

## Introduction

- There is a big push for the use of cycling and public transportation in the 21st century by transport authorities around the world. Cycling has multiple positive impacts on mental health, physical health, pollution levels and road deaths.

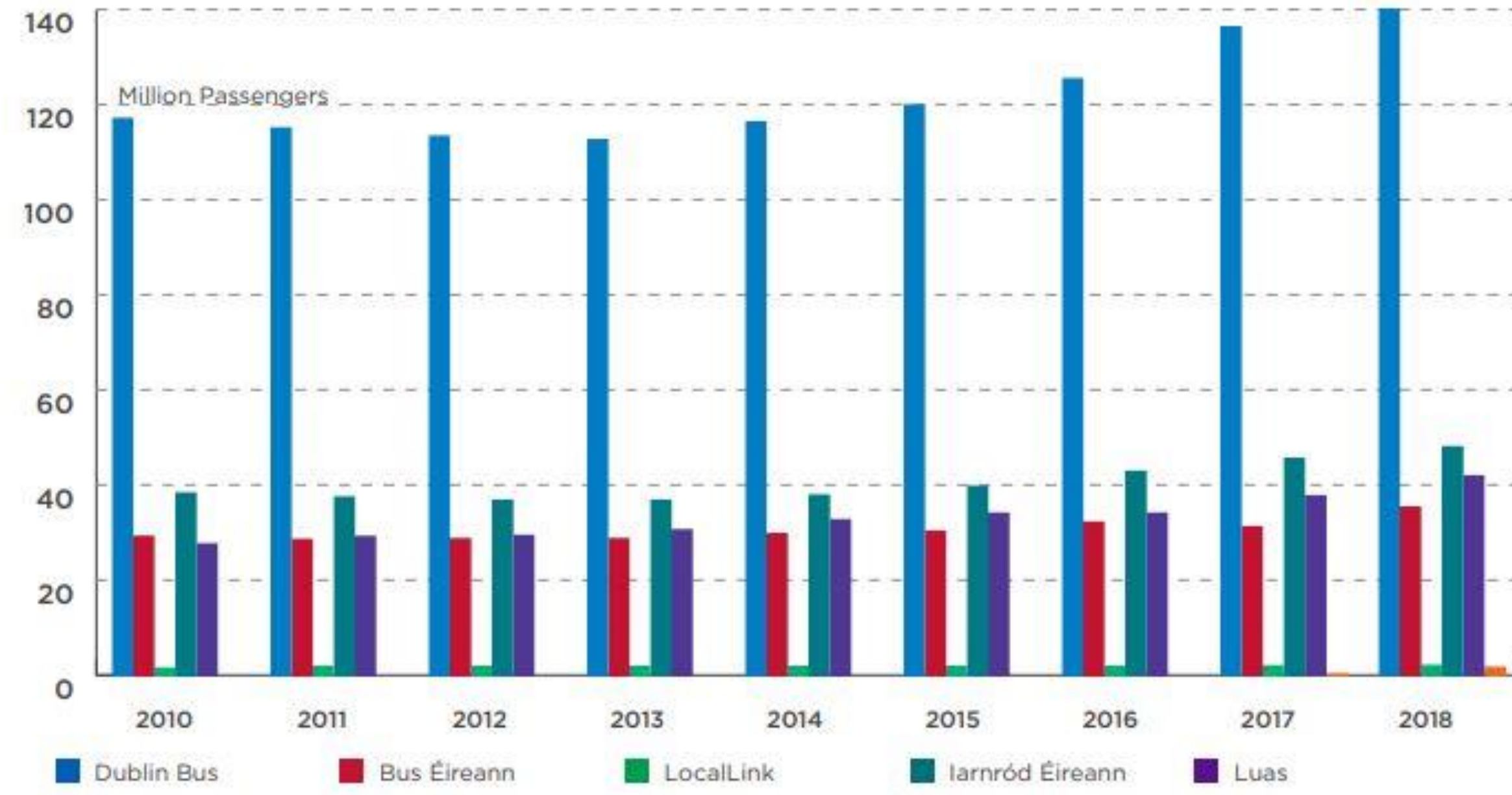


Figure: 1

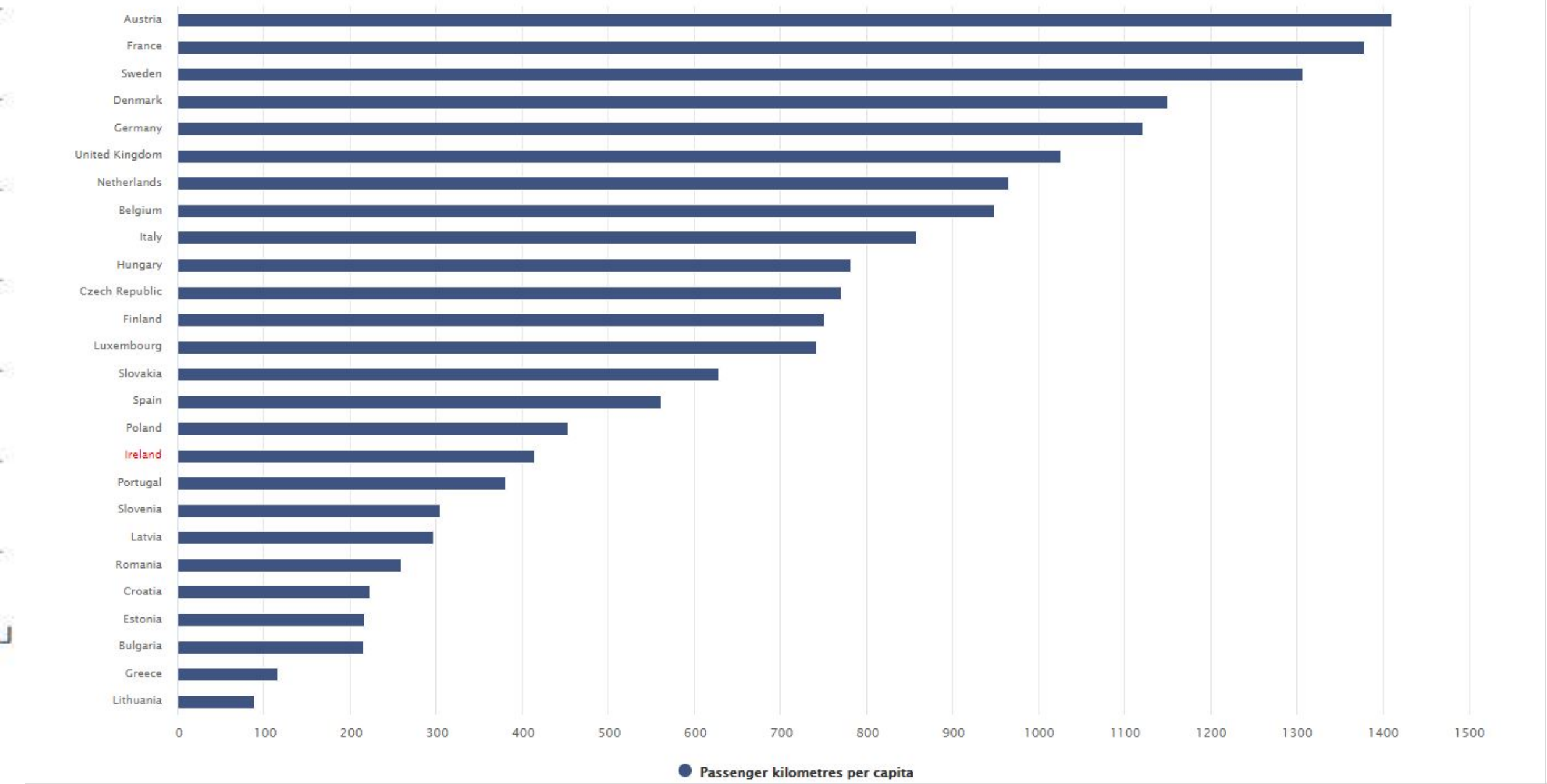


Figure: 2

- Figure: 1 shows the steady growth of Irelands light rail system (The LUAS) ) from 2010 to 2018.

