



ISOCARP
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Young Professionals' Think Deep Programme - YPTDP

RETHINKING THE CLYDE WATERFRONT

CONNECTING THE INFRASTRUCTURE
DEVELOPMENT INTO INTEGRATED
ABOVE AND BELOW GROUND
URBAN DESIGN FOR THE BROWNFIELDS
REDEVELOPMENT SCHEMES

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PREFACE

Piotr Lorens & Han Admiraal

THE GLASGOW YPTDP WORKSHOP – ISOCARP PERSPECTIVE

This report summarizes the first in a series of workshops organized jointly by ISOCARP – International Society of City and Regional Planners and ITACUS – International Tunnelling and Underground Space Association – and developed within the framework of Young Planning Professionals (YPP) – Young Professionals' Think Deep (YPTDP) Programs. The event was hosted by the City of Glasgow (Glasgow City Council) and took place within the 23rd – 28th of October 2016. The theme of the workshop - Rethinking the Clyde Waterfront. Connecting the infrastructure development into integrated above and below ground urban design for the brownfields redevelopment schemes – reflected the intention of undertaking works on integrated planning for urban development which takes into account not only urban design of overground space but also includes discussion on innovative uses of underground spaces utilization. The intention is that this workshop becomes a first in a series of events, leading towards producing a set of case studies contributing towards in-depth analysis of interrelations between city planning focusing on urban design and underground space utilization and infrastructure provision.

This workshop was at the same time a part of the ISOCARP's Young Planning Professionals' Program, which since 1991 brings together young professional urban planners from all parts of the world. The YPP Workshops provide an opportunity to work together as a closely-knit team. The workshops are hands-on and aimed at establishing a good working relationship with young colleagues from all parts of the world, while working towards results in a very short period of time. Within the framework of the YPP / YPTDP Workshop it was intended to bring together a group of 20 Young Professionals (up to 35 years old), both of British origin and coming from overseas. This group included 10 urban designers / planners / architects and 10 civil engineers / underground space specialists (such as geologists, hydrogeologists, tunnel and geotechnical engineers) as well as a few of local planners and underground space specialists. Therefore, the workshop aimed to provide young planners and underground space specialists responsible for, or participating in, the shaping and development of cities, with the principles and practices of effective contemporary urbanism with special focus on interrelations between above and below ground urban design, to above ground quality of place, connectness, land use, as well as underground space utilization and infrastructure provision. The objective of the workshop was to provide the workshop participants with hands-on practical experiences. YPs worked in a studio setting under the guidance of three experts from among the members of ISOCARP, ITACUS and Think Deep UK on a project site chosen jointly by ISOCARP, ITACUS and representatives of the local partners from Glasgow City Council – which was the Clyde Waterfront. The site focus of the workshop is a key development priority area for Glasgow, and it is intended the workshop outputs will provide examples of the comprehensive (strategic) urban redevelopment approaches for this site which the host city can endorse or take on. Understanding how to transform brownfield development using comprehensive and volumetric approaches is a key current topic for the city which has been undertaking redevelopment processes in last decades.

The theme of the workshop is in line with the aims of other major regeneration plans of the city. The Clyde Waterfront site was one of the pioneer areas leading Glasgow prosperity in 19th and early 20th century, famous for its industrial heritage. Once a vibrant port and maritime industry area, Clyde Waterfront is currently under deterioration and needs regeneration and redevelopment. This was also indicated in the Glasgow City Plan as the site was pointed out as one of the priority development area. At the same time first improvements took place within its boundaries, including iconic public buildings contributing towards creation of the new image of the site.

The development of this workshop – as well as the report which is included in this CD – would not have been possible without the hard work of the workshop coordinators as well as representatives of both societies. I would like to take this opportunity to thank all of them – with special thanks conveyed to our colleagues from Glasgow City Council (especially to Cathy Johnston, Gillian Dick and Helen Bonsor), who made a tremendous effort in order to make it a success. Also, I would like to extend my thanks to all members of the ISOCARP headquarters staff for their help in putting this publication together. At the same time I sincerely hope that this material will become a reference document both for future discussion on redeveloping the workshop site and for the development of similar initiatives in cooperation with various partners in different parts of the world.

