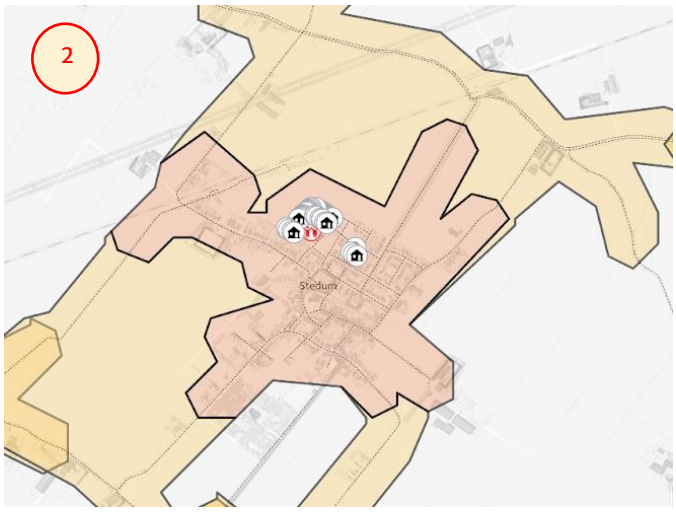
The children living on temporary housing parks have to visit important facilities outside of their location, especially when these facilities are considered lacking on the site itself.

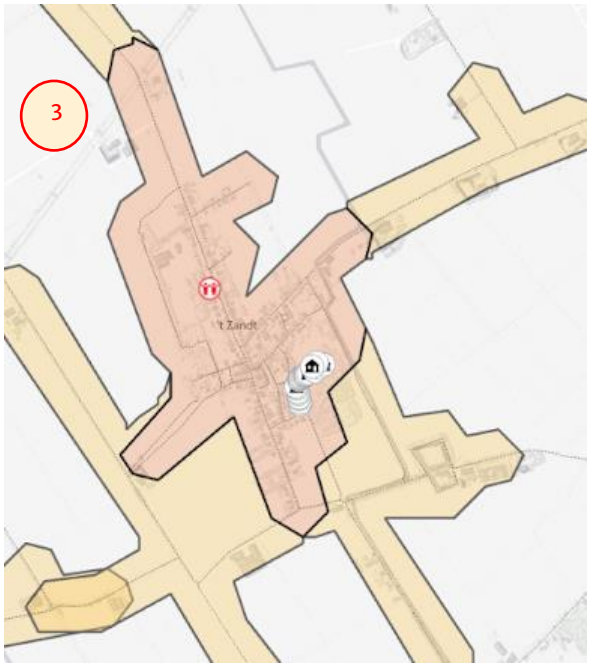
4.1.1 Schools in Eemsdelta

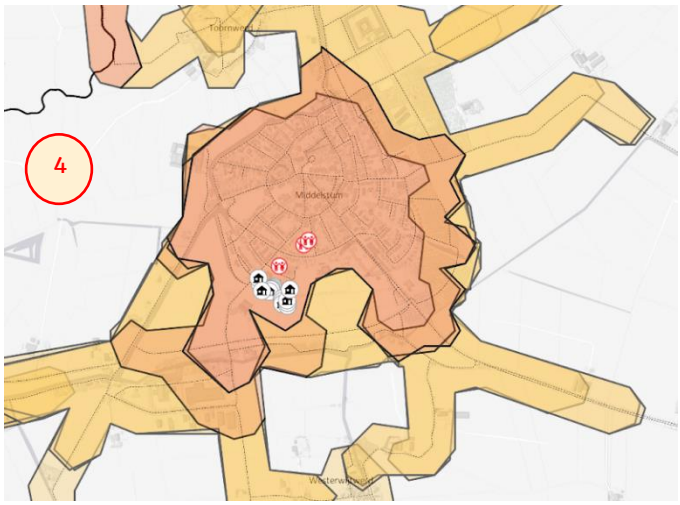
For schools, all of the 414 temporary family houses on parks in the municipality of Eemsdelta, are located within a 2km cycling distance from a primary school. For the walking distance of 1km, 290 temporary housing locations, or 70%, are within reach. According to national numbers, 97% of kids live within cycling reach of primary schools in The Netherlands **(CROW-KpVV, 2016)**, compared to 100% in this analysis. For walking, 90% of kids in the Netherlands live within reach, compared to 70% in this analysis, so below national numbers.

