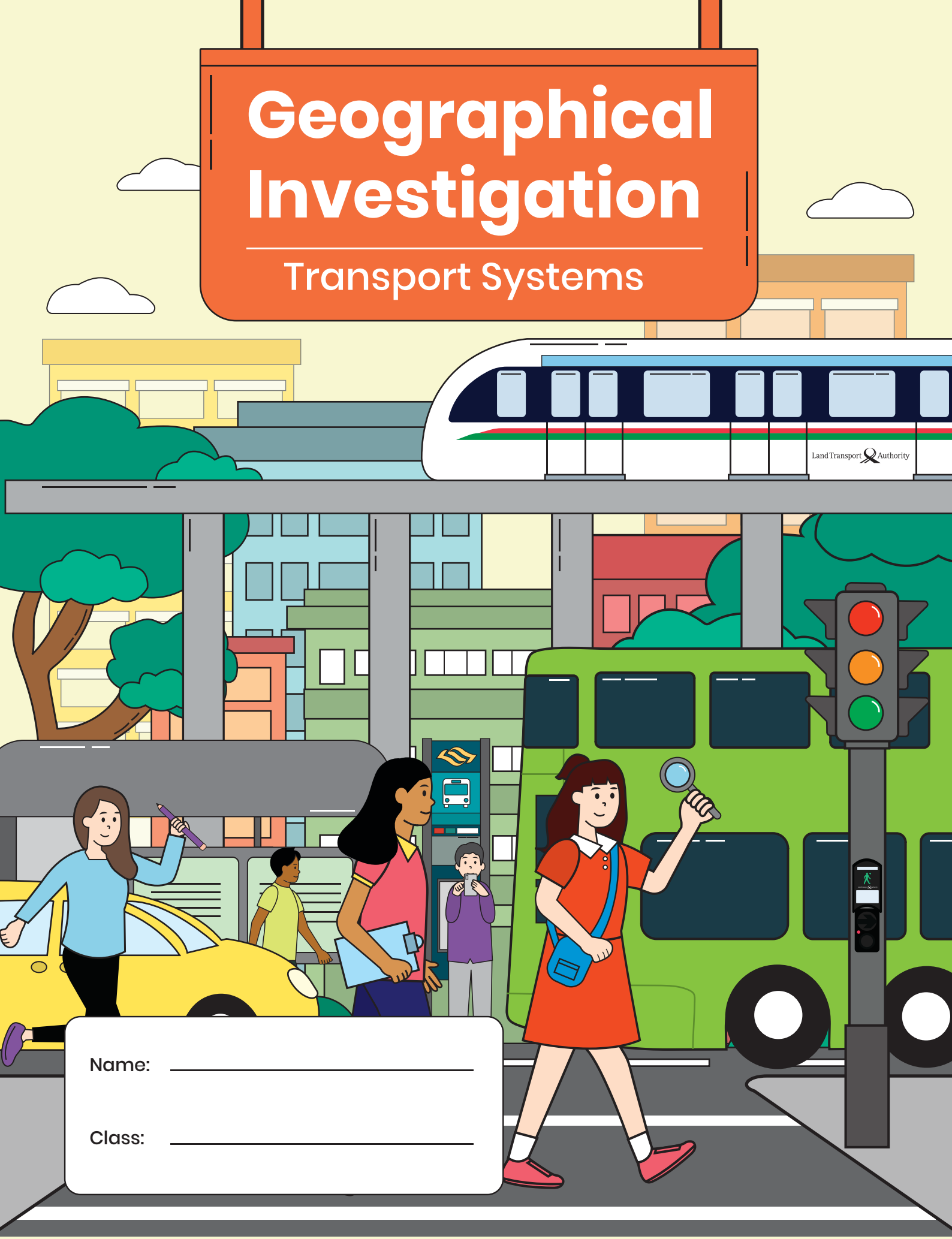
Geographical Investigation

Transport Systems



Name: _____

Class: _____

This Geographical Investigation Kit allows students to deepen their understanding of transport systems through the Geography Inquiry (GI) Process. This kit is meant for teachers and students and includes a step-by-step guide on the GI process, using a sample inquiry question.

