

Eco-Neighbourhood Report

-exploring a sustainable community on Cogan

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Abstract

This Report aspires to evaluate the Cogan station based on evidence proposed by Cardiff Council and on research analysis. The Cardiff Capital Metro is an ambitious programme to provide an accessible network abridging regional areas to various stations. As a key station to offer mobility for passengers between Vale of Glamorgan and Cardiff, it certainly has become an essential platform that could stimulate opportunities for regional development and regeneration. In addition, the authority could handle challenges through the transformation towards an ecological and sustainable community. There are three main components in the report: evaluating the status quo of the site, providing an evidence-based analysis of the programme, and proposing a mechanism to achieve a livable and walkable neighbourhood. It might boost the local economy and propose ideas for a means of sustainable transport in other regions. The data was collected through research, observation, and surveys. Site visiting was processed in March and April 2021.

Keywords

Eco-neighbourhood, GIS analysis, transport system, Cogan

1. Programme overview

1.1. Site Location

Cogan is an outskirt in Morristown, Penarth in the Vale of Glamorgan. It is located in the southwest of Wales, which is 7.2 km from Cardiff city(Wikipedia 2021). There are three main roads: Barry Road (A4055), Redlands (B4267) and Penarth road (A4160) around the area. The terrain of the west is higher than the east and Ely River flows into Cardiff Bay from north to southwest.

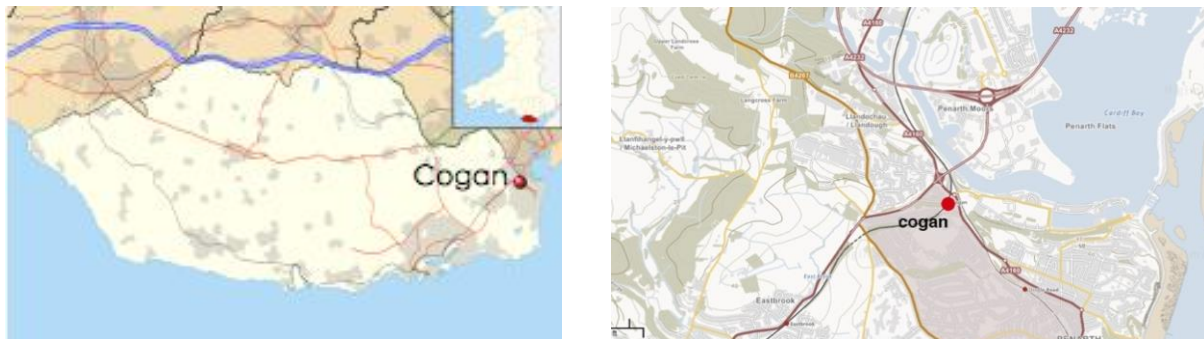


Figure 1. Cogan traffic location conditions (Source: Drawn by author)

1.2.Land Use

The buildings on the site serve residential, commercial, medical purposes as well as educational engagement. The area has been divided into a grid of four districts by main roads and Ely River. The predominant land use is for residency that includes high-rise residential ones, single-family villas, and row villas. The commercial functions cover regional superstores, Tesco and Penarth leisure centre, the latter of which is one of the four major centres in Vale, to name a few. However, there are seldom grocery shops and fast food stores along roads now. An increasing number of generic shops were replaced by private businesses like second-hand car markets and marine chandlers, which affect the convenience of local citizens' life (Wikipedia 2021).



Figure 2. Land use and building status (Source: Drawn by author)



Figure 3. Field investigation (Source: Photography by author)

1.3.Social-economics

The demographic could affect the movement function of people and the land use of the site. For example, the age distribution, health standards would influence how pathways and public space are utilised (Wales government 2021). According to the UK census in 2011, the age in Cogan concentrates between 30 and 50. The station Road and surrounding area have a higher qualification level and social grade than the average level. The districts in Cogan also have a larger-than-average concentration of residents that are in full-time employment (StreetCheck 2021).

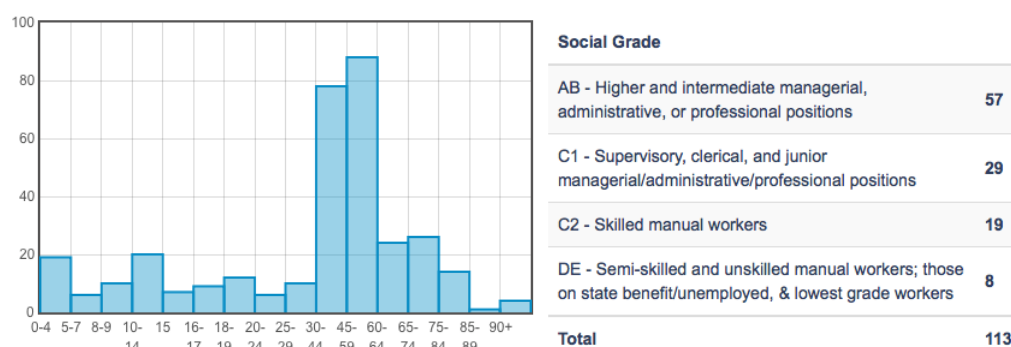


Figure 4. Population age structure and social grade (Source: StreetCheck 2021)

