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## 1. Level Up Rail Safety

## 1.1 Overview

This unit of work involves in-world Minecraft explorations and in-class activity. It is intended for students in regional areas to know and understand the issues that surround safety on and around rail lines. Students consider why there are safety issues, how technical systems at active crossings can go a long way to making us safe, and how we can each take responsibility for our own safety. They will leverage those understandings to create a safety campaign that speaks to a local area of need.

Students working in teams in pairs or teams of 3 will be optimal for this unit of work. They will work through four in-world missions in order to gain their Level Up Ambassadors rail safety badge. The four missions are designed so that students might work together or at times may divide the tasks and then share knowledge gained with their team. Tasks like research and town building readily lend themselves to being divided up for an individual focus. The discussion that occurs between students will be an opportunity to deepen learning and for the teachers to assess the development of student knowledge and understandings. Throughout the missions students will be encouraged to consider what happens in their local 'real' world and when graduating as Level Up Ambassadors they are charged with taking their knowledge and influence out into that world.

The Minecraft world is a deliberately generic town with a town centre and industrial and agricultural areas to be connected by rail lines. Passenger trains will travel through the landscape and travellers are directed to cross rail lines at 2 specific locations: a rural crossing and an urban crossing (in town). To make this town their own, students are invited to add to the town centre and environs creating recognisable local landscape features, town buildings and landmarks.

The program is intended to spread across five to eight 40-minute lessons. The number of lessons may be determined by the experience of the students and sophistication of the campaign to be developed by students.

## 1.2 Curriculum Focus





#### PDHPE

#### Content

**PD3-6** - distinguishes contextual factors that influence health, safety, wellbeing and participation in physical activity which are controllable and uncontrollable

**PD3-7** - proposes and implements actions and protective strategies that promote health, safety, wellbeing and physically active spaces Skill

**PD3-9** - applies and adapts self-management skills to respond to personal and group situations

#### Students:

- investigate and adopt practices that help promote and maintain health, safety and wellbeing
  - describe situations that may cause lifestyle diseases or injury and propose actions that promote health and safety
- plan and practise assertive responses, behaviours and actions that protect and promote health, safety, and wellbeing
  - identify personal strategies and responses that model assertiveness and resilience in challenging situations,
  - recognise and demonstrate safe behaviours and action

#### Science and Technology

#### Skills

**ST3-1WS-S** - plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions

**ST3-2DP-T** - plans and uses materials, tools and equipment to develop solutions for a need or opportunity

#### **Knowledge and Understanding**

**ST3-11DI-T** - explains how digital systems represent data, connect together to form networks, and transmit data

#### PDHPE

• investigate materials, components, tools, techniques and processes required to achieve intended design solutions (ACTDEP024)

• evaluate design ideas, processes and solutions according to criteria for success (ACTDEP027) explain how students' solutions and existing information systems meet current and future local community needs (ACTDIP021)

#### Mathematics

#### Working Mathematically

**MA3-1WM** - describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions

Patterns and Algebra

**MA3-8NA -** analyses and creates geometric and number patterns, constructs and completes number sentences, and locates points on the Cartesian plane

Measurement and Geometry

**MA3-9MG** - selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length

Statistics and Probability

**MA3-18SP** - uses appropriate methods to collect data and constructs, interprets and evaluates data displays, including dot plots, line graphs and two-way tables

MA3-17MG - locates and describes position on maps using a grid-reference system

#### **HSIE Geography**

**PD3-6** - distinguishes contextual factors that influence health, safety, wellbeing, and participation in physical activity which are

#### English

**EN3-1A** - communicates effectively for a variety of audiences and purposes using increasingly challenging topics, ideas, issues and language forms and features

**EN3-7C** - thinks imaginatively, creatively, interpretively, and critically about information and ideas and identifies connections between texts when responding to and composing texts

### 1.3 Teacher Preparation

- 1 Minecraft installation and accounts
- 2 Scouting level crossings in the local area
- 3 Attend the kick-off webinar or view the recorded Level Up introduction video
- 4 Tour the Level Up Minecraft World

#### 1.3.1 Suggested Strategies for Evidence Gathering

Assessment in this project is not about how well the students use Minecraft. Minecraft is the vehicle for learning about rail safety and assessment focuses on knowledge skills and understandings about rail safety at level crossings.