Piotr Lorens
Vice President Young Planning Professionals (ISOCARP)

THE GLASGOW YPTDP WORKSHOP – ITACUS PERSPECTIVE

The International Tunnelling and Underground Space Association's Committee on Underground Space (ITACUS) is concerned with only one thing: an urban underground future. For a long time, tunnels and tunnelling have been part of the toolkit available to planners and engineers when looking at how to develop infrastructure. The focus historically lay with tunnels that were used to tame mountain passes that would otherwise be unpassable, at least for long periods each year. Tunnels were used to cross waterways and connect countries and even continents. Within the urban environment, long tunnels formed underground networks to allow for mass rapid transport of people going about their daily lives in cities.

At the end of 20th century and beginning of the 21st, we see tunnels beginning to play a role in replacing high-rise infrastructure dividing cities or blocking cities from their waterfronts. The land that becomes available at the surface is used for redevelopment or to create open green public spaces. In this way, the use of underground space is contributing to the liveability of cities. It can contribute in many other ways as part of the sustainable development of cities and in terms of urban resilience. In order to do so, the development of underground space needs to be planned and underground space needs to be seen as an integral part of the city fabric. Using the space below the surface should be done by choice rather than out of necessity. Many mega-cities are looking at underground space as a last resort, as the spatial relief valve that can for one last time help to free space at the surface.

Although ITACUS feels very strongly about the use of the subsurface, the committee realised that this could not be achieved by engineers alone. For this reason, ITACUS reached out to ISOCARP to make planners aware of the subsurface and its role in urban planning. Both organisations feel strongly about engaging with young professionals. ISOCARP has an excellent track record in this respect. Through our cooperation in organising Young Professionals Think Deep Program workshops, we try to revive the underground urbanism that inspired French architects and planners in the previous century. By combining engineers, architects, urban planners, urban designers and geologists into one workshop, we are pushing the boundaries quite a bit. Our thinking is that this is the only way to create a vision on the use of urban underground space; it is the only way to come to an integrated use of the subsurface without one use claiming the space as its own.

The Glasgow YPTDP workshop was the first of its kind. We all experienced that and felt it in the air at times. It takes a lot of blood, sweat and at times tears to try to understand fellow professionals from other countries and across disciplines. At the same time, the workshop proved to be the perfect setting for thinking off the beaten paths, for leaving the comfort zone of your own box and entering a new world where interesting developments are possible. And that is just what Glasgow needed and what ITACUS and ISOCARP want to achieve.

An urban underground future is not going to come about by itself. It needs dedicated professionals who work with their peers in seeking opportunities and bringing them to fruition. With the Glasgow YPTDP workshop, we have taken a step in what may well prove to be the single most important contribution towards an urban underground future for our cities.

Han Admiraal
ITACUS Chair



INTRODUCTION

TOPIC AND AIM OF THE WORKSHOP

Nadya Nilina

RETHINKING THE CLYDE WATERFRONT

Connecting the infrastructure development into integrated above and below ground urban design for the brownfields redevelopment schemes

The topic of the workshop was the urban space of the Clyde waterfront east of the Glasgow City Center.

Primary Objectives

There were three primary objectives of the workshop:

1. diagnose the existing conditions at the Clyde waterfront – problem statement
2. develop a desirable alternative future scenario, or multiple scenarios–future vision
3. propose planning instruments and interventions, appropriate to the situation – action recommendations

1. The first objective of the workshop was to survey and analyze the existing conditions of the Clyde waterfront from the point of view of its functionality and amenity for the city. Despite the shortage of time, the basic diagnostic procedure had to be performed to help participants identify key spatial problems and to be able to describe its character. The evaluation had to be based primarily on individual perception—that very essential, yet often overlooked tool of urban planning. Additional information could be gleaned from on-site interviews, stories conveyed by the local participants, and information provided by the city council and other sources.

Several basic objective and subjective questions had to be asked about the site.

Functionality:

Is the waterfront well used? Who is it used by and for what purpose? What takes place there – important buildings, spaces?

Accessibility:

Is it part of the continuous urban morphology or an isolated space, disconnected from the rest of the city? Is it easily accessible or difficult to reach? Can one walk, jog or ride a bike along it continuously?