Parks with temporal housing situated within the existing built-up area, are mostly within 1km walking distance to primary schools, parks situated at the edge of towns are often not within 1km walking distance to schools but are still just within the 2km cycling distance.







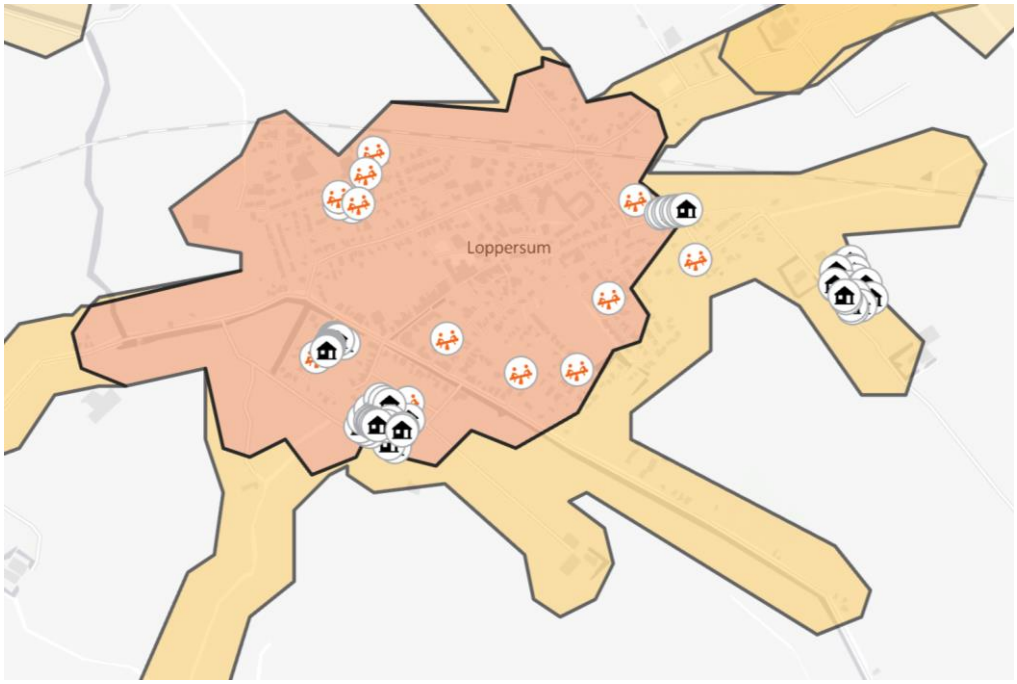


Accessibility of Schools

Map 1, Appingedam Delfzijl (author, 2023)
Map 2. Stedum (author, 2023)
Map 3, 't Zandt (author, 2023)
Map 4, Middelstum (author, 2023)

4.1.2 Schools in Loppersum

For the participants in Loppersum, the most critique on reaching their school concerning distance is at the temporary housing park Wirdumerweg (JS). Most of them go by bike, one of them is brought by car, but must bike once a week. perceive the school as being far away. In the network analysis, this location just falls within the edges of the 2km service area, which is only suitable for biking. Participants from the Pelmolen & Mosterdmalerij locations, which falls within the 1km service area for walking, stated that they also walk to school.



Map 5 Accessibility of Schools, Loppersum (author, 2023)