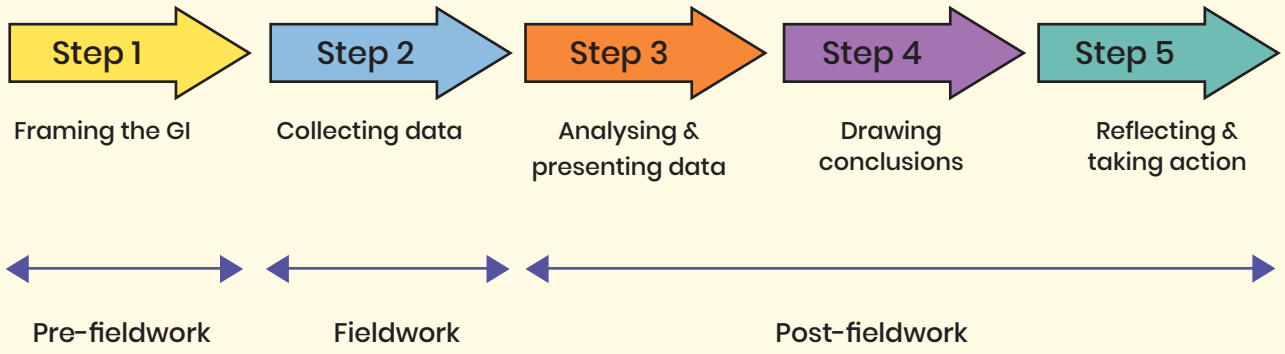
Introduction to Fieldwork

What is Fieldwork?

Fieldwork is the process of observing and collecting data about people, cultures, and natural environments. It is conducted in our everyday surroundings rather than in the semi-controlled environments of a lab or classroom.

This allows researchers to collect data about the dynamic places, people, and species around them. Fieldwork enables students and researchers to examine the way scientific theories interact with "real life." (National Geographic Education).

Stages of the Geographical Investigation Process



Pre-fieldwork

Sparking Curiosity

a) What is mobility?

b) Who are the different types of commuters? What are some factors affecting the mobility of some groups of commuters?

c) Study the article given (Annex A) and state the features that an Integrated Transport Hub (ITH) may have in the box below.

d) What are some things e.g. layout, facilities, features for persons with disabilities/ elderly etc. about ITHs that you are curious to find out more about?

Stage 1

Framing the Geographical Investigation

Hypothesis or Guiding Question

A **hypothesis** is a tentative statement about the relationship between two or more variables. It is a specific, testable prediction about what one expects to happen in one's study. It is usually based on prior knowledge, observations and experience.

Note that a hypothesis does not have to be right. While the hypothesis predicts what the investigator expects to see, the goal of inquiry is to determine whether this guess is right or wrong. When conducting an inquiry, the investigator might explore a few different factors to determine which ones might contribute to the ultimate outcome.

A **guiding question** may focus your investigation to answer a question or solve a problem.

An example of a **hypothesis statement**:
"The provision of mobility options at Integrated Transport Hubs (ITHs) promotes the use of public transport among the elderly and persons with disabilities (PWDs)."

An example of a **guiding question**:
"Does the provision of mobility options at ITHs promote the use of public transport among the elderly and persons with disabilities (PWDs)?"

Our guiding question:

Planning Your Data Collection

Discuss with your group members about what type of data is needed for your investigation. You may wish to consider the following:

1. Types of data

a) Primary data - data observed or collected from first hand experience

- e.g. Surveys, interviews, landuse surveys

b) Secondary data - data collected by someone else other than the current data collector

- e.g. newspapers, published articles, statistics from an organisation

2. Sampling

Prior to conducting any fieldwork, sampling is an important consideration that impacts the validity and reliability of the data collected. Hence, it is essential to understand the key sampling methods and consider their respective advantages and disadvantages.

