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Creating and connecting new development areas: an emphasis on cyclists and pedestrians

An examination of Bailrigg Garden village

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ABSTRACT

The "Garden city" concept was first introduced after the Industrial Revolution to create healthier and liveable spaces (Howard, 1946). As it is clear now that active travel modes help us to maintain our mental and physical health (World Health Organization, 2020), governments and city councils aim to encourage active travel behaviour. A new project (dated 2021) to the south of Lancaster, namely Bailrigg Garden Village, combines these two ideas and aims to provide sustainable solutions including walking, cycling and public transport routes to minimise vehicle traffic volume. In this paper, we first focus on this new Garden Village project and introduce the principles of the project and design details briefly. Then, using both pedestrian and cycling links, we explore the pre (current situation) and post (situation after the implementations) conditions of the project area and its connections with the Lancaster city. This study gives insights to future studies about how to develop sustainable and healthier environments with well-designed pedestrian and cycling connections.

KEYWORDS

Urban design, Healthy cities, Space syntax, Cycling, Walking.

1 INTRODUCTION

Cycling and walking, as a part of daily travel, are important for cities, since these travel modes create more sustainable environments (e.g., less vehicle traffic, less air pollution) and help people to be physically more active, therefore healthier (e.g., they reduce the risk of being obese, asthmatic etc.). Recent decisions in Europe about having net zero emission countries by 2050 (Abnett, 2021) affected policies in the United Kingdom (UK) as well and the UK government set

out net zero strategies (UK Government, 2021). Following this decision, the significance of promoting cycling and walking is highlighted to hit the net zero target (Bicycle Association, 2021; Westwater, 2021). Moreover, Covid-19 pandemic has also affected transport decisions of governments and people's travel behaviour; hence, travel behaviour has changed during and after the lockdowns in England (Butler, 2021; UK Department for Transport, 2021), as in many other countries. UK Government published new cycling policies and aimed to promote cycling and walking behaviour more in cities (Department for Transport, 2020).

These decisions also had impacts on local authorities: city councils aim to promote walking and cycling for different age, social or economic groups following different strategies.

1.1 Aim and Research Questions

In this research study, we focus on a new settlement proposal, Bailrigg Garden Village project in Lancaster, which includes planning decisions, parallel to the UK central government's decisions, seeking to promote active travel. We aim to understand the design principles of this project and their resultant impacts on the Lancaster city. Since there is a trend in the European Union and in the UK to promote active travel modes, it is important to understand the needs of new settlements with respect to transportation decisions. Hence, in this study, by analysing a proposed project that will be conducted at outskirts of Lancaster, we will be able to understand the needs of future cities and possible weaknesses or strengths. Research questions asked in this study are:

I. What are the planning decisions in Bailrigg Garden Village, particularly considering transportation?
II. How do these changes affect the existing transport infrastructure in and around Lancaster? Can we argue that the environment will provide accessible and preferable sustainable transportation? Will there be sufficient connections to Lancaster city centre?
III. How might the results of this study be generalised for other cities?

2 METHODS

Methods are discussed under two headings: first Garden Village project and principles are explained, then the measures used to analyse its surrounding environment are presented and described.

2.1 Bailrigg Garden Village project

Lancaster is on the north-western part in England and it is the county town of Lancashire. Lancaster is considered as one of the most bike-friendly cities in the UK (Everett, 2020; True Solicitors, 2020). In the past, it had been chosen as cycling demonstration town and the government invested money between 2005-2011 to promote cycling (Cope, 2017).

Especially since the start of the pandemic, UK Government has decided to promote cycling more and city councils across the country have developed alternative plans (Department for Transport,

2020) including Lancaster City Council. South Lancaster is to be transformed by Lancaster councillors and approximately £260m is to be invested for this purpose (Rouncivell, 2021). As a part of this transformation, more than 9,000 houses will be built in next 25 years and a 2.5 km highway connection, running parallel to M6 (the longest motorway in the United Kingdom that connects Midlands to the border of Scotland and also passes along Lancaster) is proposed, as well as a new 2km spine road and reconfiguration of M6 Junction 33. The Bailrigg Garden Village project is just a part of these wide-sweeping investments.