- Dublin recently opened its new extension to this rail system called LUAS Cross City which runs directly through the city centre. In a report to the National Transport Authority (NTA) it was stated that the ideal situation would be for cyclists and tram services to be segregated but due to limited space this is not a possibility in some locations.

- With an increase in both cycling and tram services operating in crowded cities, the increased numbers of cyclist related accidents along these tram lines is expected. The cause is often the bicycle wheel becoming lodged in the groove of the track. This is not localized to Ireland as many countries have a large rail presence as shown in Figure: 2

## Current Preventative Measures

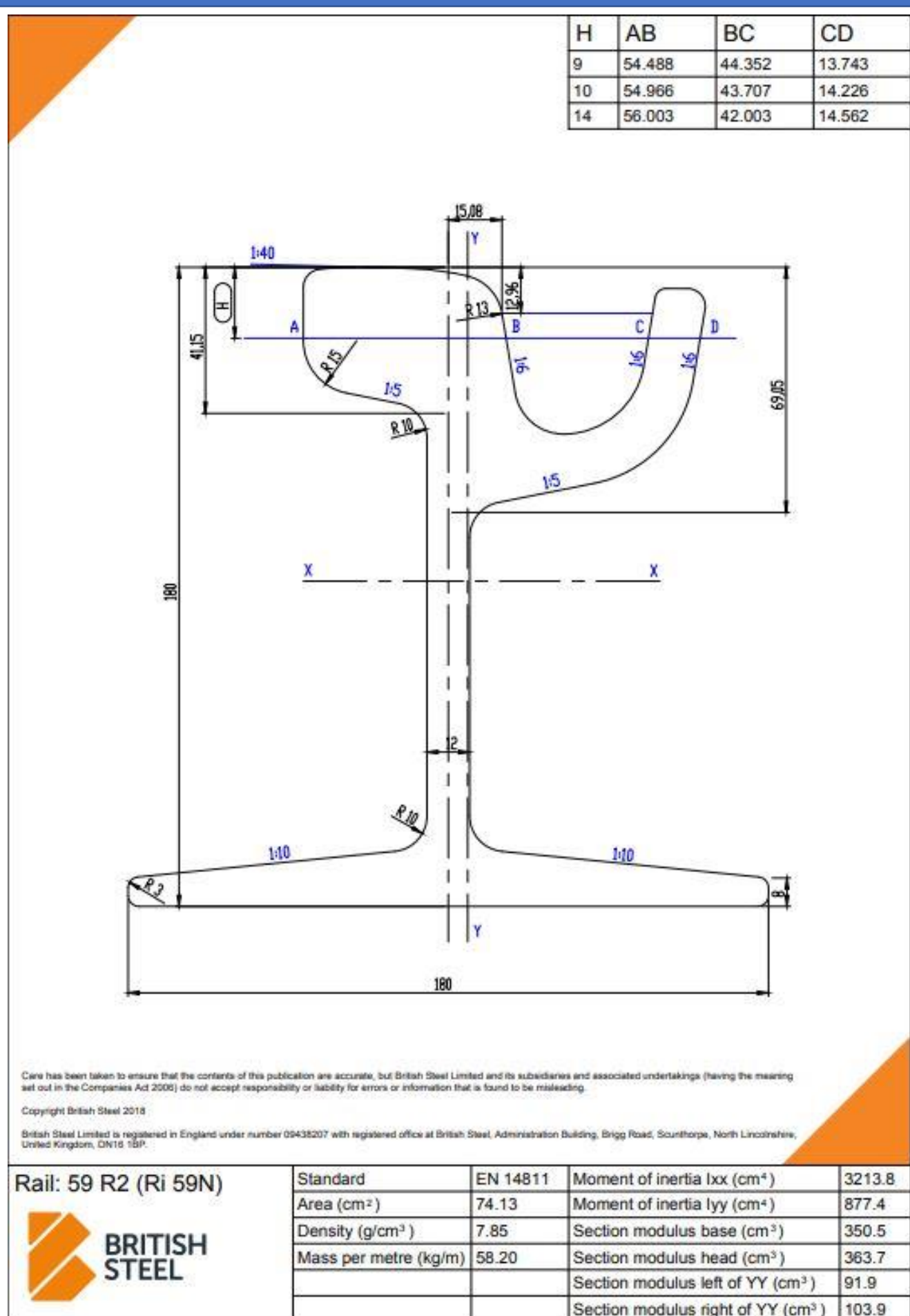


Figure: 3

- veloSTRAIL** is a system of rubber panels which aims to remove the flange groove from railways crossings. This groove can be seen in Figure: 3 and veloSTRAIL can be seen in Figure: 4 and 5.

- Any rolling sock would easily compress these panels but they provide enough resistance for bicycle wheels etc to cross safely.

- The small rubber panels which go in the flange are completely removable and replaceable.