- Observe guided discussion
  - Listen for student use of terminology and their understanding of the safety issues.
- Collect work samples Students can upload progress images and reflections to their portfolio if using tools like SeeSaw.
- **Peer evaluation** Have student teams examine each other's campaign ideas and give feedback.
- Observation of student working group discussions Walk about while student teams are in-world and observe their work, discussions and the knowledge demonstrated.
- Individual student scaffolded reflections (2) Three reflection opportunities have been flagged in the lesson notes. These reflections can be achieved by taking a photo in-world and writing a short summary of what they achieved and have learned.
- **Quiz activity** Teachers or students could create a final fun quiz to test the understanding of safety at rail crossings and personal responsibility.
- Assessment Rubric for campaign (used by students, test users, teacher) A suggested rubric is included in the final lesson description. Teachers can use or modify this to have students self-evaluate, for peer or player review of campaigns and/or for teacher assessment.

#### 1.3.2 In-World Tips for Teachers

**NOTE:** After walking about the town and rural areas to orient themselves, students may want to **teleport** between key destinations. They should press 't' to bring up chat and type **/tp <coordinates>** for instance /tp 2, 67, 62 will teleport them to the Lab.

#### **Key Destinations**

Area	Co-ordinates	Image
<b>Town Hall</b> For Missions and Award Ceremony	75 65 630	
		Spawn point – The Town Hall
<b>Rural crossing</b> For Upgrade	130, 65, -160	

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### 1.3.3 The Lab Simulation Activity Explained



Students will be required to complete three consecutive successful tests in order to be able to upgrade each of the two crossings (rural and urban).

#### The Settings

Students set 5 variables to create a safe level crossing

- distance the train is detected from the crossing entry.
- time after the train detection for lights turn on.
- time after the train detection for boomgate to go down.
- time after the train leaves the crossing before boomgate goes up.
- time after the train leaves crossing before lights turn off.

#### A Failed Test

If students' crossing is drastically unsafe the simulation will fail.

## Simulation Failed! Resetting in 1s

Drastically unsafe is defined as the boomgates moving or not being down while the train is in the crossing, or the lights not being on while the boomgates are moving or down.

#### A Successful Test

A successful test can result in two outcomes.

#### Simulation Successful Surveying road users

If the timings are not all within safe bounds students will be given targeted feedback to support them to adjust and improve the safety of their proposed timings.

Simulation Successful! Road user feedback all good

If the timings are all within the safe bounds students will be requested to run the simulation again to get three consecutive successful trials.

#### 1.3.4 Discouraging Risky Behaviours in-World

Students standing on the tracks for 3 seconds or more will be teleported to a safe distance from the track and be offered guidance about the consequences of their behaviour by Non-Player-Characters in-world.



Figure 2 A view of the locked player screen

Teachers should also be aware that if a student attempts an unsafe behaviour around trains on multiple occasions they will be 'locked' from play and their screen will show the locked image. The student will have a timer on screen showing how long they are locked for (starts at 5 minutes - longer for more transgressions). Teachers are encouraged to take up this teachable moment with students, to discuss these actions and the likely real-world consequences. A teacher may release a student by typing the 'escape command' in the in-game chat on the specific student computer (press 't' to bring up chat) and type /**tag @s add teacherunlock** 

#### 1.3.5 Research in the Lab Library Explained

Students will find sets of resources linked to computers, books, and posters in the library. Some will be informational. Others will require the team to discuss what they read, see, or observe. Some will challenge them to carry out activities outside the Minecraft world.