What is sampling?

- It is a representative method for investigating a whole population.

Why sample?

- In reality, there is simply not enough time, energy, money, labour/manpower, equipment and access to suitable sites to measure every single item or site within the parent population or whole sampling frame.
- An appropriate sampling strategy is adopted to obtain a representative and statistically valid sample of the whole.

Sampling considerations

- Larger sample sizes are more accurate representations of the whole.
- A sampling strategy made with the minimum of bias is the most statistically valid.

Sampling Methods	Best when
Convenience (selects participants that are available around a location)	Doing qualitative research
Simple random	Whole population is available
Systematic sampling (every nth person)	When a stream of representative people are available (e.g. in the street).

Source: http://changingminds.org/explanations/research/sampling/choosing_sampling.htm

Methods of Data Collection

3. Surveys/Interviews

A survey is a questionnaire in which people are asked to respond by writing their answers to questions on paper or filling up an online survey form, whereas interviews involve asking people questions and recording their verbal responses.

Guidelines for Formulating Survey/interview Questions

1. Keep questions short and simple.
2. Don't ask leading questions. For example, "How great was the football game?" implies that person thought the game was great. Maybe it wasn't.
3. Ask close-ended questions. Whenever possible, provide answer choices. Such questions are much easier to answer and to analyse after the survey.
4. Give as few answer choices as is reasonable. Too many choices annoy the person being surveyed and are difficult to analyse.
5. Put the questions in a logical order. For example, ask, "Do you have pets?," before asking, "What kind of pets do you have?"
6. Make it neat and orderly. Number your questions.
7. Pretest your survey. Give the survey to five people before doing the actual study. Ask them to tell you if a question is unclear or bothersome. Read their responses. Are your questions getting the information that you want?

4. Fieldnotes

Other than surveys/interviews, do remember to take notes of your observation e.g. types and levels of activity at a train station during peak hours.

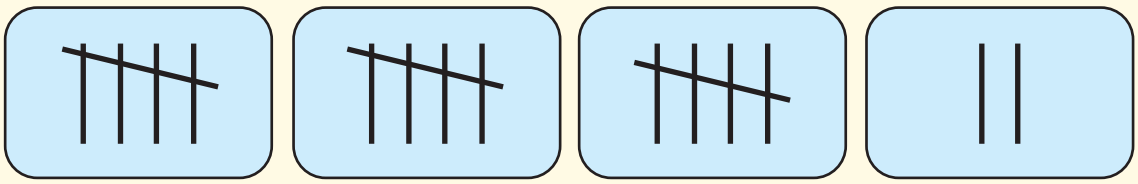
5. Observation & Counting

You can observe and count the number of people that utilise a feature of the ITH. You may also want to take photographs because they provide an accurate record of part of the environment. They allow us to identify key features and observe the relationships between these features.

Counting can be used in a variety of different situations e.g. counting frequency of waves, people, traffic, litter, house types etc.

Technique

1. Mark your location onto the map and recording sheet.
2. Note and record the time, date and duration of the task.
3. When counting items, it can be recorded by using a tallying method also known as the "five bar gate".



4. A hand clicker can also be used to record when each person or vehicle passes to get an overall total.

6. Perception Surveys

A perception survey is a data collection method that can be carried out to investigate the views on the quality of the built environment. The survey uses pairs of opposite words to talk about the environment. By showing the extreme ends of each pair (e.g. high versus low), the respondent can then choose the most suitable option.

Perception surveys can be used to determine the quality of the built environment at the ITH and how the ITH has an influence on people's experience.

As it is based on personal judgements, the data collected using environmental perception surveys is subjective rather than based on facts.