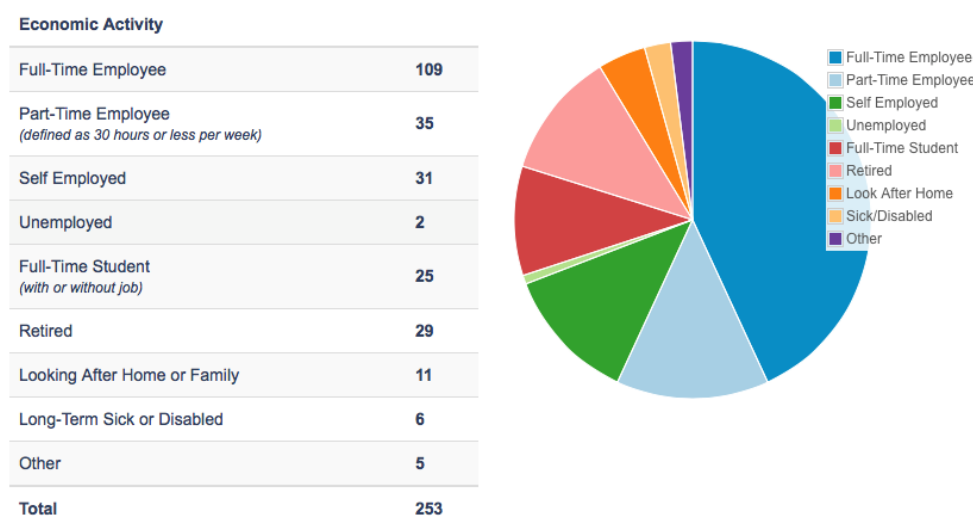


Figure 5. Economic activity (Source: StreetCheck 2021)

2.Transport system

2.1.Road Traffic

The volume of vehicles on the key junction of main roads in Cogan grows rapidly which approaches capacity on rush hour. It's shown as dark red and orange on map (Google 2021). According to Cardiff Local Development Plan (2012), the results of travel behaviour research in Cardiff and Penarth illustrate that leisure(28%) and work(24%) are the primary purposes for subjective reasons rather than the necessity of transportation systems abovementioned.

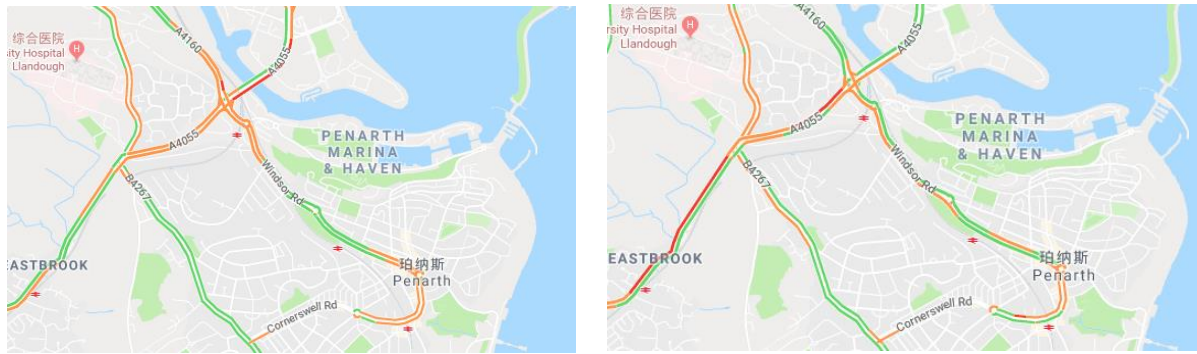


Figure 6. Traffic conditions at 8 am and 6 pm (Source: Google map)

2.2. Rail system

Cogan railway station links Barry, Rhose, Bridgend to Cardiff. Due to the background of the new Metro System Plan of the Wales government, Cogan Station would be connected to the metro system with various public tools to vertical transit. Moreover, the new planned metro network shows that there would be a metro line providing service passing through Cogan station from Cardiff airport to the north area of Wales (Welsh Government 2021). In addition, there were two platforms in the Cogan area, both were regenerated to private business now (Wikipedia 2021). From the pictures taken by the field trip, it can be seen that there are two platforms with shelters on each side and a bridge that provides a connection for people on both sides of the river. Boards on each platform show departure time of the transportation vehicles. A large-scale car park is on the south side of the station. However, the facilities in the station are not fundamentally built to accommodate most of the passengers with special needs, even though wheelchair users can still be able to use the entrance unaided.

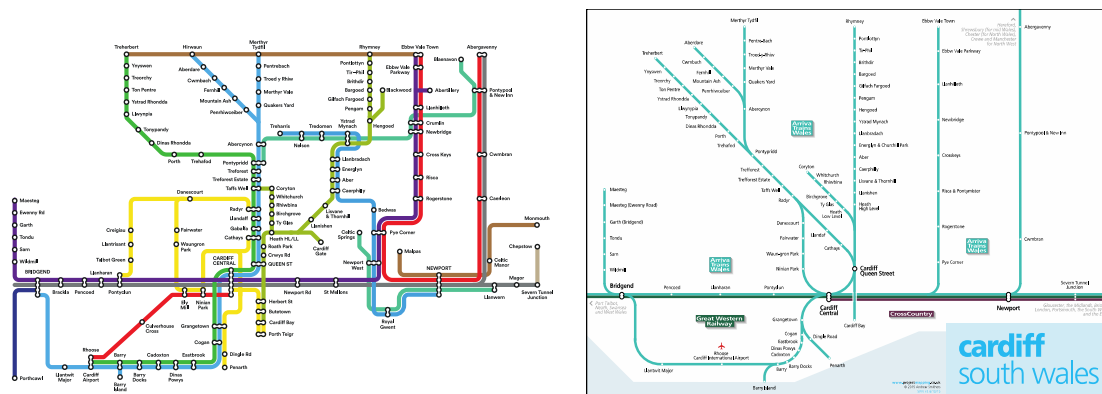


Figure 7. Metro system (Source: Welsh Government)