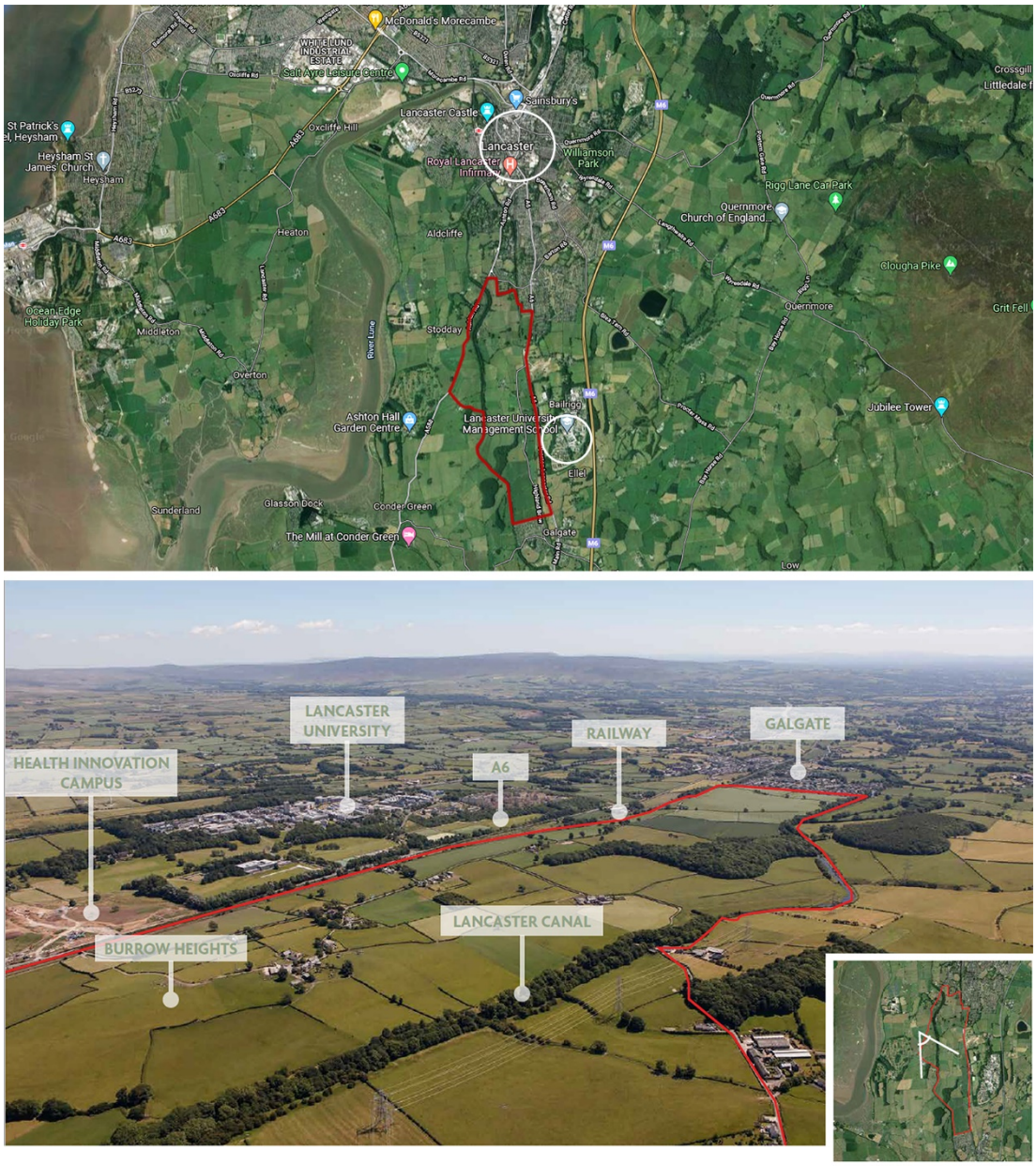

Figure 1. Location of the study area: above, red boundary shows the Bailrigg Garden Village project area, small white circle represents Lancaster University and the larger white circle represents Lancaster city centre. Image below is taken from the Bailrigg Garden Village report (Lancaster City Council and JTP, 2021) and shows the study area and its immediate surroundings.