Figure: 4

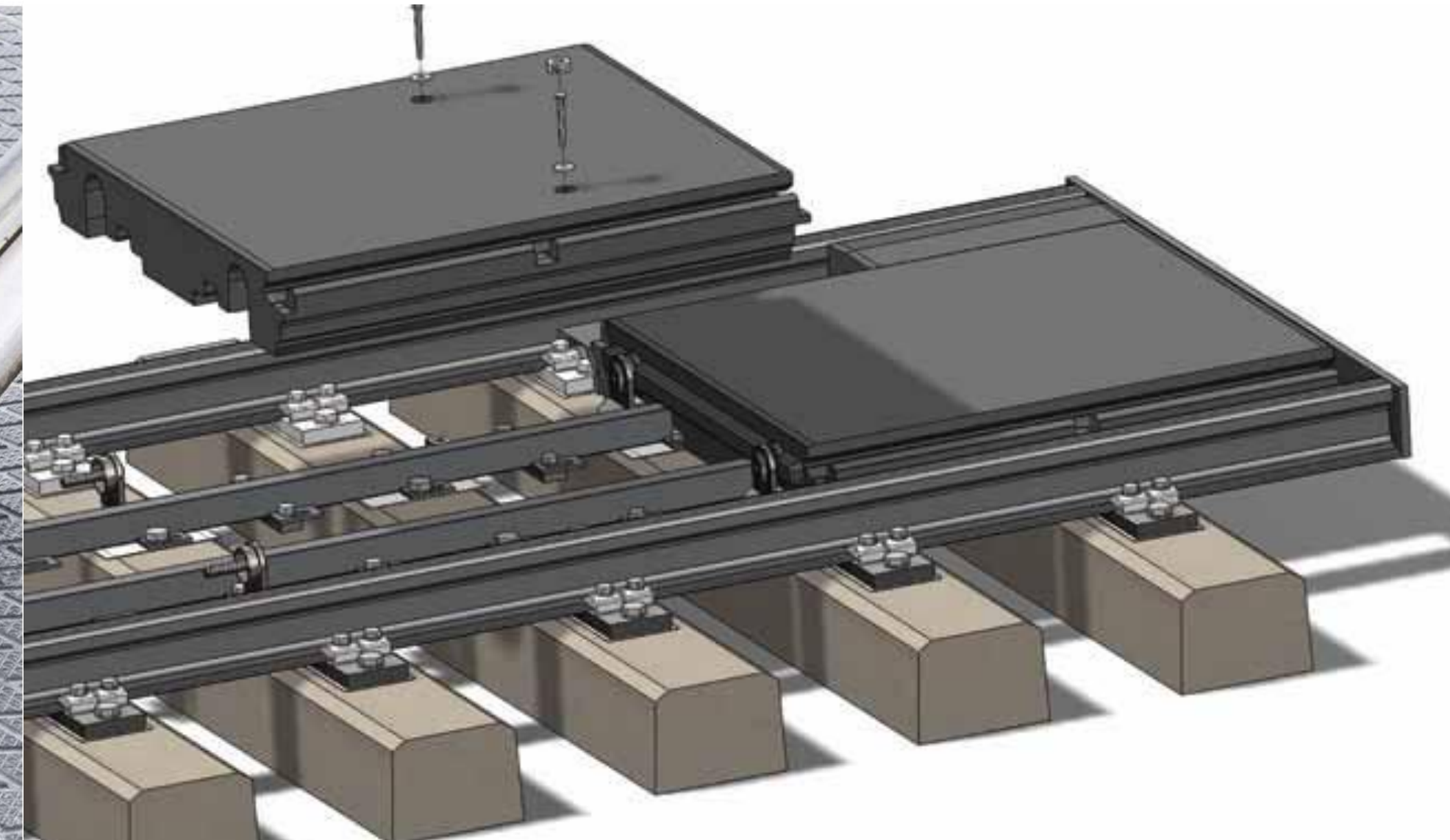


Figure: 5

- This product has an estimated cost of €800,000/Kilometre with the replaceable strips costing €50/600mm strip. This is a high cost and is simple not feasible to cover the entire LUAS Cross City line. Installing this at local accident hotspots alone remains too high a cost.

- There are many other products of a similar nature to this however the intention is to cover small sections or railways crossings. Due to the high amount of road traffic and weather conditions in Dublin this type of flange filling was not advised by many Engineering companies reviewing the problem.