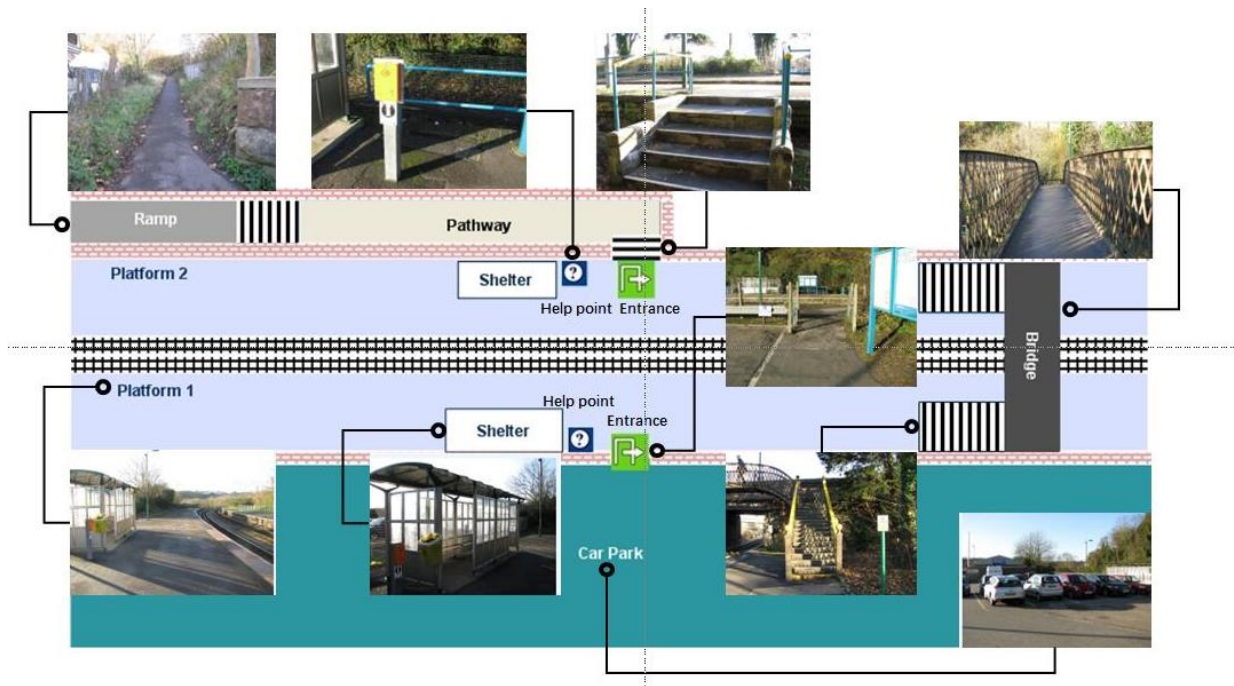


Figure 8. Cogan station (Source: Drawn by author)

2.3.Public bus system

The data of bus stop locations and route information are based on Google map. The public transport capacity is determined by two aspects: the distance among bus stops that reflects the convenience degree and the number of bus routes indicating the density capacity of public transportation offerings (Alonso 2013). By using Kring Interpolation of ArcGIS, the two factors are interpolated on the bus capacity map.

According to the analysis, the bus stops on Penlan Road and Dochdwy Road on the west of the train station are serving more than four bus routes on average and the public transport service capacity is relatively comprehensive. However, there are fewer bus stations in the residential area in the south of the railway station, which are mainly arranged along Pill Street. The average bus routes are about two and bus service capacity is relatively low. Penarth bus station provides more lines of four bus service whose capacity is better designed. The four bus lines are number 89, 92, 93 and 94. All routes pass through Cardiff centre.

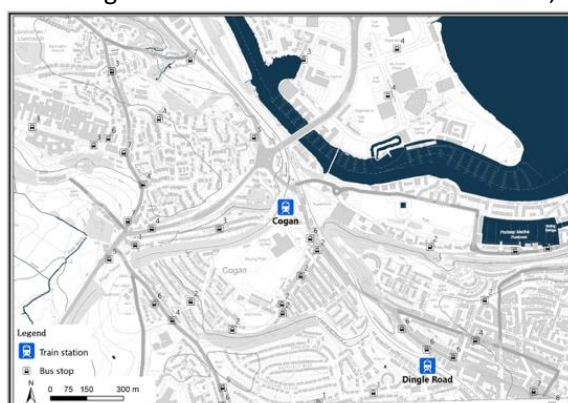


Figure 9. Distribution of bus stops (Source: Drawn by author)

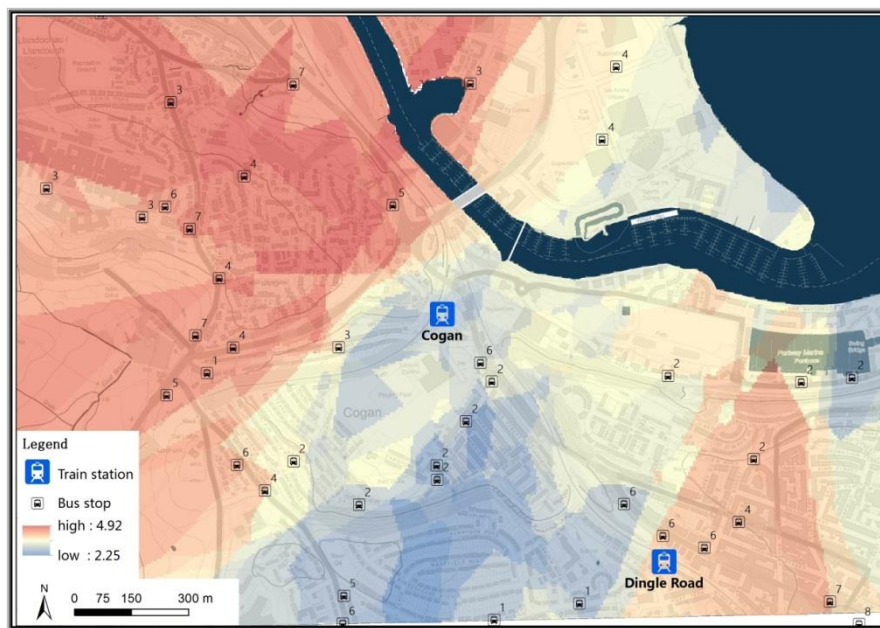


Figure 10. The bus capacity map (Source: Drawn by author)