Bailrigg Garden Village is planned as a distinctive, self-contained community to the South of Lancaster (Figure 1): a sustainable settlement that will involve thousands of houses, strong-connections to Lancaster city with walking, cycling and public travel use (low carbon transport)

and zero carbon buildings (Lancaster City Council and JTP, 2021). The project aims to follow the Garden Village guidelines set out by The Ministry of Housing Communities and Local Government (MHCLG); so it has a clear identity, sustainable scale, well-designed places, strong local vision and engagement, forward looking and accessible transport, generous accessible and good quality green & blue infrastructure (e.g., water courses, woodlands), healthy places, legacy & stewardship arrangements for the benefit of the whole community and, finally, to be future proofed (JTP Architects Masterplanners Placemakers, 2021). In addition, the project aims to minimise any loss of green fields, ancient woodlands, easy access to wild spaces, and to protect the existing character of the area (Figure 2). Bailrigg Garden Village also intends to be separated from both Lancaster and Galgate (another existing village/settlement adjacent to the southern part of the Bailrigg Garden Village project) by green buffers. The area will be self-sustainable as it will provide a range of different infrastructure facilities such as primary schools, nurseries, health centres and convenience stores.

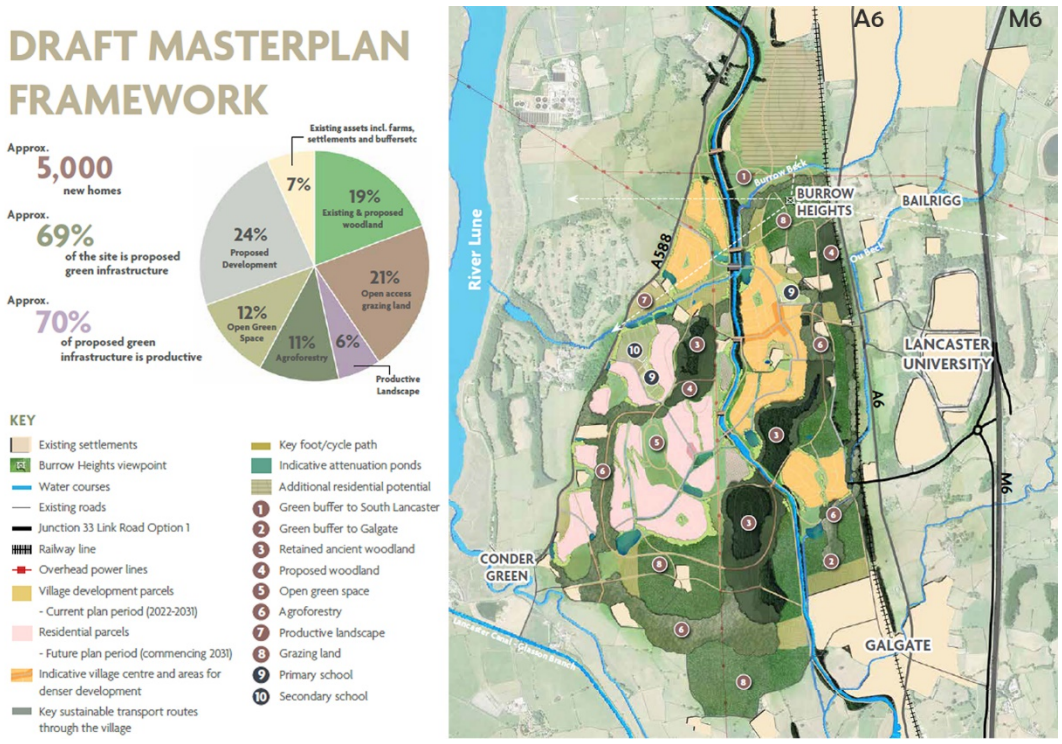

Figure 2. Bailrigg Garden Village masterplan framework (Source: JTP Architects Masterplanners Placemakers, 2021).