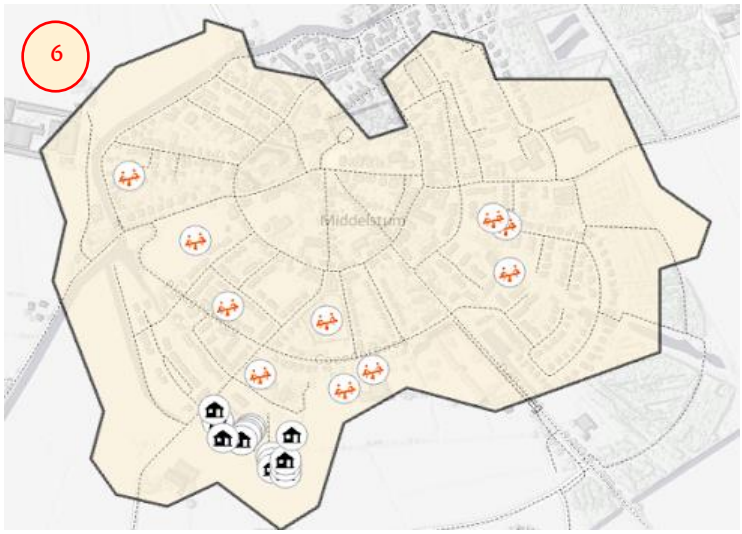
4.1.3 Playgrounds in Eemsdelta

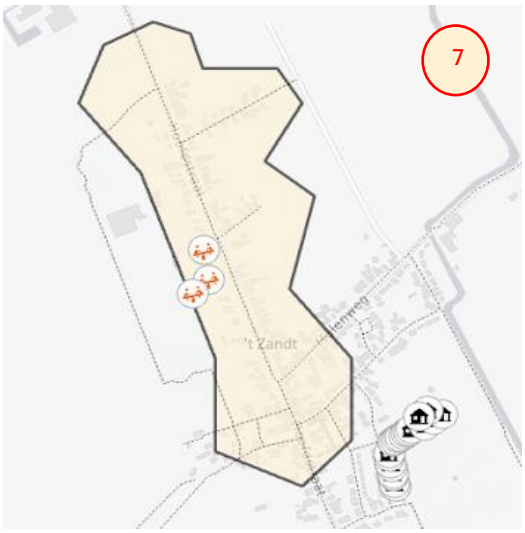
For playgrounds, just 293 out of the 414 temporary family houses on parks in the municipality of Eemsdelta are within a 400-meter reach of playgrounds, which is 70,1% of all temporary houses.

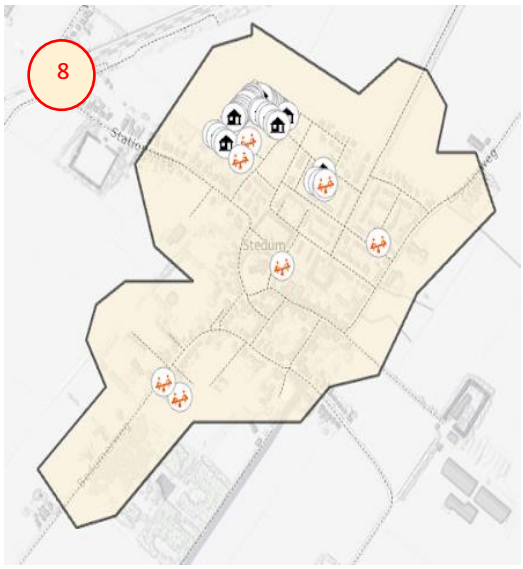
Also, in the case of playgrounds, the temporal housing locations positioned at the edge of the towns are the ones that have the largest distance to facilities. While temporal housing parks placed within the already existing built environment profit from the present facilities, the parks placed at the edge of towns lack playground facilities. This can be seen in the cases of Loppersum **(Map 9),** ‘t Zandt **(Map 7)** and Delfzijl **(Map 10).**

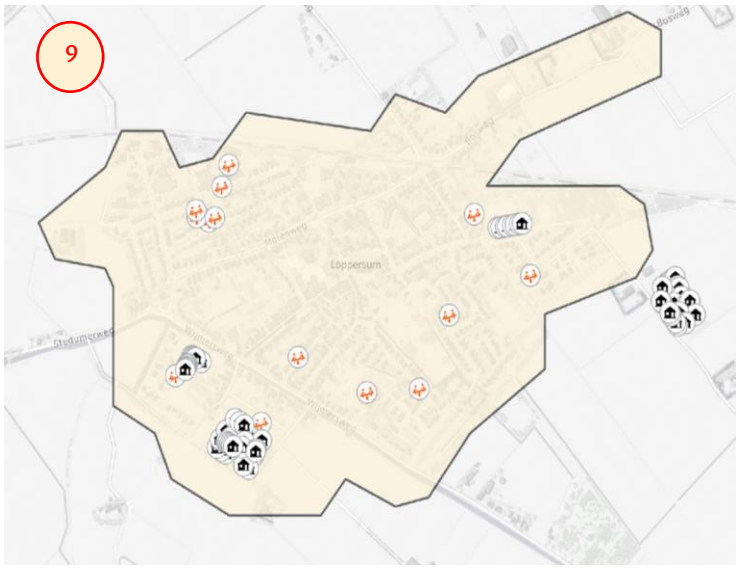
Another notable finding is that this analysis exposes some weak points concerning accessibility of playground facilities in the already existing built environment. Parks with temporary housing in Appingedam, in the northwest and south of the town (**Map 10)** are built within the city borders but are not placed within a maximum 400-meter distance of a playground. This does only apply to these temporary

housing parks, but also to the permanently placed houses around them, in the case of the northwest location.