2.4. Bicycle System

The bicycle lane in the north area is well functional while in the south area, there is a lack of lanes and parking areas for bicycles. A specialized bridge has been built to connect two areas. From the field trip, though there are hilly ramps in the west area, bicycle transport signs on the junction still could be seen on road.

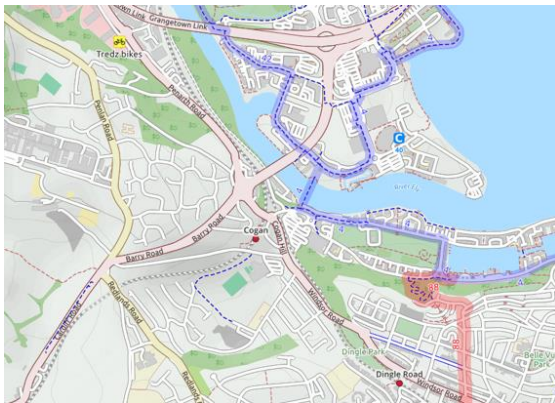


Figure 11. Bicycle System (Source: Drawn by author)

2.5. Walking System

The width of the footpath in the area is narrow in the neighbourhood and there are no special lanes, pathways, or facilities for people with optical dysfunctionalities. Since an intersection that leads to each main road has a big traffic volume in the area, walking is not well designed around the junction. Moreover, the hilly ramps in the west lead to a poor user experience for pedestrians. Some of the streets in the neighbourhood level are sparsely walked by people in the community. However, it is noticeable that traffic buffer islands are built in the middle of the road, especially on the main traffic signals waiting area.



Figure 12. Walking System(Source: Photography by author)

3.Site analysis

The succinct vision in Cogan provides an overview by site survey and data sources. Based on the evidence, an assessment of the local area was presented by the tool of Place Standard. The indicators of this tool assess physical elements such as buildings, spaces, and transport links as well as social aspects. For example, whether people have a sense of belonging in the place can be one of them. It could, in the meantime, maximize the potential of physical, social and environmental support for the wellbeing of the local community and therefore aim for higher quality of life. Moreover, from prompts of results presented by the diagram below (figure. 14), it could indicate the elements and places that need to be improved and ones that have done a wonderful job. It can be seen that a lack of walking and cycling routes leads to a low score on Moving around. The outdoor facilities are not accessible for children and the disabled., Meanwhile, local businesses have been deteriorated, which also leads to a low mark on the diagram. However, high-quality housing is available for different sizes of households. Moreover, the Ely River and natural forest are well maintained which can be attractive to tourists and the local.

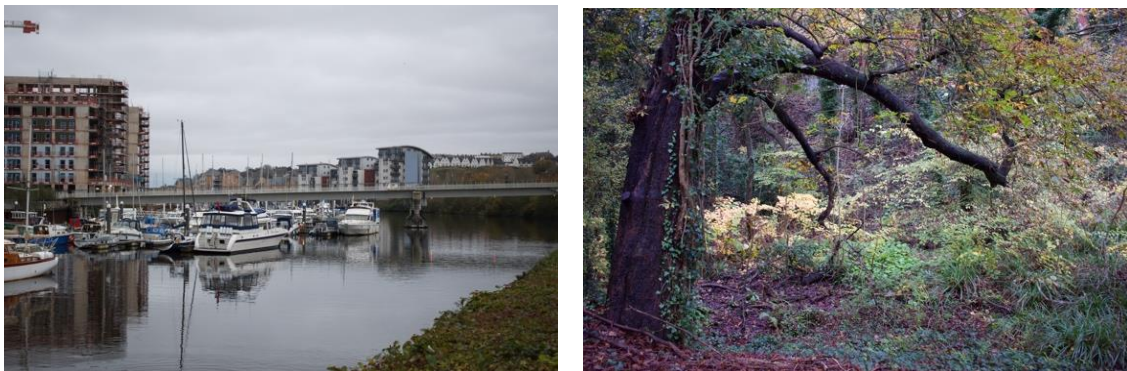


Figure 13. Ely river and nature forest (Source: Photography by author)