Sustainable routes are to be developed to connect the Garden Village with Lancaster University, Lancaster city centre and Galgate by buses, bike lanes or pedestrian lanes (proposed cycling and walking routes in the master plan are shown in Appendix 1). The project provides bus stops within 300m of every home, a core sustainable movement route to bus, cycle and pedestrian movements and links between cycling and bus infrastructure to enable cyclists to become bus users easily and vice versa (JTP Architects Masterplanners Placemakers, 2021). The project also offers walking and cycling opportunities along the canal that passes through the masterplan area, which is one of the most significant recreational areas considering green buffers around the canal

and different activity areas such as workshop places, kayak clubs or pubs located on the green buffers. Walking and cycling paths vary in the masterplan: existing strategic cycle routes and proposed super cycleway are shown in the plan and strategic pedestrian and cycle routes (they will sit alongside the strategic primary street), pedestrian and cycle 'quiet' leisure routes (car-free routes), bridges for sustainable modes, e-bike cycle hire hubs are proposed.

2.2 Measures

In order to understand and better estimate the effects of the project, space syntax methods (Hillier and Hanson, 1984) were used and segment-based angular analyses were conducted. Street segment data was downloaded from Ordnance Survey[1] and checked and cleaned in ArcMap 10.5.1 using a reference base map. Then, using the masterplan of the Bailrigg Garden Village, the segment map was expanded to compare the pre (current situation) and post (situation after the implementation of the master plan) conditions. Space syntax analyses are conducted using a 15k buffer from the centre. Segment based angular connectivity, integration (r: n, 2, 3, 5, 9), choice (r: n, 2, 3, 5, 9 and 400, 800, 1600, 2000, 300 meters) and normalised choice (r: n, 400, 800, 1600, 2000, 3000 meters) analyses were conducted using both the existing and the proposed plan. These measures were chosen based on previous studies (Liu *et al.*, 2016; Orellana and Guerrero, 2019; Von Stülpnagel and Lucas, 2020).

3 ANALYSIS AND RESULTS

In order to have comparable results, the same values were used to produce the following results/images. Considering the current situation in the study area (Figure 3), it can be seen that M6 motorway, the road that connects the Midlands with the border of Scotland, has the highest angular global integration and choice values (the road on the right side of the images heading from north to south). It is followed by another important connection, the A6, which links Luton in Bedfordshire with Carlisle in Cumbria. A6 has high global integration and choice values as well as some of the roads between M6 and A6 roads.

An increase in integration of the A6 road is to be expected when the Garden Village project will be implemented. In addition, one of the proposed connections between the village and M6 road (the link on the southern part of the Lancaster University campus) is likely to have high integration values. So, this road would be expected to attract a higher number of vehicles, pedestrians or cyclists and is likely to become the main gateway to enter the Garden Village. When we focus on global choice maps, this same road has higher choice values when the village project is implemented. This supports the idea that the road mentioned previously is likely to be chosen by higher number of people when the project is completed. This road is proposed as "strategic pedestrian and cycle routes" and partially as "pedestrian and cycle 'quiet' leisure routes" in the master plan. Hence, we can say that the proposed road will increase accessibility

[1] https://osdatahub.os.uk/downloads/open/OpenRoads

for pedestrian and cyclist traffic. Moreover, it can also be said that when the project is completed, A6 road is likely to be preferred by higher number of people when we take into account choice 5000 meters and global integration maps. This road (A6) is proposed as “super cycleway” in the masterplan. With the construction of the Garden Village, this road can also be used by higher number of cyclists. Hence, we can say that the village project proposes more accessible connections for pedestrians and cyclists and it has strong connections with its close surroundings, especially with the major roads (with both A6 and M6).