Technical information relevant to the crossing upgrades can be found upstairs and the downstairs library hosts the human resource material relevant across all 4 missions. Student teams may choose to divide up the research tasks and spend time knowledge sharing with their teammates in class. This is why it is important that all students keep a notepad handy when they are in-world.

## 1.4 The Flow of Learning Activities

This program consists of 5 sequenced stages that may take from 5 to 8 (40 minute) lessons to complete. Activity will take place both in-world in Minecraft Education Edition and in-class. What follows is the advice for teachers to best support a quality learning experience.

This program is designed optimally for student teams of 3 (or 4) to play together in a single multiplayer world or for students to work individually in single player worlds. Instructions for supporting multiplayer play appear in the section for Minecraft Support.



Figure 3 Lesson sequence



#### In-class

Introduce the class to some images of level crossings and discuss where students might have encountered these. Where do they occur in the local area? Use maps, photos, Google maps and street view to bring these to the forefront of student minds. You can locate level crossings in NSW using the NSW Public Level Crossing Finder (also linked for student in the in-world Lab Library) Discuss why there are level crossings? What are the different types of level crossings?

If possible, walk to a local crossing to look at the features. Have discuss their experiences, thoughts, and feelings about times when they have crossed the track at a crossing. What do they know about the safety rules around rail lines and level crossings?

#### In-world

Students enter the Level Up Minecraft world to be greeted by Rosie the train driver outside the Town Hall. Rosie who invites their team to Meet the Mayor and take up their role as the town safety officers.





The Mayor (in the Town Hall) will explain their job and introduce their 4 Missions on the road to becoming Level Up Safety Ambassadors.

- 1 MAKE THIS YOUR TOWN \*
- 2 UPGRADE TO ACTIVE CROSSINGS \*
- 3 ADOPT A CROSSING AND BECOME SAFETY AMBASSADORS
- 4 CREATE A SAFETY CAMPAIGN TO INFLUENCE PEOPLE

\*Teachers may choose to split the program components and engage in Missions 1-2 then complete Missions 3-4 (carried out largely outside the game), at a later date.

Throughout their in-world activity students should use a notepad to record coordinates, gather information, remember simulation settings, for planning the town build and campaign ideas.

After being given Mission 1, students will head out to explore the town and the areas around it and consider how they might make this more like their own town. Students will encounter townspeople who all have messages for them that hint at safety issues with the crossings in town. Rosie the train driver will guide and motivate student teams.



#### In-class

Discuss the landscape, iconic buildings and landmarks that distinguish your town or city as well as how and where they could be built in Minecraft. Students may also use time in-world, when not upgrading the crossings, to further develop the landscape of their town. This customisation will make visual content to be used in their campaigns more authentic and relatable in Mission 4.

#### In-world

Students complete Mission 1 when they have successfully added key local landmarks and made this virtual town their own. The team returns to the Town Hall to report their progress to the Town Councillor, Students collect the instructions for Mission 2 to upgrade the level crossings.

Rural Crossing: At the passive rural crossing the team will meet the rail engineer who will explain the safety issues at this crossing and their task in the planned upgrade. Students will move to the lab and start the simulation to test settings for the level crossing upgrade (to operate with the correct safe timings).

Throughout their in-world activity students should use a notepad to record coordinates, gather information, remember simulation settings, for planning the town build and campaign ideas



Rural passive crossing (before upgrade) with engineer

Students will be required to do research in the library before attempting the simulation. Resources and relevant information have been sprinkled throughout the library to support each of their four missions. These resources will include images, videos, animations, and stories. Each small collection of resources has a thinking or discussion task for the students to carry out after they review it.



Figure 5 Lab instructions

In the lab students will don a VR headset and work to simulate timing for the elements of an active crossing to create a safe journey for all. The simulation will ask them to decide the distance from the crossing to place the signal box and to create the correct sequence and timing for the lights and boom gates to warn and ensure the safety of people on the side roads. Instructions for using the simulation are available in-world. HINT: Setting s signal box distance far enough away from the crossing is vital – think BIG!