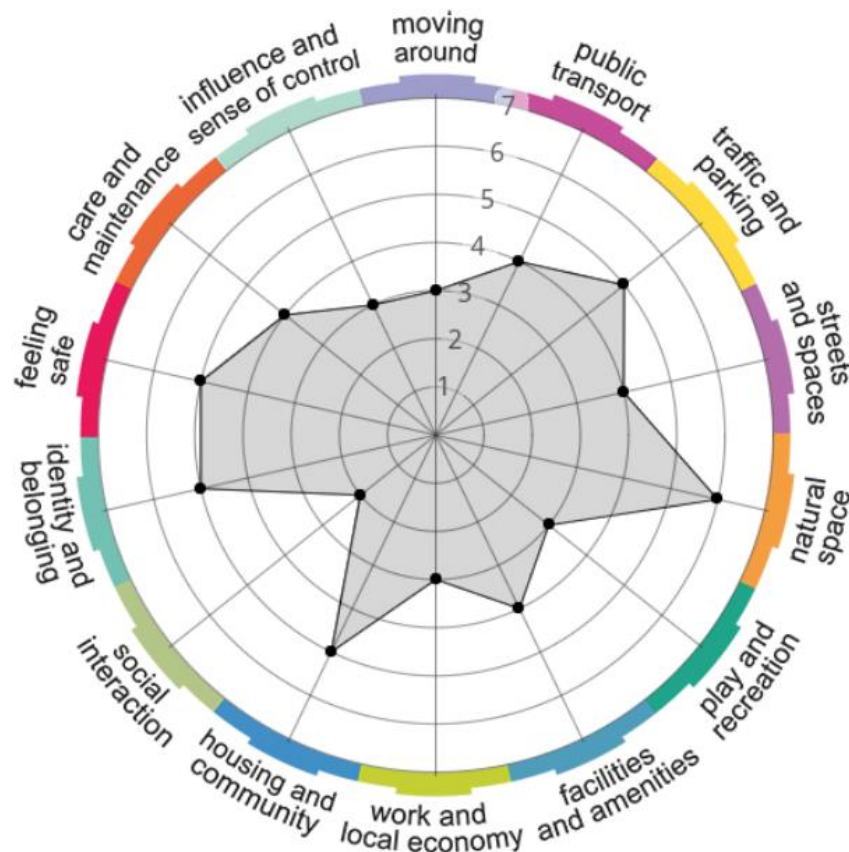


Figure 14. Assessment of local area (Source: Drawn by author)

3.1.SWOT analysis

Strength and Weakness

Strength:

The housing is of good quality and routes in the neighbourhood are well organized and identified. Demographically, the residents in the community are among 30-50 who have been through high quality of education. They would like to get rid of private vehicles to live a sustainable and responsible life, according to a site interview. In addition, the public service systems are readily available, such as Penarth Leisure Centre, Tesco, Primary Schools and University Hospitals.

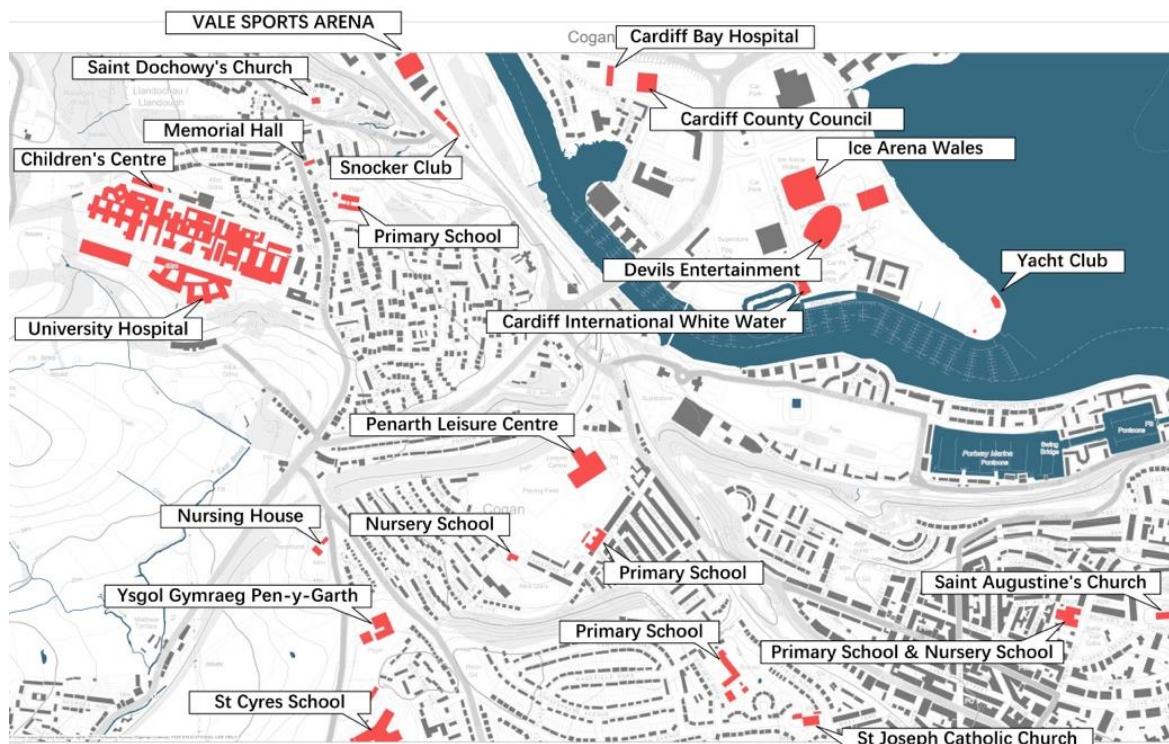


Figure 15. Public service system (Source: Drawn by author)

Weakness:

Based on the UK government traffic count statistics (2021), the amount of traffic volume on Road A4055 grew steadily from 2000 to 2016, which indicates that the road capacity is unfordable these years. The traffic congestion is heavily among the main roads in Cogan, which leads to a severe deterioration of noise, safety, air quality as well as a waste of land use for parking. The situation also influenced the prerogatives which pedestrians and bicycles lane are ignored in design. Moreover, lacking public space and facilities for recreation leads to less communication and a sense of belonging. In addition, the housing density in the Cogan region is low, which leads to less activities and more depression suffering in the local economy. Many grocery stores are closed down during the past 40 years.