Accessibility of Playgrounds

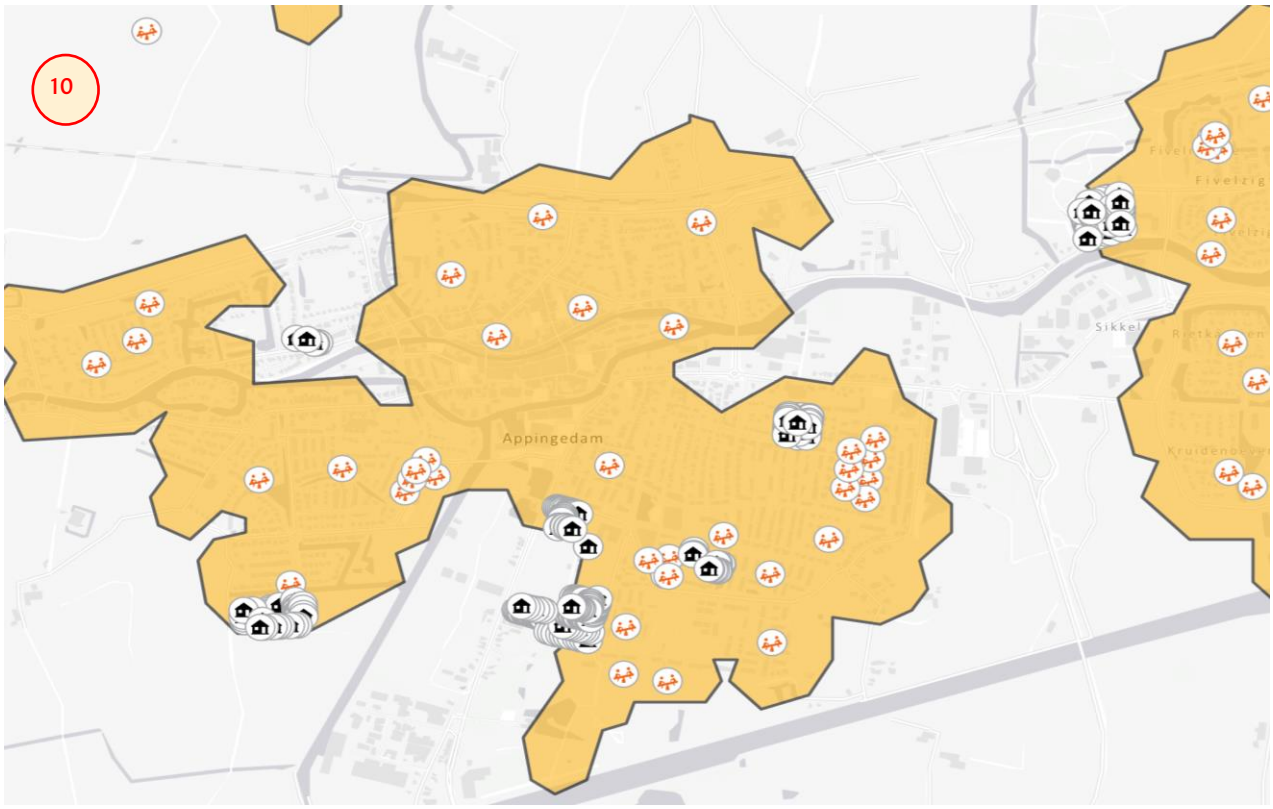
Map 6. Middelstum (author, 2023)

Map 7. 't Zandt (author, 2023)

Map 8. Stedum (author, 2023)

Map 9. Loppersum (author, 2023)

Map 10. Appingedam, Delfzijl (author, 2023)



As seen in (**Table 6)**, there are some specific locations with insufficient scores concerning independent accessibility. For playgrounds, green means within 400m, orange means partly within 400 metres, and red means not within 400 meters. For schools, green represents the 1km walking distance, orange represents the 2km cycling distance.

Three parks out of 16 don't have sufficient scores on accessibility of schools and playgrounds, with just 9 out of 16 parks of which the accessibility of both facilities is sufficient.