Figure 6 View through the in-game VR headset for simulation settings to prepare the upgrade.

Once students have completed three consecutively successful trials they will be asked to take those settings to the engineer at the rural crossing to have him install the upgrade. The engineer will take the student settings, use them to implement the upgrade, and call the train through the now active crossing. Students will be able to observe the successful passage of the train through the crossing.

Urban Crossing: Students will then be directed to meet the engineer at the town crossing who will explain the issues and reason for upgrading this second crossing.

Students will be advised trains crossing through built up areas travel at lower speeds than in the open rural areas. The students are invited to return to the lab and test for the new settings that will be required for this in-town upgrade. They will follow the same process as the first upgrade challenge and bring back successful settings to pass to the engineer to implement the upgrade.



Figure 7 After the upgrade in town

Upon completion the engineer will thank them for their fine work. They will comment that technology can only go so far to making people safe, and that people need to take responsibility for their own safety too.

At this point students should write their first individual written reflection on learning – "Upgrading the rail crossings helped me to understand..."

The team will head back to the Town Hall to report their completed Mission 2 to the Town Councillor. Students will then begin Mission 3. They can revisit both crossings and choose one to adopt. They should choose the one most like a crossing in their local area.



#### In-class

Create an advice wall for level crossings. As a class students brainstorm the advice, they would now pass on to level crossing users, given what they know about trains, crossings and near misses. How much will the upgrades put in place by the team, prevent unsafe situations? This wall could be achieved with post-it notes or cards. The wall should be visible to the class for the following lessons and be something students might add to as other ideas arise. They will reference this when deciding on the issues to address in their safety campaigns.

#### In-world

Students return to the library of the lab and explore the resources to find rules for safety at level crossings. At this point they should return to the Lab library and do further research about unsafe behaviours around crossings and to find rules for safety. They will discuss the rules for pedestrians, the rules for cars, the most likely causes of crashes and near misses.

On completion of their crossing adoption and research, students will return to the Town Hall to report completion of Mission 3. They will receive instructions for their final mission to Create a safety campaign to influence people.



#### In-class

As a class, using an electronic whiteboard or projector examine some of recent successful road safety campaigns. What is the purpose of these campaigns? What are they trying to achieve? Who is it speaking to? Discuss what a safety campaign includes and how it ties to gets its message across. Students will see when they examine these campaigns, that they are targeted to a particular group of people or 'demographic'. Suggested campaigns to examine are:

Campaign	Link
Look out before you step out	<u>https://roadsafety.transport.nsw.gov.au/campaigns/look-out-before-</u> you-step-out/index.html
Be bus aware	<u>https://roadsafety.transport.nsw.gov.au/campaigns/be-bus-</u> aware/index.html
Driveway safety	https://roadsafety.transport.nsw.gov.au/campaigns/theyre-counting- on-you/driveway-safety.html
They're counting on you	https://roadsafety.transport.nsw.gov.au/campaigns/theyre-counting- on-you/index.html
Stop, Look, Listen, Think	<u>http://www.roadsafetyeducation.vic.gov.au/teaching-</u> resources/primary-school/introducing-stop,-look,-listen,-think-to- cross-the-road-safely

#### Decide your demographic

Look out before you step out is targeted at adults where *They're counting on you* is targeted at parents. *Stop, Look, Listen, Think* is the message that is used for pedestrians and for children and parallels the pedestrian behaviours for rail crossing safety.

#### **Consider the rules**

What behaviours are of concern from your target audience? Can you select one behaviour that is of most concern? What is the message that could be conveyed to your audience to help them think about and hopefully change that behaviour? Each team should select and talk about the message they see as most important and how they plan to get that message across.