Example: Environmental Perception Survey

Positive Aspects	+2	+1	0	-1	-2	Negative Aspects
Convenient						Inconvenient
Comfortable						Uncomfortable
Accessible						Inaccessible
Total score						

7. Reliability of Data

Ensure that the data collected is reliable and accurate e.g.

- If you collect data only for a day, will it be reliable? How many days should you collect the data? Why?
- Do all members of your group need to conduct your survey/investigation at the same time of the day? Will the results differ for peak and non-peak hours? Should you collect the data on weekdays or weekends?

8. Materials Needed

- Map of the selected locations for data collection
- Phone with camera and voice recorder
- Clicker
- Survey/interview questions
- Recording sheet

As a group, decide on the

i) sampling method for your data collection and state your reasons below

ii) method(s) of data collection and your reasons

9. Pilot Survey

A survey that is conducted with a few individuals of the target population or the sample of a survey, in order to test and refine the survey instruments (questionnaire and instruction manual, data processing manual and programmes). This takes place before the main data collection across the target population or the full sample.

Source: UNESCO Institute for Statistics

Decide if your group will be doing a pilot survey. The date should ideally not be too far apart from the actual fieldwork date.

Stage 2

Fieldwork

Collecting Data

Using this guiding question as an example, conduct your fieldwork at your chosen ITH.

"Does the provision of mobility options at ITHs promote the use of public transport among the elderly and persons with disabilities (PWDs)? "

1. Understanding the site

Identify the features at your chosen ITH that improve mobility of the elderly and PWDs.

2. Survey/Interview

In pairs/trios, you will have to conduct surveys/interviews with a pre-determined number of respondents based on your sampling method.

3. Observation & Counting

Take photos of the features and count the number of elderly and PWDs that use the features you have identified in (1). You may record any findings below.

4. Perception Survey

If you have chosen to conduct perception surveys, each pair/trio will select the most appropriate option for each aspect stated. You can also conduct this with the commuters at the ITH.
Use your camera to capture supporting evidence whenever possible.

Stage 3

Post-fieldwork

Analysing and Presenting Data

1. Represent the data

- In what ways can your data be best represented?
- Consider the type of data you have collected and decide which types of graphs/charts can clearly and effectively represent your data for easier analysis.

Examples:

Maps (by marking out sustainable transport features)

Field sketches

Graphs (simple bar graphs or pie charts showing the results of the survey questions)

Texts (qualitative survey responses)

Images (of transport mobility features)

2. Analyse the data you have collected as well as your graphs

- Do you see any patterns in the data? (e.g. are there some facilities that improve the mobility of the elderly and PWDs more than others?)
- Is there a relationship between the provision of mobility options and the use of public transport by the elderly and PWDs?
- Do the patterns differ for different ITHs? (You may consider this if you have done your investigation at more than one ITH)

Stage 4

Post-fieldwork

Drawing Conclusions

3. Does the data collected answer your GI question?

- Are there any other emerging patterns or anomalies to your data?

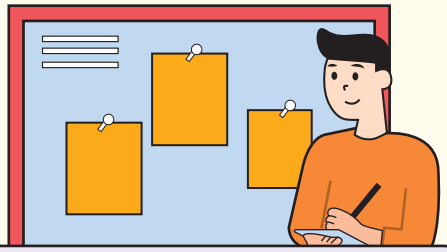
4. Explain your findings

- Suggest some reasons for your findings, based on your knowledge, experience and any prior research you have done.
- Are there any limitations to your data and evaluation?

Stage 5

Post-fieldwork

Reflecting and Taking Action



Evaluate the following factors in conducting your fieldwork. Do note that the questions are for consideration and not all may be applicable to your study.

1. Methods (ensuring reliability and validity)

- Is the sequencing of activities appropriate?
- Were the data collection techniques used appropriate? Why?
- Is there consistency in the recording of data? How did you ensure accuracy of data? How would you improve this the next time?
- What challenges did you face during the collection of data? How did you resolve them?
- What is lacking in your data? What new data would you have collected?
- Are there any other sources you think you could have used to verify your data?
- How could you have done better?