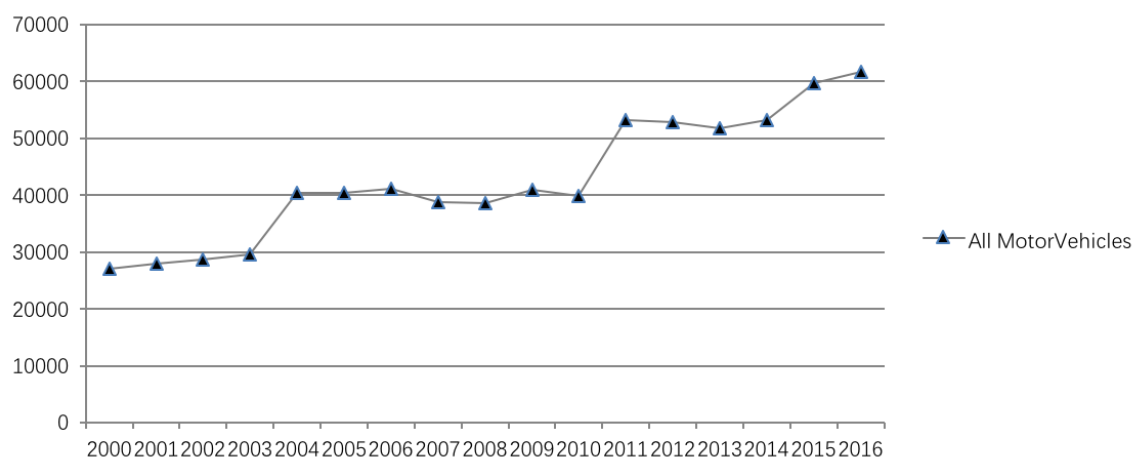


Figure 16. Traffic volume on Road A4055 (Source: UK government traffic count statistics)



Figure 17. The housing density in the Cogan (Source: Drawn by author)

Opportunity and Challenge

Opportunity:

Firstly, Cardiff Capital Region Metro provides an opportunity for both passengers and the local community, which has a positive effect on the economy and environment. Cogan station could make the full use of the strategy to connect local region to a wider range of places to develop key corridors and stations and spur employment. Moreover, it can also tackle the increasing road congestion in the junctions of Cogan area towards a sustainable benefit. Secondly, the nature scenarios, such as Ely River and green park, in the waterfront could combine with tourism to increase activity and recover the local economy. The graph illustrates that Cogan, belong to the south-west area is one of the most attractive places for tourists. Moreover, since a bicycle bridge has been built to connect the north and the south, it could be an opportunity to establish a stronger bond between two areas and make it an awful lot more convenient for the local.

	Total	Purpose of trip				
		Holiday	VFR Total	VFR Holiday	VFR Other	Business
Unweighted Base	720	529	124	82	42	56
Weighted Base	1802	1286	314	204	110	170
Mid Wales	309	257	35	27	9	12
North Wales	640	518	83	56	27	32
South East Wales	418	196	121	71	49	85
South West Wales	386	286	68	45	22	28

Table 1. Purpose of trip (Source: UK government traffic count statistics)

Challenge:

The condition of Cogan station now does not fully serve its purpose for the local. The insufficiency of public facilities and amenities for the disabled and the location of station is near junction which imposes inconvenience for passengers. Moreover, there is a waste of private parking and it is difficult to alter what people think of private cars. Due to the issue of land ownership licenses, blocks with a good natural geographical location are private. It would be serious for the regenerated public places and be subject to legal aspects of land license and the demolition issues. Ely river has a private dock for cruises, which influences sight range for view and worsens ecological water system.



Figure 18. The condition of Ely river and Cogan station (Source: Photography by author)

3.2.Mechanism of option development**Regeneration in Ely River waterfront**

Public space is an essential element of a community that might serve a variety of purposes for the residents (Planning organization 2021). As an almost derelict waterfront of Ely river, it could be transformed into an attractive landscape for leisure and recreation. Since water is important to life and natural environment, it should be organized in a sustainable mechanism. The following part is some key points to redevelop the waterfront area in Cogan.

Firstly, transforming land use in the south of the river, the residential area with a low housing density, can be ideal. Multifunctional land use, such as commercial, leisure and art centre in the area, can be a better strategy, economically. One part should be demolished to build a waterfront commercial pedestrian street and mix-used building, and the other part of housing could be preserved and redeveloped as servicing and self-catering accommodations. According to Wales statistic data (2021), the table shows the choice for accommodation in Wales of demographics. Besides commercial hotel, guesthouses and self-catering accommodation are the most popular choice for travel. Thus, it could just be an opportunity to maximize the effectiveness of land use and local economy of tourism if different commercial practices, such as café, restaurant, hotel, shops can be deployed.