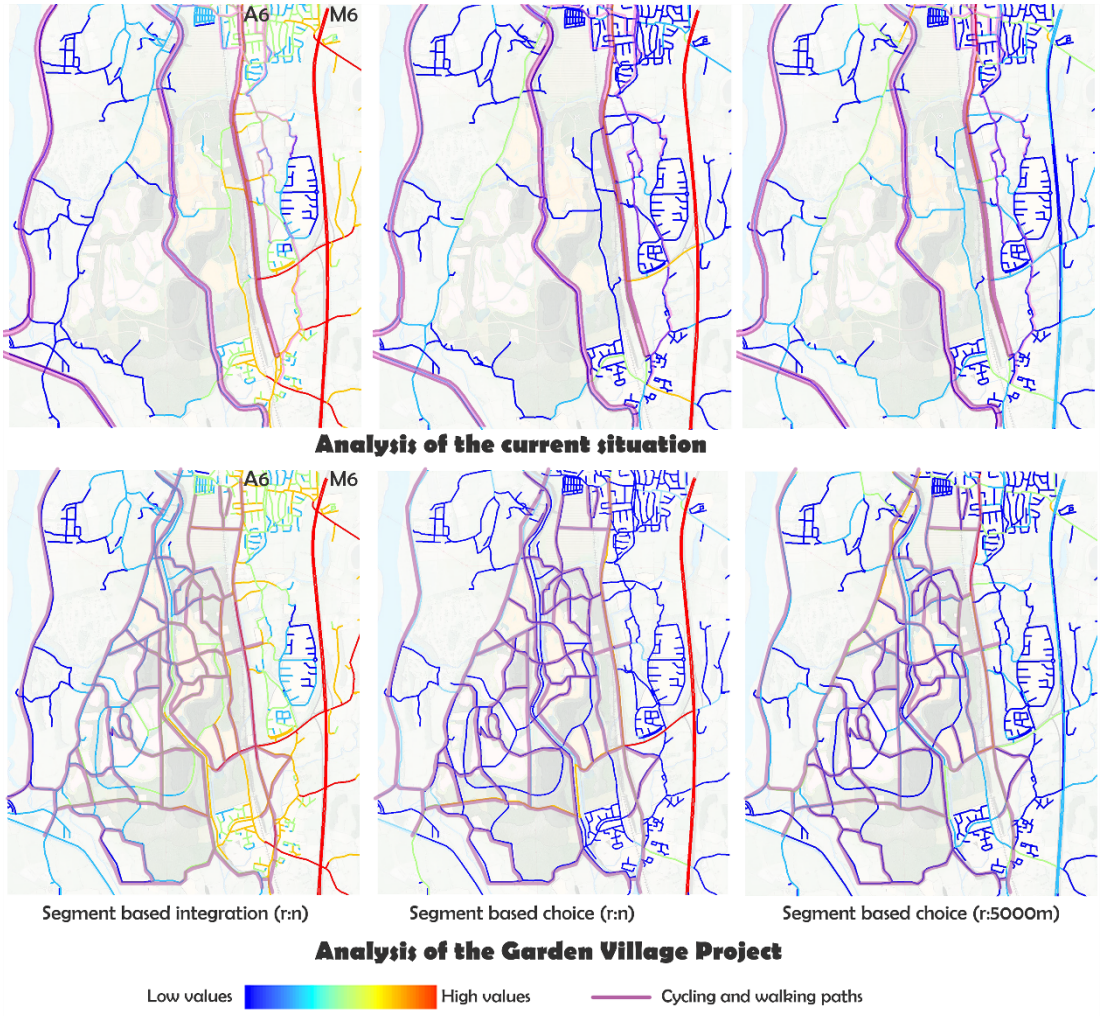

Figure 3. Bailrigg Garden village project and its relationship with its close surroundings. Both pre (above) and post (below) conditions are shown here for comparison. The Bailrigg Garden Village masterplan is used as a basemap to show the study area and approximate location of the university.