Park	Location	School Accessibility	Playground Accessibility
BURG. KLAUCKELAAN	APPINGEDAM		
BURG. WELLEMANLAAN	APPINGEDAM		
HILMAARWEG	STEDUM		
HINK OOSTINGSTRAAT	'T ZANDT		
JAN NIEUWENHUYZEN	APPINGEDAM		
MAARVLIET	STEDUM		
OLING	APPINGEDAM		
OOSTRAND	MIDDELSTUM		
PELMOLEN & MOSTERDMALERIJ	LOPPERSUM		
TRIANGEL / SECR. HOLSCHER / VOSLAAN	APPINGEDAM		
VERLENGDE OOSTRAND	MIDDELSTUM		
WEG NAAR DEN DAM	DELFZIJL		
WESTERSINGEL	APPINGEDAM		
WIRDUMERWEG (JS)	LOPPERSUM		
WIRDUMERWEG (WOCO)	LOPPERSUM		
ZWARTE LAAN	LOPPERSUM		

Figure 6 ***Measured school and playground accessibility (author, 2023)***

4.2 Important places and it's quality.

In photographs of places that are marked as important by the participants, places for play are considered the most important.

4.2.1 Places perceived pleasant

Of the 39 photos that are marked as pleasant by the participants, 10 are displaying a nearby playground (**Photo 1**). Another 9 photos are displaying grass fields and nature, in or near the temporary housing parks **(Photo 2)**. In the group discussion, the children stated that they value places with green and nature. , as mentioned by **Jansson et al. (2022)**. It can also be seen that green places overlap with playground facilities **Jansson et al. (2022)** Another six photos that are marked as pleasant include side walls of temporary houses. According to the participants, these places are suitable for playing since they can play football against the walls (**Photo 3**). Overall, places for play are considered the most important, which is corresponding with the literature (**Hayball, 2018) (Hume et al., 2005)**.

According to the children, the playground next to the temporary housing park Pelmolen & Mosterdmalerij, as also displayed in **Photo 1**, is sufficient, and no complaints from participants from that area are on the quality of the facility. The playground has a wide variety of different playground equipment, an important factor for its quality (**Little, 2010)**.

Photo 1

Photo 2

Photo 3

4.2.2 Places perceived unpleasant

Concerning places that are perceived as unpleasant, children from all locations criticize the gardens of their temporary houses. The front gardens of these houses are seen as not big enough and barely usable (**Photo 4)**, and back gardens (1) lack a sufficient size (**Photo 5)**; (2) don't have enough grass (**Photo 5)** and (3) are shielded by high fences (**Photo 6)**, which makes it not possible to play there**.** Children experiencing their gardens as unpleasant corresponds with the literature on open and green spaces, since this involves gardens that are suitable for play (**Hume et al., 2005).**

Photo 4

Photo 5

Photo 6

Children from both Wirdumerweg locations criticize the availability of nearby playgrounds, and the quality of the ones existing. A participant from the Wirdumerweg (JS) location argues that the quality of a nearby playground is insufficient, since there is 'just one tree trunk to walk on' thus lacking the influential factor of variety and challenge of playground equipments (**Little, 2010**). The playground at Zorgvlijt, even though marked as a pleasant location (**Photo 7**), is not considered as welcoming, because of the rules to not cause nuisance for neighbours and the opening times.

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

According to multiple participants from the Wirdumerweg (JS) location, the location lacks a facility to play at all. Streets are bland (**Photo 8 & 9)** and a grassfield in which the participants see an opportunity for a nice playground, is currently not suitable because of the amount of dog poop that is found there while playing (**Photo 10 & 11).** Multiple participants even refer to this field as the 'poop field'.

At the Wirdumerweg (JS) location, the children specify that there is a playground on their location, but that this facility is only accessible for the foster home it belongs to. The fact that the children are not welcome there and don't have another playground on the site, puts them in a situation which is considered unfair, which directly contradicts with what a child friendly city should be according to the definition of **UNICEF (2018**).

4.3 Safety

In the data collected by the participants, two main safety related themes stood out: concerns about (1) safety of the park itself and (2) road safety.