	SEX			AGE						CHILDREN IN HOUSEHOLD		SOCIAL CLASS OF HOUSEHOLD					
	TOTAL	Male	Female	16-24	25-34	35-44	45-54	55-64	65+	Yes	No	A	B	C1	C2	D	E
Unweighted Base	288	132	155	31	52	51	47	35	71	110	177	13	79	89	46	34	27
Weighted Base	2119	985	1134	234	392	392	377	286	438	750	1369	115	692	674	319	225	93
Commercial accommodation (net)	1341	682	659	130	278	247	280	183	223	536	804	55	387	436	276	140	47
	63%	69%	58%	55%	71%	63%	74%	64%	51%	72%	59%	47%	56%	65%	86%	62%	51%
Serviced accommodation (hotels & guesthouses) (sub-net)	537	333	204	63	144	69	107	45	108	179	358	34	88	214	111	72	18
	25%	34%	18%	27%	37%	18%	28%	16%	25%	24%	26%	29%	13%	32%	35%	32%	20%
Self-catering accommodation (sub-net)	903	396	507	73	128	174	184	180	164	349	554	21	344	258	165	74	40
	43%	40%	45%	31%	33%	44%	49%	63%	37%	46%	40%	18%	50%	38%	52%	33%	43%
Camping & caravanning (sub-net 2)	542	238	304	54	92	89	96	124	87	214	328	11	231	123	101	53	24
	26%	24%	27%	23%	24%	23%	26%	43%	20%	29%	24%	9%	33%	18%	32%	23%	26%
Other self-catering (sub-net 2)	360	158	202	19	36	85	87	55	77	135	226	10	114	135	64	21	16
	17%	16%	18%	8%	9%	22%	23%	19%	18%	18%	16%	9%	16%	20%	20%	9%	17%
Hostels (sub-net)	23	8	15	0	5	10	0	0	8	15	8	0	8	15	0	0	0
	1%	1%	1%	0%	1%	3%	0%	0%	2%	2%	1%	0%	1%	2%	0%	0%	0%
Own home/friend's home/relative's home (net)	776	298	478	106	115	152	96	99	208	223	553	61	329	238	27	80	41
	37%	30%	42%	45%	29%	39%	26%	35%	47%	30%	40%	53%	48%	35%	8%	35%	45%
Other (net)	12	8	4	0	0	0	0	4	8	0	12	0	8	0	0	0	4
	1%	1%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%	1%	0%	0%	0%	5%

Table 2. The choice for accommodation in Wales (Source: Wales statistic data)

Secondly, City park in the south should be a sustainable revival and a key ecological corridor. The Park is surrounded by private housing and is inactive (Figure 19) now. It is proposed that city park is designed as a central adjacent park that links to the international sports centre and new commercial street in north waterfront area by a continuous trail, square and numerous cultural and entertainment facilities. Thirdly, building a sightseeing chain or wooden bridge for walking can't be the worst idea. There is an A4055 Road connecting the south to the north which links to Cardiff city centre and a bicycle road has been built to connect cycle route system in regional level. A new chain bridge could be a walking function for passengers. The three bridges offer connections for automobiles, bicycles, and pedestrians. Moreover, a lane for walking and cycling should be served for people and related facilities should be considered for people with disabilities. As shown on the picture, increasing walkable trail at the waterfront could enhance the livability in this area. Considering the connection among a wider range, The River Ely serves as a sightseeing stop for cruise ships connecting Cardiff bay. It is a recreational option that links Cardiff to commercial marinas in Cogan to provide water leisure projects. The regeneration in River Ely waterfront could be a landscape as well as an element to spur the local economy and provides employment opportunity for the local people. Chang (2010) claims that the convergence of commercial, artistic, cultural and residential functions at the waterfront is a symbolic for a site.

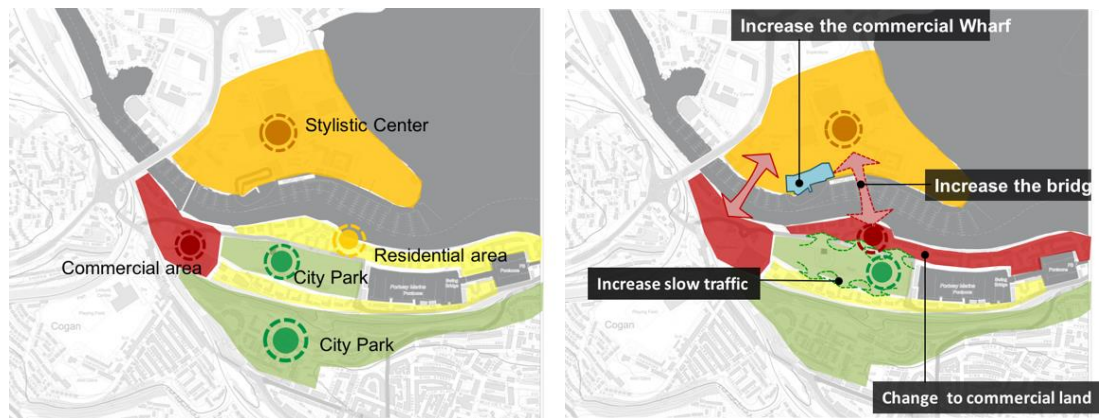


Figure 19. Current functional zoning and planning strategy (Source: Drawn by author)



Figure 20. Planning scheme (Source: Drawn by author)

3.3.Improvement of transport system

On the one hand, Cardiff Region Capital Metro drives the improvement of Cogan rail station. The amenities and facilities should be improved such as waiting room, toilet, and the staff room. Accessible facilities should be designed for the less fortunate. Moreover, the original area of car park could be reduced, while bicycle lots, as well as bus stop, should be planned for sustainability purposes. Since the traffic volume is heavy at the junction, there should be a vertical transit such as passage underground which brings subway lines for network connection. It can also link the waterfront area to the station prioritized for public transport for travellers.

On the other hand, since Cogan has an ecological natural sceneries, it provides an outdoor off-road fast track for bikes. According to London Cycling Design Standards (LCDS 2014), the cycle lanes should prioritize safety and allocate space separated from volume motor traffic on each side of road. In addition, cycle routes should flow and has special traffic lights and signs in order. With the development of bike sharing, public bicycle sharing should be considered as a system for daily life for commute as well as leisure (Suzuki 2021). The designated parking space for bicycles should be close enough to the exits and entrances of public transportation stations, public parks, and frequently visited places for users to move around. The pictures (Figure 22) show bicycle routes and lots in a wide range of Cogan.