When Garden Village project is analysed together with the city centre, it is seen that global integration is higher along the A6 road (the road on the eastern border of the study area) and on the M6 road. Global choice is also high around the garden village project: both A6 and A588 roads (A588 runs from Poulton-le-Fylde to Lancaster in Lancashire) have high values as can be seen from the visuals (Figure 4 and Figure 5).

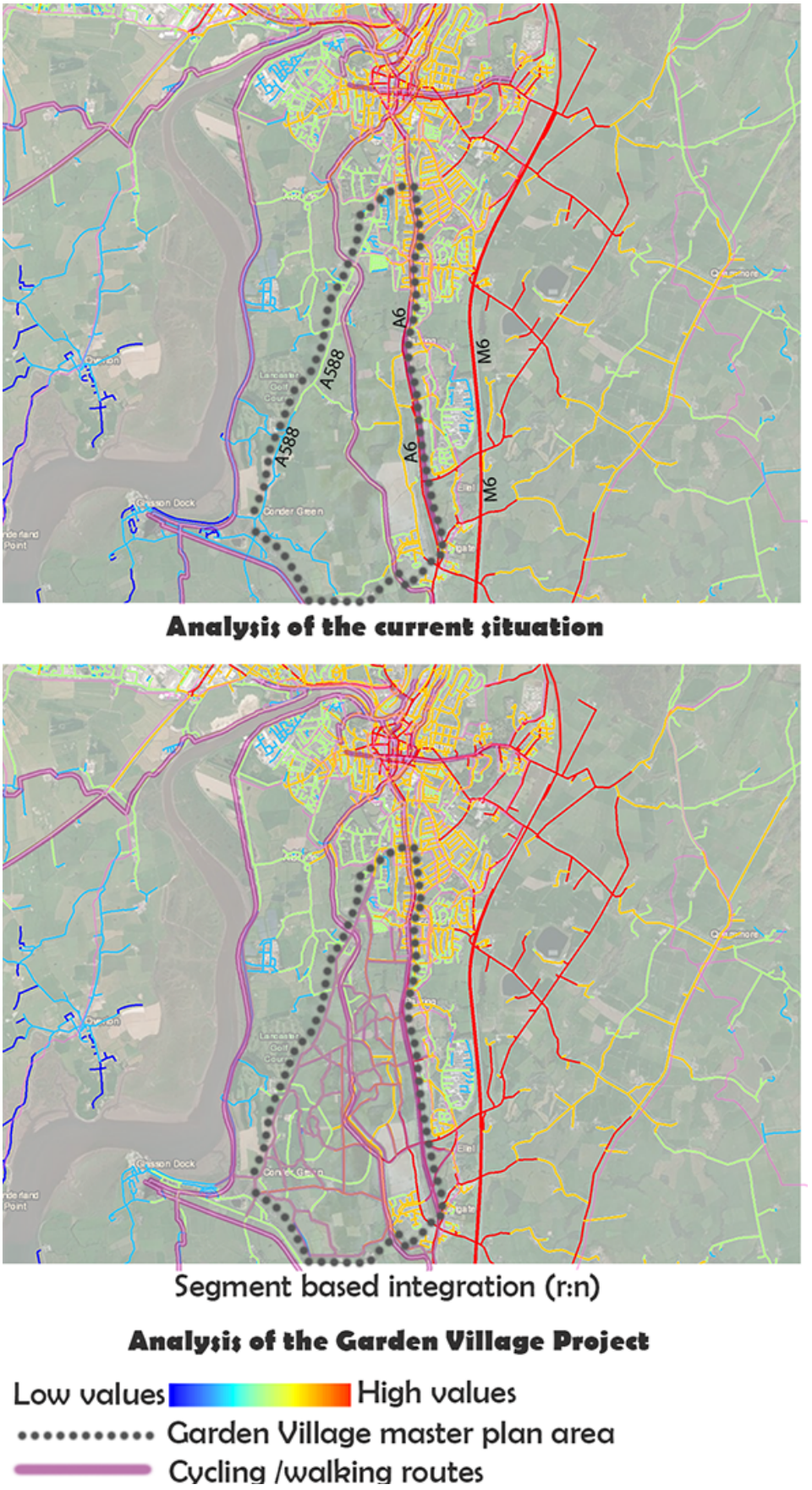

Figure 4. Bailrigg Garden Village master plan area and its relationship with Lancaster city centre (Global integration analysis). Both pre (above) and post (below) conditions are visualised for comparison.