Image:

Does it contribute to the positive image of the city, or is it a liability more than an asset? Does it inspire a sense of civic pride, or is it rather embarrassing? Is it easy or hard to orient oneself and to navigate to and along the waterfront?

Experience:

What is the experience of being on the waterfront? How does one feel being there? Is it a welcoming space or a hostile territory? Is it safe and does it feel safe? Does one feel overly exposed to the elements or protected and comfortable?

Physical character:

What is the essential character of the space? Is it an essential part of the city or a left-over space with an uncertain purpose?

Social significance:

Does the waterfront convey the historic narrative of the city? Are there elements of heritage, collective memory, industrial past or significant events that are worth keeping and celebrating?

Metaphorically speaking, does it act more as a living room or is it rather an attic (where one stores useless junk in perpetuity)? Is it attractive for kids and the elderly? Are there attractors along the waterfront that bring people there? Is there anything interesting and worth seeing?

Spending time on the site and answering these and other questions helped participants identify specific concerns faced by the city and the waterfront. An insightful tour led by Gillian Dick of Glasgow City Council, helped us understand the nuanced social situation around the site, particular problems affecting the neighborhoods as well as their history and traditions. One of the groups conducted a set of brief interviews with the people at the waterfront.

Put together, knowledge, intuition, first impressions and further research added up to a comprehensive problem statement—the first step towards envisioning an alternative future. Severe spatial isolation turned out to be the defining characteristic of the waterfront today. A number of significant spatial obstacles were identified between the city and the waterfront and along the waterfront. The architectural character of the waterfront was defined as “disconnected objects in space.” The experience was judged as far from attractive.

2. As soon as the the key issues became clear, participants moved on to the second objective – shaping an alternative vision of the future. That vision singled out the waterfront as a central space, a “living room” of the city. A well connected, well integrated space that gives a new civic identity to Glasgow. A space that brings people together and offers an unprecedented amenity – a space for recreation, a space for daily commute, a space of enjoyment, history and pride.

3. To define the path towards the realization of this vision, the participants created a set of recommendations – spatial interventions that could be implemented over several years. These recommendations revolve around the most important single purpose: reconnecting the waterfront with the city. Reconnecting by way of calming the highway that currently severs the waterfront, removing obstacles, enhancing the quality of space. Another set of recommendations addressed the adjacent community and offered ideas about social cohesion by way of creating an engaging practice-community agriculture.

Secondary Objectives

This workshop was unique. It brought together engineers with the expertise in underground infrastructure and urban planners that typically address the above ground spatial conditions through design and policy. To take advantage of this exceptional composition of participants, the secondary set of objectives was to develop an analytical and planning methodology that can be used jointly by the urban designers and engineers. In other words, the process of working together was itself an intelligent experiment aimed at establishing a methodology for cross-disciplinary cooperation.

In addition, engineers introduced valuable planning options - envisioning underground connectivity scenarios. This significantly enhanced the tool palette and created ambitious additional ideas.

It is safe to say that all objectives of the workshop were met. Participants gained an important experience of cross disciplinary cooperation, of working with a real site and a real set of issues, of working under a very tight deadline in a charrette mode, of working with colleagues from all over the world, of producing coherent, well-argued proposals in a very short time and, of course, presenting ideas to the real client. In addition, the experience of engineers and planners working together was very valuable and demonstrated a potential way forward in addressing waterfronts and other urban areas in many cities.

WORKSHOP METHODOLOGY AND PROGRAM

Karolina Krosnicka

METHODOLOGY AND PROGRAM

The workshop adopted the interactive method, used frequently in the practice of spatial planning, facilitating the search for an “outside of the box” approach or for unobvious answers to problems identified by local experts. For the joint ISOCARP and ITACUS Glasgow workshop, the vast area of the River Clyde waterfront was (and still is) a subject of a long discussion. The group of young planners and engineers coming from 19 countries were asked to support the City of Glasgow with their objective, external view, and with “fresh” ideas for developing the area of the Clyde waterfront.