#### Select campaign components

Campaigns usually combine a number of media to make sure the message is widely received. As a class brainstorm all the ways teams might use Minecraft and the resources in our town to create a campaign for safe use of level crossings. How can they creatively use what they have built, designed, and tested in Minecraft to inform and influence others? Before returning in world to create their campaign products teams should:

- Choose the demographic for their own campaign. Who is it they want to influence? Who needs to hear their message?
- Create a slogan like those in road safety They're counting on you or Look out before you step out.
- Decide what rules or message they want to convey and how to make it clear.
- Select the media they may want to create for their campaign.

#### Design and build your campaign

Create a campaign and test it on people in your school, family, or town.

#### In-world

In or from Minecraft resources, students might create and variously combine: (these ideas are technically supported in the page that follows)

- Record 'machinima'- a movie recorded in-world with voiceover soundtrack added.
- Create a game in-world for people to play that teaches or tests them on their rail safety knowledge.
- Create an AR model of a level crossing with a tool like Adobe Aero or CoSpaces and take it into the playground to test with peers.
- Compose a digital information booklet use the camera and book to create a resource that could be added to the in-world library for future versions of the game.
- Format a physical brochure, poster or story using in-world images captured during play.

- Program an NPC character in-world to deliver a quiz (link out to something like Kahoot) and give players a reward.
- Construct a roadside billboard (Minecraft board) in-world to present information and ideas.
- Record or write a radio or newspaper advertisement to support your safety campaign.



#### In-class

Students complete the second individual written reflection on their learning by answering the question. "How can we each play a role in making level crossings safe?" **In-world** 

Student teams demonstrate their campaigns to peers and make them available for other students at school to explore and give feedback. Campaigns can be reviewed against a rubric as part of the assessment of teamwork.



Figure 8 The Mission wall in the Town Hall

Completion of the campaign marks the end of their work in-world. Students have now completed all 4 missions.

**Please note:** The teacher will need to check off completion of Mission 4 by typing in the chat line, at each student computer, the command **/tag @a add teachercheck** 

Students can then check off Mission 4 Complete and graduate as Safety Ambassadors in a medal ceremony held in the Town Hall. Schools might host their own ceremony to award medals the Level Up Ambassadors. These medals could be cheaply purchased, or 3D printed in the school. Students are invited to use their knowledge, skills and understandings to impact behaviour in their local area crossing/s.



Figure 9 At the Level Up Ambassador's Award Ceremony

Select a winning campaign. Predict as a class how this campaign would change behaviours. It is important that wherever possible, student campaigns are actually used, or the one voted best is used in the local area. It could be shared with the local council, shared across the school, on the school website, in a school information booklet so students can see it in action and its impact when used in the school and wider community.

## 1.5 Glossary

During the course of this program students will take up the language of the field. This is part of playing their role as the safety engineer.

The <u>RailSafe Glossary</u> provides an extensive glossary of rail related terms should students want to delve deeper into the language. The terms defined below are important to this program.

Word	Definition and Description
Level Crossing	<ul> <li>A location where the railway line and a road or pedestrian walkway cross paths on the same level. Rail Safe</li> <li>A designated area on the road designed for vehicles to cross train tracks. Level crossing users are protected by a combination of one or more of the following safety features: <ul> <li>Road sign (Railway Crossing)</li> <li>Stop/give way sign</li> <li>Stop line</li> <li>Warning lights (flashing)</li> <li>Boom gate</li> <li>Barrier/flag person</li> </ul> </li> </ul>
	• No safety features (usually on private property e.g. farm)