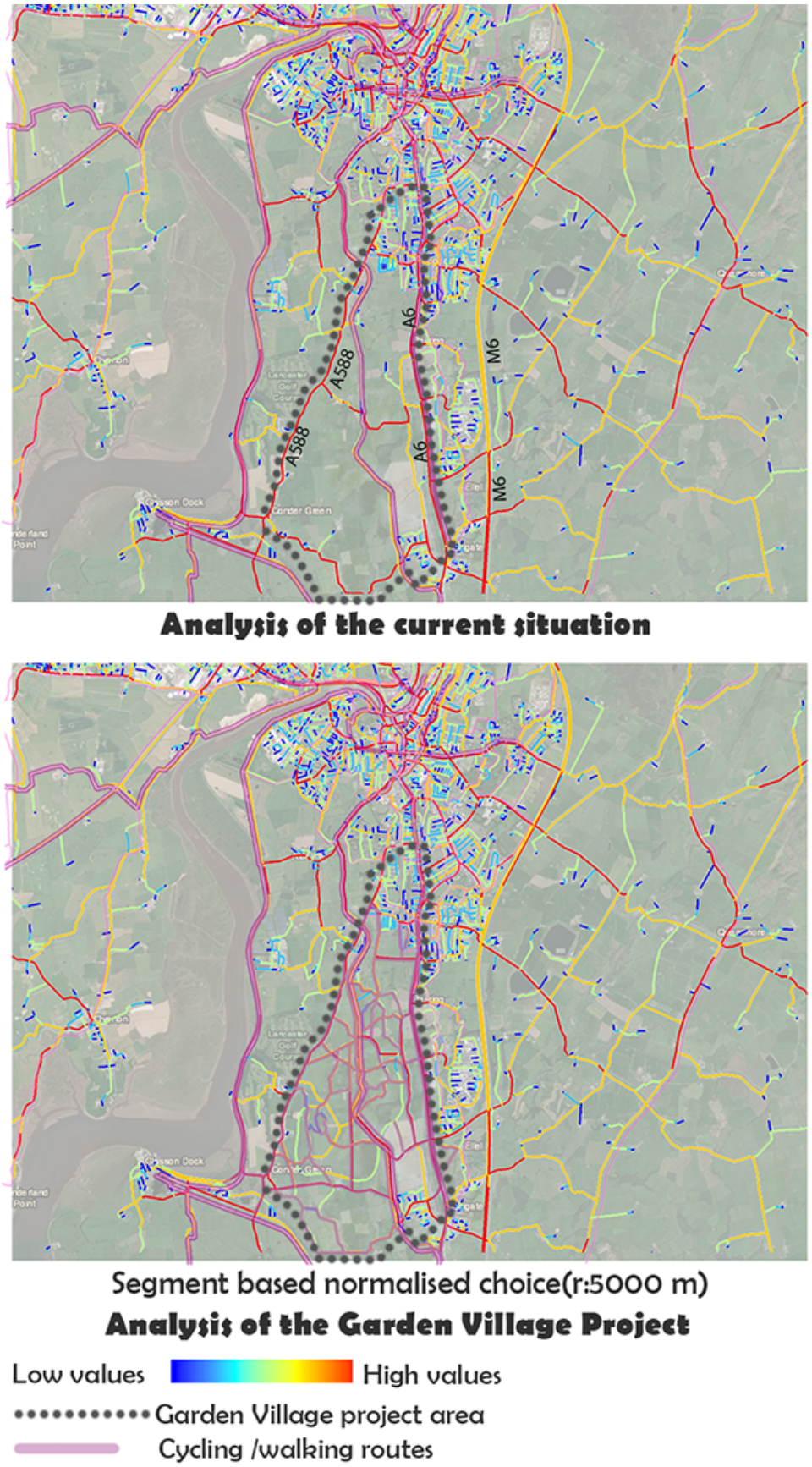

Figure 5. Bailrigg Garden Village master plan area and its relationship with Lancaster city centre (Choice 5000 metric analysis). Both pre (above) and post (below) conditions are visualised for comparison.