The planning process usually includes the following steps: a vision (answering the “what could be done?” question), a revision (“what is really possible?”), and a project (“how to implement it?”). The possibility of implementing even the most creative vision needs to be first reviewed by professional analysts in terms of its reality and profitability, and then, finally designed. In case of the joint ITACUS and ISOCARP Young Professional’s “Think Deep” workshop in Glasgow, the decision to create interdisciplinary teams of people with different professional backgrounds ensured an initial removal of unrealistic proposals. The groups were formed according to a rule: an urban planner, an architect, two engineers of different specialization (traffic engineer, tunnel engineer, geologists etc.), and one person having one of the above professions from Glasgow (supporting the others with information about the local conditions of the site).

The workshop itself is usually a series of brainstorming exercises, resulting in a vision of development for the area. The style of brainstorming depends on the experience and personality of the participants. In Glasgow, the groups were given the freedom to choose a method of work, which took the following forms:

- discussion based on setting strategic targets (“G.L.A.S.G.O.W” group)
- discussion based on SWOT analysis (“Urban garden” group)
- discussion based on a target ‘user’ of the proposed solutions – a model person (group “Welding the Weegie Waterfront”)
- “Understanding and designing by drawing” approach – discussion based on the redrawing of maps and plans, the production of sketches and of drawings (groups: “Clyde Connections” and “The Clyde Boulevard”).

Figure 1
Group “Welding the Weegie Waterfront” at work (left). Common discussion (right).



Discussions were structured from the global (the scale of the city and its region) to the local scale (the area of the Clyde waterfront), and all the way to the scale of the urban detail (a specific urban solution for a particular place). While most discussions were unstructured and open, several groups tried to structure individual opinions using Post-It notes. One group decided also to use in situ interviews in as a tool of collecting the opinions of residents. The group work received constant support by representatives from the City of Glasgow.

The workshop program organized five days of intensive work (24th– 28th of October). The participants gathered already at 23rd of October (Sunday) for a dinner at the Centre for Contemporary Arts in Glasgow.

Monday 24/10/2016	Tuesday 25/10/2016	Wednesday 26/10/2016	Thursday 27/10/2016	Friday 28/10/2016
city presentations	work in groups	work in groups	work in groups	work in groups
site visit	review 1	review 2		final presentation
forming of groups	individual group site visits	work in groups		
work in groups	work in groups		review 3	

Figure 2
Program of joined ISOCARP and ITACUS Glasgow "Think deep" Program

During the first day of the workshop (24th October 2016), participants were provided with extensive information about the Clyde Waterfront. The presentations were delivered by:

- Cathy Johnston (Glasgow City Council), *Planning for a Healthy, Sustainable Vibrant and Resilient City*
- Chris Burrows, *Delivering the river strategy: City Deal waterfront and West End & City Deal*
- Donald A Linn (Senior Geologist, Glasgow City Council), *Glasgow geology overview*
- Ian Kelly (DRS Project Management & Design, CAD and BIM Group), *Developing integrated above-and-below ground approaches for Project design – trying to unlock challenges and development.*

Later on, participants took part in a study visit from the Glasgow city center to Govan, guided by Gillian Dick (Development Plan Group, Development & Regeneration Services, Glasgow City Council). In the afternoon, participants were divided into groups and started working on materials prepared by the municipality

The first review took place in the afternoon of the second day. The comparison of observations and preliminary results presented by particular groups revealed the impossibility of merging the proposals into a one common, coherent vision. After an intensive discussion with the help of the ideas board (fig.1, right), there was a tendency to want to split into groups by disciplinary expertise – participants considered re-grouping according to their professional background (specialists on green infrastructure, technical infrastructure, urban planning, etc.). A danger of losing the multidisciplinary approach appeared. There were also questions concerning land-use intensity and profitability of underground investments. The review helped to redefine the problem—the Clyde waterfront was found to be too large to be developed as one lot, and to have only one possible option (and at the same time a vision) for development. Nevertheless, the group investigations pointed to specific areas that seemed to be triggering points for further growth of the site. These areas were first of all transfer spaces enabling to overcome existing barriers: passages to the other side of the river/road/railway line. So each of the groups mentioned bridges, ferries, tunnels.