4.3.1 Safety of the Park

Starting with the temporary housing parks themselves, the built quality of the houses raises concerns amongst the participants. Multiple photos marked as unpleasant show outside walls of temporary houses with holes in the outer layer, which is made out of strips simulating bricks (**Photo 12 & 13)** According to participants, local youth has found out that these strips are easily breakable and are ripping them off for fun sometimes. Another photo exposes a roof tile that has fallen into a backyard (**Photo 14)** which gives the children an extra feeling of unsafety, since it is possible that a roof tile could hit them while sitting in the garden or walking close to a house. According to this data, the safety of temporary housing parks is insufficient in both perception and risk of danger ways, both two important factors of safety in a child friendly environment (**Jansson, 2022**). The quality of the physical environment causes safety problems, since used materials are not safe.

Photo 12

Photo 13

Photo 14

4.3.2 Road safety in reaching important places

The majority of the safety concerns are about the roads next to which the temporary housing parks are built, which can also be seen as influencing the accessibility. This relates to the literature, because safety mostly overlaps with accessibility in terms of traffic safety (**Jansson, 2022**). For Loppersum, the locations Pelmolen & Mosterdmalerij and Wirdumerweg (location outside Loppersum) are built next to busy and important roads. These roads are photographed multiple times and marked as unpleasant by the participants (**Photo 15, 16 & 17).**

The children argue that, in both situations, cars tend to drive fast. For the location Wirdumerweg (JS), there are more concerns. There is no pleasant sidewalk, since it is seen as a bicycle path and should be shared with cyclists. Also, a part of the sidewalk is not separated from the road, forcing people to walk really close to the road. The participants also state that the street lighting for this road is insufficient. The road itself does not have any streetlights, and the small lights on the sidewalk do not lit up the place sufficiently, and are often plastered with chewing gum, so that the amount of light is even less. According to the children, this makes the situation even worse, since the distance to certain important facilities is long, and the only road to the town, and thus the important facilities, is not considered safe and child friendly. Since children draw inferences of safety from basic social cues, aspects as insufficient street lights and no separation of traffic will have the most influence on their negative safety perception (**Côté-Lussier, 2015)**.

The children also argue that, in both situations, cars tend to drive fast. For the location Wirdumerweg, there are more concerns. There is no pleasant sidewalk, since it is seen as a bicycle path and should be shared with cyclists, making the absence of separation of traffic an important influence on the safety perception (**Jansson, 2022).** Also, a part of the sidewalk is not separated from the road, forcing people to walk really close to the road. The participants also state that the street lighting for this road is insufficient. The road itself does not have any streetlights, and the small lights on the sidewalk do not lit up the place sufficiently, and are often plastered with chewing gum, so that the amount of light is even less.

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Photo 15

Photo 16

Photo 17

4.4 Other findings

The participants also stressed that they preferably live on a temporary housing park within the already existing built environment, since they can more easily reach important facilities, mentioning facilities such as playgrounds, shops and friends.

For the case of the Wirdumerweg location, the children argue that they experience noise nuisance from the Wirdumerweg, since cars drive really fast and because the park is built next to the road, with some houses even directly facing the road.

In preliminary conversations, parents of the children participating in the research indicated that the child friendliness of temporary housing parks is insufficient, since there is 'nothing to do' for the kids and that playgrounds of a decent quality are too far away.

5. Conclusions & Discussion

5.1 Interpretations

The aim of this research was to evaluate the child-friendliness of temporary housing locations within the themes of places perceived important, accessibility, environmental quality, and safety. The study shows that all temporary housing parks have elements that are not considered child friendly. Moreover, parks located outside the already existing built environment are perceived less child-friendly than parks within towns. Concerning perceived important places, children value places to play the highest, since a large part of the photos marked as pleasant are photos containing playgrounds, open fields and greenery, which corresponds with literature and often overlap (**Hayball, 2018**) (**Hume et al., 2005**) **(Jansson, 2022)**. Remarks are involving gardens, since they are too small and not considered suitable for playing. For the Wirdumerweg (JS) location, remarks are on the quality of a grass field that could be suitable for a playing area on the Wirdumerweg (JS) location. Also, the accessibility of already existing playgrounds and schools is not optimal from temporary housing parks, since just 9 out of 16 parks in the municipality are in a walking reach of a school and a playground, which is below the national average **(CROW-KpVV, 2016)**, this counts for temporary parks built outside the built environment, but also some parks inside the built environment lack decent accessibility to schools and playgrounds. Concerning safety, all parks are not perceived as safe because of the lacking quality of materials, with tiles and bricks falling down from the buildings, giving participants a feeling of unsafety. Children on parks placed next to a busy road criticize its safety, since sidewalks and bicycle lanes are not considered pleasant, cars are often driving fast, and

sufficient streetlights are lacking. Since children tend to base their perception of safety on basic physical cues, these factors are a large influence on their feeling of unsafety (**Côté-Lussier et al. 2015)**