2. Presentation of Data

- Based on your purpose and inquiry question, why did you choose these methods to represent your data?
- Are there any other ways of doing so? How would it have affected your analysis and interpretation?

3. Analysis of Data

- Did you approach the analysis of the data systematically (for e.g. comparing data and classifying information based on similarities or differences for better understanding of the inquiry)?
- How would you improve the analysis of data the next time? How would you do the interpretation differently the next time?
- What are the thinking processes involved in your interpretation of data?
- What is still puzzling you?

4. Applying Findings / Extending Inquiry

- Can your findings be applied to the other ITHs?
- Extending your inquiry – you may want to collect data from other MRT stations that are non-ITHs. Consider how similar or different the spaces are organised in terms of the facilities provided and whether these factors affect mobility of the elderly and PWDs.

5. Taking Action

- Are there any suggestions or recommendations which you could provide to the relevant authorities based on your findings?

This resource is developed by the Singapore Mobility Gallery, Land Transport Authority.

About the Singapore Mobility Gallery
The SG Mobility Gallery provides a behind-the-scenes look at how LTA plans, designs and builds our land transport system while balancing efficiency, liveability and inclusivity as it leverages technology for smarter urban mobility.

For enquiries or school visits to the Singapore Mobility Gallery, please email: sgmobilitygallery@lta.gov.sg

SINGAPORE MOBILITY GALLERY

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Annex A

Woodlands Integrated Transport Hub to Open on 13 June 2021

Singapore's 11th integrated transport hub (ITH), Woodlands ITH, will open on Sunday, 13 June 2021.

2. Due to its close proximity to Woodlands North-South Line (NSL) and Woodlands Thomson-East Coast Line (TEL) MRT Stations, as well as Woodlands Temporary Bus Interchange, it will provide commuters with more convenient transfers to these key transport nodes.

3. Woodlands ITH is the largest ITH since the first ITH was built in Toa Payoh in 2002. Woodlands ITH has incorporated inclusive facilities, such as barrier-free boarding and alighting areas, as well as graduated kerb edges to make boarding and alighting easier for passengers in wheelchairs and parents with strollers. There are also barrier-free toilets, priority queue zones with seats, and a nursing room to cater to the needs of the less mobile, elderly and families with young children. A commuter care room is also set aside for special needs commuters who need access to a quiet and calming space.