Following the review, most groups found it important to make a second site visit to collect additional information about the site, and to compare the data received from the city representatives with the reality on site.

The third day's review revealed progress in the groups' concepts. Occurring in all the proposals were common directions of development for the Clyde waterfront, which permitted the drawing up of joint recommendations for the whole area, complementing the wealth of ideas for particular locations. The review at the end day four of the workshop was more of a technical character, aiming to prepare a coherent narrative for the final presentation to the Glasgow City Council the next morning.

The work of teams was constantly assisted and supported by Helen Bonsor (NERC KE Fellow - Accessing Subsurface Knowledge, British Geological Survey, Edinburgh) and Gillian Dick, who provided information on local conditions and directions of development of the city of Glasgow. Together with Cathy Johnston (Group Manager, Development and Regeneration Services Glasgow City Council), they supervised the course of the YPTDP workshop.

PROBLEM STATEMENT

Nadya Nilina

PROBLEM STATEMENT

The key problem of the waterfront was defined as “spatial and semantic disengagement of the site with the rest of the city”—a “left over” space, rather than a coherent part of the urban morphology.

In addition, the waterfront is composed of an unrelated set of buildings and disconnected spaces, rather than a continuous promenade that takes advantage of the beauty and expanse of the river, the views and the historic heritage of place.

This historically rich site does not reveal its history. Its narrative is incomplete; history gone, lost, forgotten. The site is robbed of its identity. With the exception of the Finnieston Crane, nothing conveys a sense of its heroic past. Nothing inspires pride or, at least, makes it a unique, unforgettable space. What a shame! The Glasgow waterfront has an amazing history and an incredible social significance.

Thus there are several problems: spatial problems, problems of identity, lack of programming.

The first spatial problem is the lack of continuity along the waterfront and the insufficient connections between the two sides of the river. The river currently severs two halves of the city, rather than connecting them. An amazing quality of the river and the vast open space it offers is lost due to the poor quality of the promenade. It is simply not attractive or special in any way. The river's edge is not treated in a way that would emphasize its quality, make one want to stop and contemplate the river, enjoy the views, and breathe in the fresh air. The space is purely utilitarian and, as such, is not very appealing.

There is an inherent conflict of uses: Bikers, walkers and joggers are pushed into one poorly articulated corridor that is interrupted by parking lots and other barriers. The physical barriers along the promenade make it difficult to enjoy its full length.

The river and the waterfront are also cognitively very far from the city. There are few signs, landmarks or other orientation devices that invite people to the river or at least mark its presence. Despite the dramatic topography of the city, the awareness of the river is minimal.

In addition, unsurmountable spatial barriers, such as the Clydeside Expressway and numerous enormous parking lots surrounding the disconnected waterfront buildings such as the Scottish Exhibition and Conference Center, add up to a confusing, unpleasant and disorienting experience. Even the Riverside Museum, intended to revitalize the waterfront is so hard to access that it defeats its own planning purpose.

Lack of clear spatial connections to and across the river fragments the city, disconnects the neighborhoods, and creates vast cognitive distances. The mental map of the city becomes a series of episodes, rather than an easily inhabited, connected space, easy to navigate and providing a sense of belonging.

Being on the waterfront is not a romantic experience one would want to repeat many times over, but an ordeal. Navigation is obstructed. One is exposed to the elements. There is very little reason to be there.

These problems can and should be solved with spatial interventions, but they will require extensive stakeholder collaboration that begins with the acceptance and the acknowledgement of these problems as essential.