Consequences of insufficient child-friendly elements can contribute to a lower well-being of children living on temporary housing parks, while they are already experiencing psychological problems to due to the moving process (**Zijlstra, 2019)**, which the potential for these problems to develop further. For example, on the Wirdumerweg (JS) location, problems with the quality and safety of the nearby road, also contributes to a feeling of being closed off from their town, because these roads are often their only option to reach the rest of the community. While children in Groningen are relatively perceive there well-being the lowest of all provinces in the Netherlands (**de Jong, 2022**), this number is at risk to increase with more people living on temporary housing parks that are considered not child friendly.

5.2 Strengths & Limitations

The conceptual model should have been more in-dept about the interactions between the different parameters. As seen in the results section, the parameters overlap in different ways and different forms. This was also stated in the literature, but the results consisted more of different themes involving all three parameters. The model could be expanded by including important themes, and stating which parameters overlap in which way. Considering limitations of this study, the group of participants from temporary housing parks was limited, since just 10 children from 3 parks participated in the research. Because of this, it is difficult to make generalized statements regarding all temporary housing parks.

5.3 Future research recommendations

For future research recommendations regarding the child-friendliness of temporary housing locations, more factors of child-friendliness could be included. Specifically, research could be done from a perspective of parameters or themes that children perceive as important, instead of mainly following parameters from the theoretical framework, to create more in-depth results for this context-specific situation.

Generally, more children participants could be included in research from different parks, making it more suitable for generalized statements.

Also, other people such as parents could be involved, since their behaviour in the earthquake situation is influencing stress and concerns among their children, as stated by **Zijlstra (2019)** and children are taking over their perception of safety in the physical environment (**Côté-Lussier, 2015)**.

5.4 Policy recommendations

For parks that will be planned in the future, it is suggested to start with an environmental scan involving themes considered important by children, most importantly places suitable for play and safe infrastructure.

Even though places for play could be within reach, the quality is not always satisfactory for children, as for example argued by a participant from the Wirdumerweg (WOCO) location, since a nearby playground facility “only has one tree trunk to walk on”. To improve child-friendliness, the quality from already existing important places can be upgraded, to benefit the whole community. Concerning already existing parks, which sometimes lack a facility in reach at all even though the location has potential, new facilities could be created on us near the park itself.

Especially for temporary housing parks located at the edge of the built environment, it is possible that there is just one option to reach the community and important places. To not risk problems with safety, accessibility, and the risk to close children of from the community, it is needed that the infrastructure is child friendly. Preferable parks should be located to safe roads with a separation of traffic, enough lighting during dark hours, and speed measures adapted to the presence of children moving independently. When necessary, roads can be upgraded with better lights, speed measures and a separation of traffic.