## Proposed Method

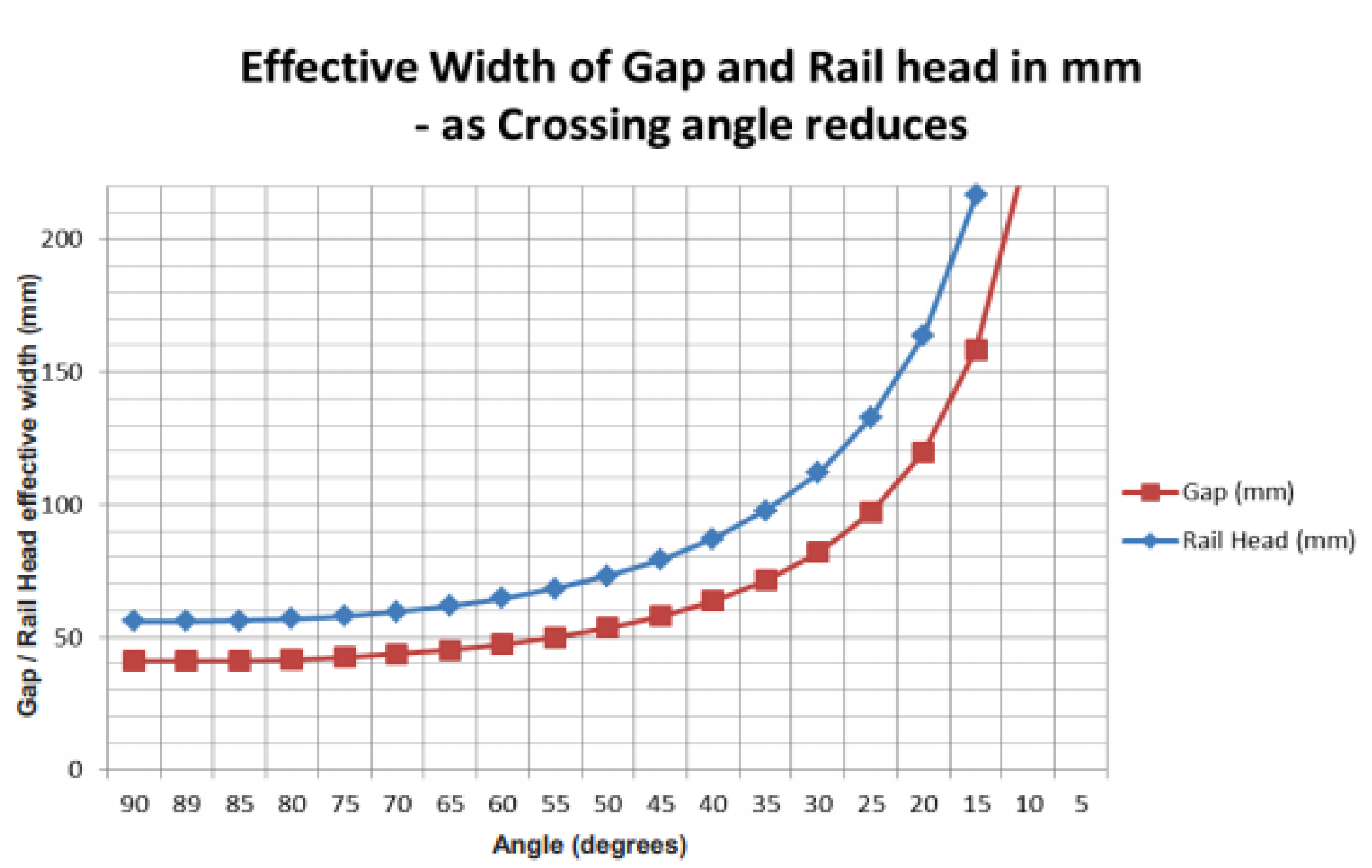


Figure: 6

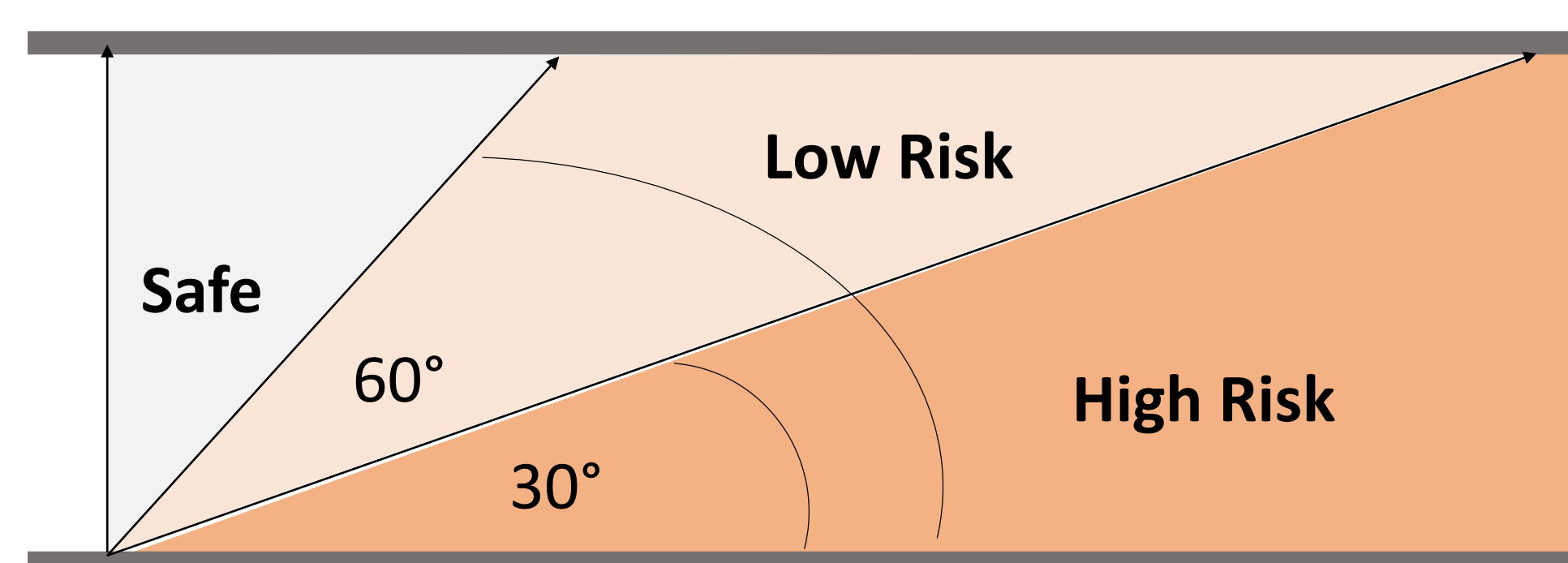


Figure: 7

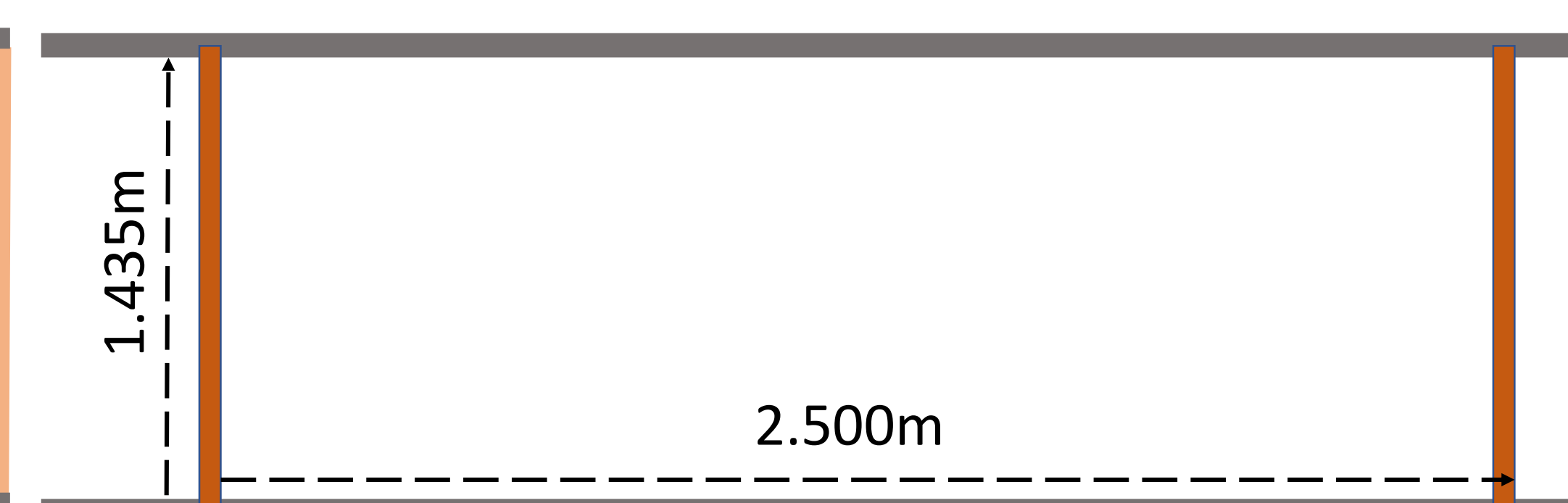


Figure: 8

- As the wheel of the bicycle crosses the tracks, the angle dictates the time the wheel is in contact with the track. This also means the wheel is in contact with the tracks for a greater distance. Figure 6 shows how angle effects this.
- This data is from an infrastructure review with Sheffield City Council using very similar tracks to the R159N shown in Figure: 3. Therefore the shallower the angle of crossing, the higher the risk of falling, which grows exponentially. This is shown visually in Figure: 7.

- As the wheel of the bicycle crosses the tracks, the angle dictates the time the wheel is in contact with the track. This also means the wheel is in contact with the tracks for a greater distance. Figure 6 shows how angle effects this.
- The proposed idea is a simple one. Road markings will be placed as lines across the two tracks as shown in Figure: 8. The distance between these lines is set depending on the width of the tracks. The intention is that through a targeted advertisement campaign, cyclist will only cross the tracks between these lines. This will ensure that they cross at the low risk angle as anything shallower than 30° will cause the cyclist to cross over one of the lines.