When the project is implemented, both integration and choice values improve, especially around the project area. As can be seen from the global integration analysis, the Garden Village project has strong connections (highly accessible streets) that link the project area with A6 road, so with the centre of Lancaster. Similarly, there are multiple street segments in the project area that have high choice values. So, these roads can be taken by people to reach different parts of Lancaster. The roads in the project area with higher choice and integration values are the roads proposed as "improvements to the canal towpath - pedestrian, cycle and bridle-", "proposed pedestrian and cycle 'quiet' leisure routes", and "proposed strategic pedestrian and cycle routes". Hence, we can say that these proposed bicycle and pedestrian connections have different levels of accessibility and preferability. In addition, the links close to the A6 and M6 have higher values, as would be expected. Moreover, changes in global integration on the northern part of the village project suggest that after the construction of the new roads, the northern part of the village will have higher accessibility values. This also suggests higher accessibility to Lancaster city centre.

4 DISCUSSION AND CONCLUSIONS

This paper investigated the possible impacts of a proposed garden village project on cyclists and pedestrians using space syntax analysis. To do this, pre and post conditions of the project area and its surroundings are analysed. We focused on cycling and pedestrian routes specifically to see the changes on these routes. Results of the study showed that the proposed project suggests different levels of accessibility and preferability. Roads on the northern part of the study area (connections with the centre) and on the eastern part (connections with A6 and M6 roads) had higher values. This result suggests that the proposed routes help to reach both the centre and A6 and M6 roads, which connects Lancaster with other cities. This result is important as it highlights that the designers of the Garden Village project did not only consider the study area but also its connections with the Lancaster city and its surrounding.

As mentioned in the introduction, recent attempts focus on public transport as well as pedestrian and cycling routes in cities rather than vehicles and Bailrigg Garden Village project also has a similar aspect. The results of the analysis showed that the village project proposes different classification of roads: some are more accessible and preferable while other are more segregated and less preferable. In addition, the project proposed higher accessibility and connections for pedestrians and cyclists with the city centre and other cities via the A6 and M6 connections. Considering this result, we can suggest that Bailrigg Garden Village project can be successful and attractive for people. In the past, the most integrated roads were prioritised for cars and the segregated routes were given to cycles or pedestrians. However, the most integrated roads are shared by different travel modes (by drivers, pedestrians and cyclists) in this project. Garden Village project clearly shows two alternatives that pedestrians and cyclist can follow: direct and accessible routes for transport purposes (routes that will be shared with vehicles), and quiet /more leisurely routes which run through green links for recreation purposes. Hence, it is important to consider all travel modes together while planning major roads and provide necessary

infrastructure. Future research & practice-based studies can also analyse and propose high level of connections to support transport activities as well as recreational activities to create attractive environments for sustainable travel modes.

However, it is also important to consider pedestrians' and cyclists' safety while designing routes parallel to vehicle traffic. It is important to have different measures to reduce the vehicle traffic/to slow down vehicle speed and create safe environment for cyclists/pedestrians. Garden Village Project suggested a bus route that can play an important role in decreasing the amount of vehicle traffic generated by the new development. However, alternative solutions should also be considered for the Bailrigg Garden Village (for the roads that are shared by different travel modes). In addition, practitioners and theorists should also consider alternative solutions to create safe environments for drivers, cyclists and pedestrians.

Acknowledgement

The authors would like to thank Richard Camp (Planning Policy Officer at Lancaster City Council) for cycle routes and Emma Chung (Associate and Senior Urban Designer at JTP) for her comments on the Bailrigg Garden Village Project.

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Appendix 1. Proposed cycling and pedestrian routes Source: JTP Architects Masterplanners Placemakers, 2021)