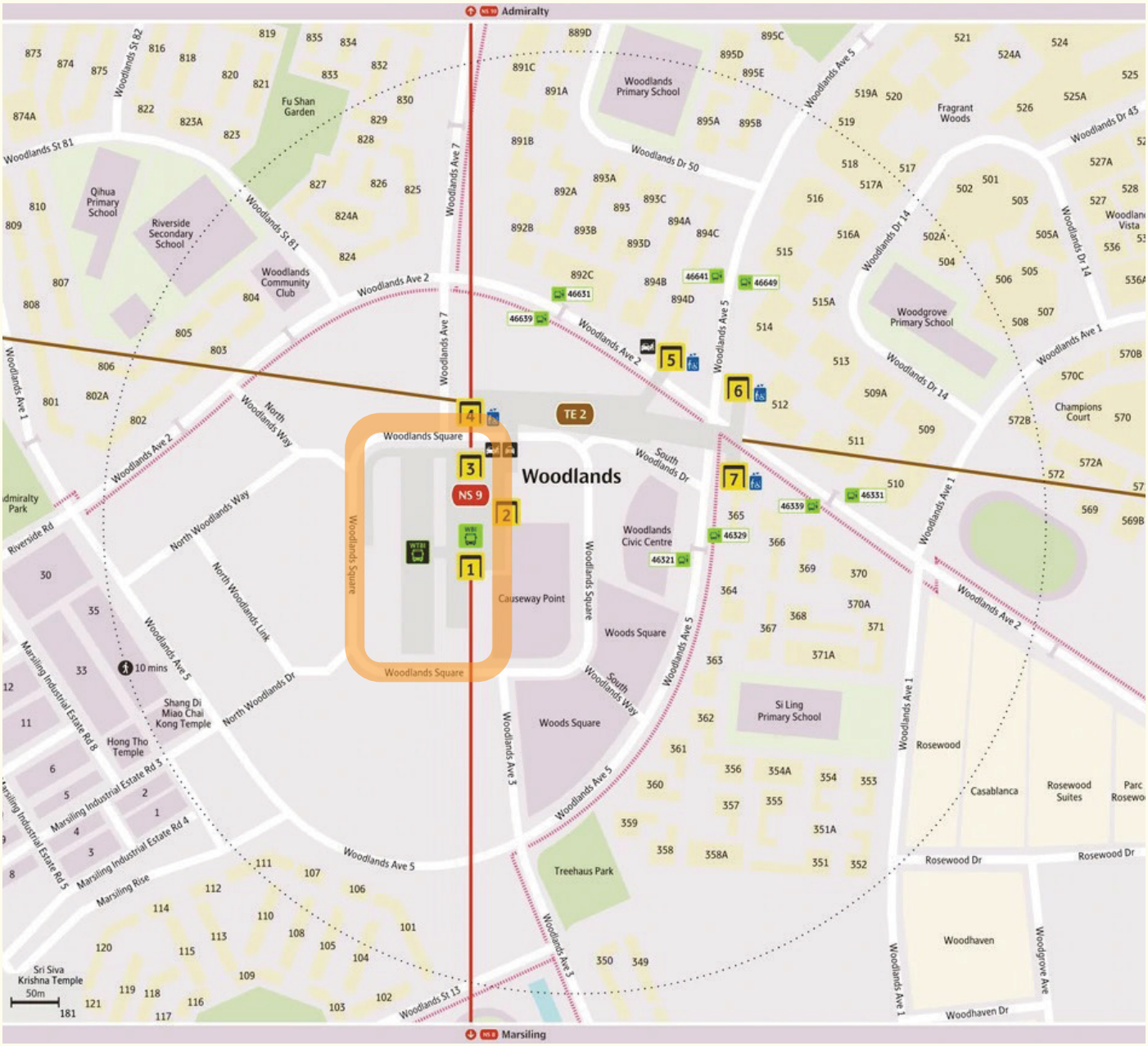
4. Besides commuter facilities, Woodlands ITH also comes with upgraded amenities for transport workers including bus captains. These include an air-conditioned staff canteen, dedicated staff toilets, a cleaners' room and a staff lounge. The bus interchange is also equipped with a reverse warning system to enhance safety by alerting bus captains through blinker lights when other buses are reversing within a parking area.

5. Woodlands ITH will be managed by SMRT Buses Limited.

Source:
https://www.lta.gov.sg/content/ltagov/en/newsroom/2021/5/news-releases/Woodlands_ITH_to_open.html