Figure 21. London Cycling Design Standards (Source: LCDS 2014)

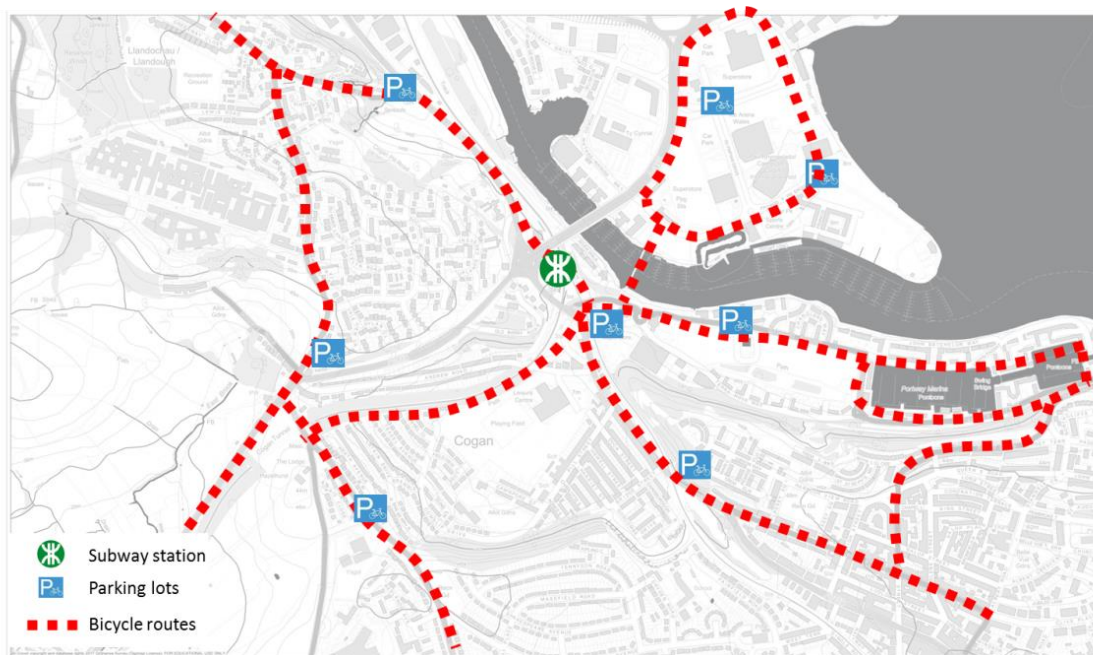


Figure 22. Bicycle routes and lots in a wide range of Cogan (Source: Drawn by author)

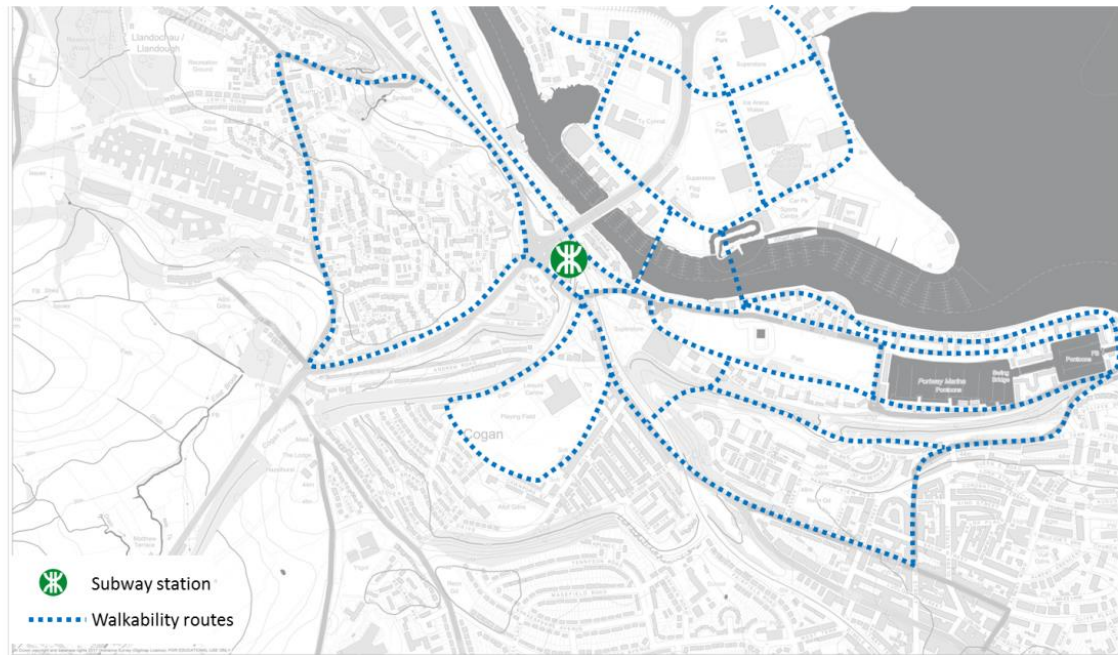


Figure 23. Walkability network in a wide range of Cogan (Source: Drawn by author)

4. Conclusion

The Report assesses relevant aspects of the Cogan area on community, landscape, movement, land use, as well as protocols for the redevelopment in the area. Whilst the planning refers to interests of the government, stakeholders, authorities, and residents, it is necessary to be supported by each group for implementation. Furthermore, the scale of the development needs to be supported by funding, which can be a challenge to accommodate infrastructure. It is noticeable that the Report attributes to provide examples to tackle the current transport situation and highlight accessibility, livability, and sustainability in regeneration mechanism. However, more work can be required in order to build an attractive community.

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