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Word	Definition and Description		
	Can be separate or adjacent to a pedestrian level crossing. Tracksafe Glossary		
Passive Crossing	All road/rail intersections (grade or level crossings) are provided with either passive or active protection. Passive protection is by signage only, which provides an unchanging warning to the road user whether or not a train is approaching the crossing. TfNSW. A pedestrian crossing might have either a maze or gate either side, along with yellow lines to direct or prevent the flow of traffic.		
Active Crossing	Active protection varies the warning provided to the road user and, in some cases, blocks access to the crossing when a train is within a predetermined distance of the crossing. TfNSW		
Livery	An identifying design (as on a vehicle) that designates ownership Merriam-Webster Dictionary		
Locomotive	Self-propelled, railway vehicles used for hauling other rolling stock. Railsafe.org		
Train	A locomotive or self-propelled vehicle, alone or coupled to one or more vehicles. Railsafe.org		
Rail corridor	The land on which a railway is built, comprising all property between property fences, or if no fences, everywhere within 15m from the outermost rails. Railsafe.org		
Freight train	A freight or good train is a train that carries goods rather than people Merriam-Webster Dictionary		
Passenger train	A passenger train is one that people use for traveling Merriam-Webster Dictionary		
Rural	Relating to, or characteristic of the countryside rather than the town Oxford Dictionary		
Urban	Relating to, or characteristic of a town or city: A built-up area is an area such as a town or city which has a lot of buildings in it. Oxford Dictionary		
Campaign	A connected series of operations designed to bring about a particular result Merriam-Webster Dictionary		
Simulation	Examination of a problem often not subject to direct experimentation by means of a simulating device Merriam-Webster Dictionary		
Signal box	Box that controls lights which tell the train driver when to stop, use		

Word	Definition and Description
	caution and go (similar to traffic lights). Tracksafe Glossary
Whistle	A device such as a bell, whistle, siren, horn, or hooter, fitted to rail traffic to give audible warning.

## 1.6 Minecraft Support

NSW Department of Education T4L Kids Magazine The Minecraft Design Issue! Comprehensive support for students for building your town and creating a campaign.

Design or imagine a public space using the power of Minecraft: Education Edition (M:EE) in our special Minecraft edition. Explore a range of tutorials and guided challenges to harness the power of M:EE to create a design for a public space – reimagined of course!

Minecraft saves worlds to the local computer. In schools using shared computers this can become problematic. As a practice is advisable, at the end of every session, students export their world to a shared drive, (Google, OneDrive or other).

Importing and Exporting Worlds

- Importing and Exporting World Files in Minecraft: Education Edition
- Importing Worlds into Minecraft Education Edition

Playing in Multiplayer Worlds

• Multiplayer Game Guide

Building in the World (using boards, immersive reader)

- Boards, slates, and posters tutorial
- How to use Immersive Reader in Minecraft Education Edition

#### **Creating Machinima**

• Screen recording for Minecraft Education Edition will be dependent on the tools you have available from PowerPoint recording, QuickTime Screen Recording to Camtasia and Screen-Cast-O-Matic or FlipGrid screen recording or even use Zoom or Teams meetings and screen share Minecraft to record. Teachers will need to investigate which tools are available and might work best in their context.

Programming Non-Player Characters (NPCs) Minecraft: Education Edition NPC Tutorial

• This is a how-to video that accompanies the in-game NPC Tutorial in Minecraft: Education Edition. Learn more and download the tutorial world here: https://aka.ms/minecraftedu-npcs Students will need to create their own NPC quiz in another world as world builder rights, required to create NPCs, have been disabled to protect the simulation.

#### Designing a Quiz

• NPCs can offer players links to web content. Students could use online tools like Kahoot to create a quiz to test the knowledge and understandings of their players. This option can be taken up if students are prepared to build in a separate world where they can use world builder rights. The simulation world does not permit that.

## 1.7 Rail Safety Resource Links

Below is a list of some of the key resources for teachers to acquaint themselves with the issues.

Resource Link	Useful For
Why Teach Rail Safety	Background information for teachers
Level Crossing Safety - Consider the Facts	Factual information
Safety Around Level Crossings	Safety for children
Railway level crossings	Signage and rules
Level Crossings	Speed limits on roads at level crossings
Kids Rail Safety Quiz	Safety rules
No room for risk at level crossings	Media release with facts
How to teach children the 'TrackSAFE Actions'	Good outline of the rules with a family focus





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