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Appendix 1 – GIS Analysis

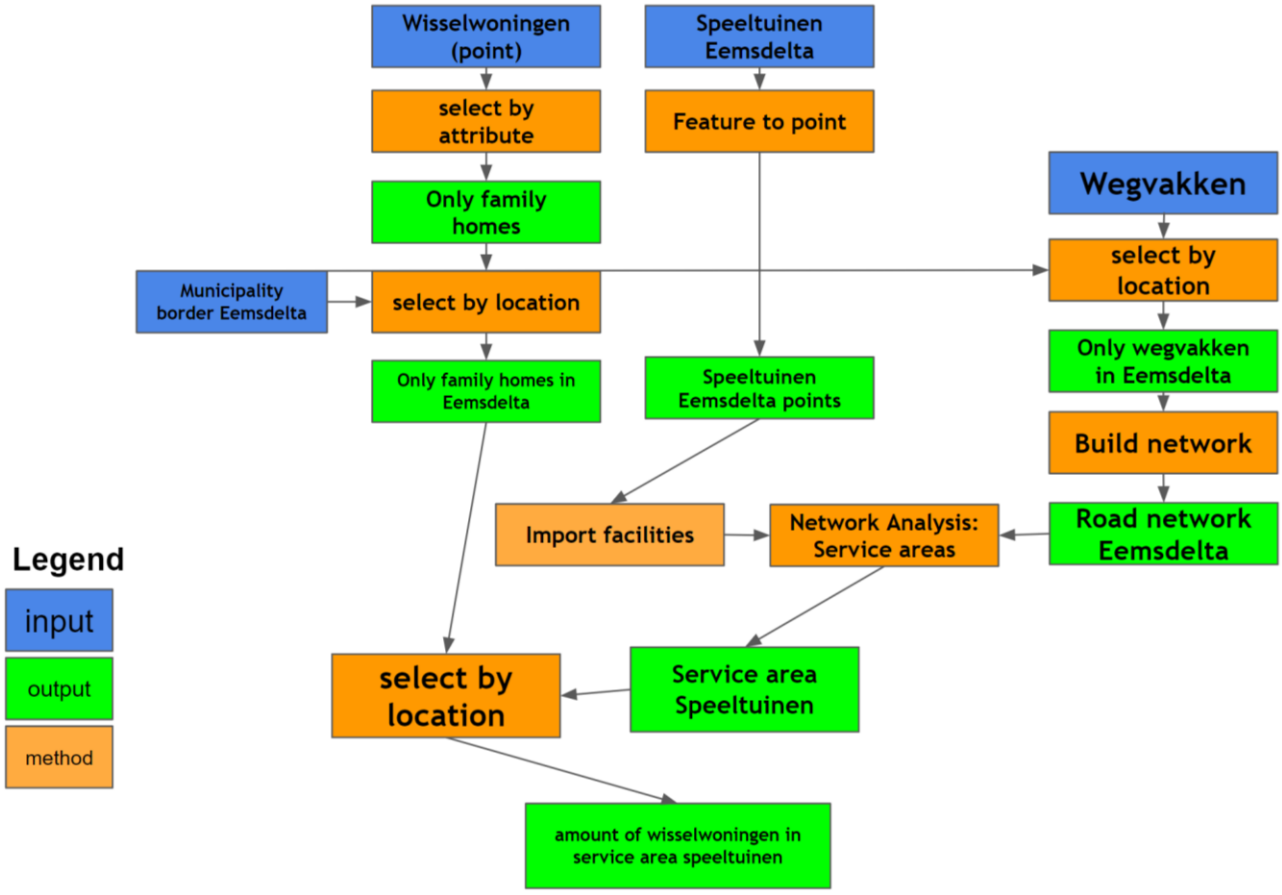

Figure 7 ***GIS Analysis scheme for playgrounds***

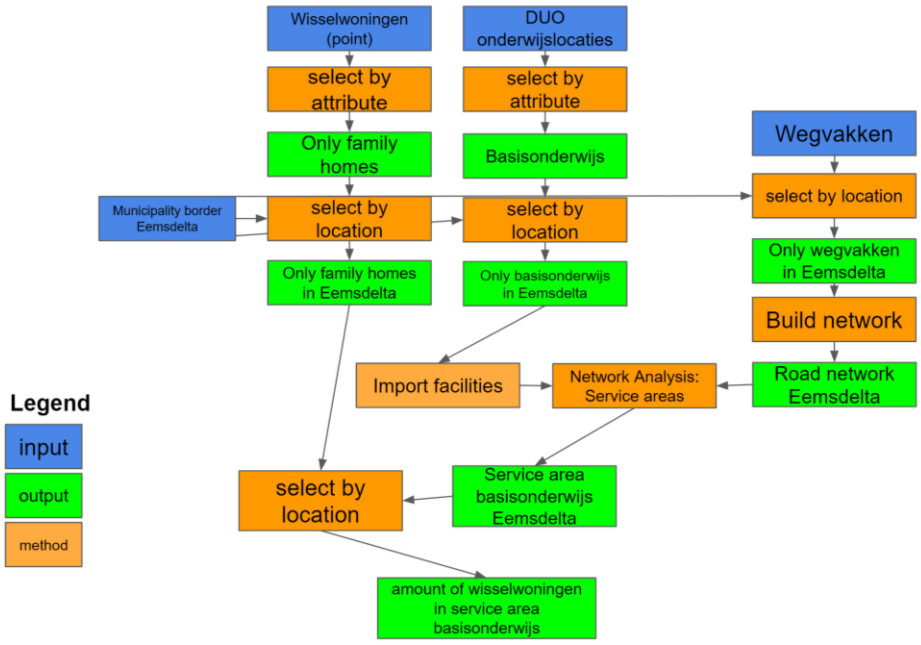

Figure 8 ***GIS Analysis scheme for schools***