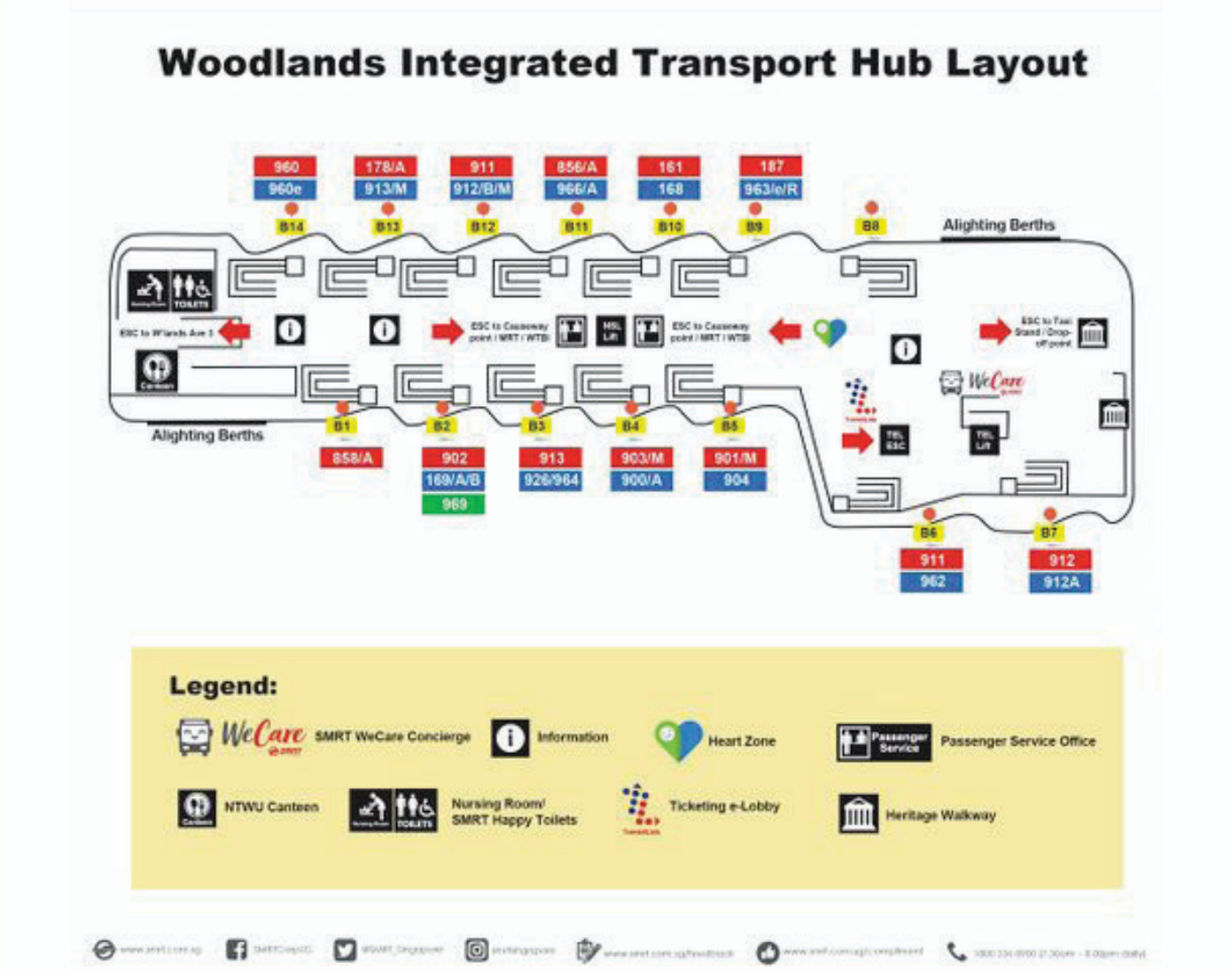
Annex B

Map of Woodlands ITH & Surroundings



ITH is marked by the orange boundary.
Source: SMRT

Layout of Bus Interchange



Source: SMRT

Annex C

Possible topics for GI on Transport	
Improved Transport Mobility Options within the ITH	• Which features of the ITH bring about improved mobility of the elderly and PWDs? • Which features of the ITH result in the increased use of public transport among commuters?
Active Mobility	• Does the provision of pedestrian-friendly features in estates promote walking as a mode of travel among the residents? • Are there more people cycling in estates with better cycling infrastructure?
Electric Vehicles	• Are electric buses quieter than diesel-run buses? • Do the locations of EV charging stations make it more convenient for people to access them?
Transport & Housing	• Is the provision of transport facilities the most important factor for people when deciding to buy a HDB flat? • Is the accessibility of transport facilities the most important factor on residents' level of satisfaction? • Are there more age-friendly and barrier free transport initiatives in mature estates than new estates?