CASE STUDY AREAS

URBAN STRUCTURE

Jamie Shields

THE CLYDE WATERFRONT

Figure 1
(Willie Miller Urban Design)
Urban Characteristic Areas

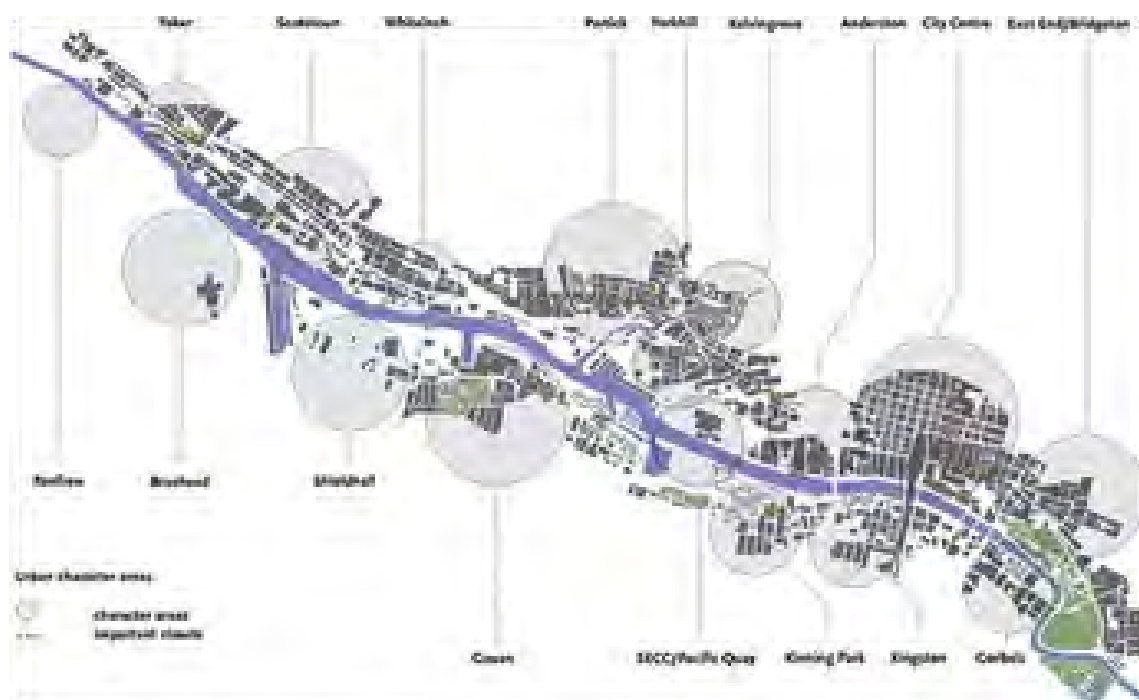


Figure 2
(Willie Miller Urban Design)
Clyde Waterfront Zones

The River Clyde has always played a fundamental role in the life of the City of Glasgow. From the industrial boom in the 19th century to the mid-20th century, the Clyde was one of the great industrial and shipping centres of the world. This economic activity existed side by side with dense urban communities. However, from the 1960s onwards, a process of industrial decline and demolition of traditional housing areas caused a rapid collapse in the urban fabric of this once famous waterfront area. During the 1980s and 1990s a model of regeneration was adopted, which sought to counter the negative effects of this economic collapse. Throughout the 2000s, this strategy had some notable successes, with the BBC relocating their Scottish headquarters to Pacific Quay, for example. However, with the onset of the global economic slowdown and recession in 2008, the pace of Clyde waterfront regeneration has slowed. The public sector has made some key interventions with the construction of the Riverside Museum and the SSE Hydro arena acting as examples of successful visitor attractions. However, the rate of private sector investment has stalled and there is a need for a new strategy that can unlock the potential of the Clyde waterfront for the Glasgow city-region and for the country. See Figure 1 (Willie Miller Urban Design) for existing Urban Structure and Figure 2 (Willie Miller Urban design) for existing Zones.

Glasgow West Economic Study

Studies will help identify and deliver the priorities of proposed Glasgow Economic Commissions by creating a rationale for sectoral growth opportunities on the Western and Yorkhill sites as well as regeneration options for the surrounding Church Street Triangle/Byres Road area. There are existing City Deal projects that aim to deliver the required site remediation, access and public space improvements required to maximise the GVA potential of the Clyde Waterfront area.

Pacific Quay

Scottish Enterprise has invested within the Pacific Quay area over the past decade with a focus on creating a 'Digital Media Quarter' for the city. The aim has been to deliver a vibrant centre for media, technology and creative business in Scotland. The momentum of regeneration gained a major boost when the BBC moved its Scottish headquarters there and this continued with other media and technology firms locating in the area. Recent investigations noted poor connectivity to public transport and poor pedestrian circulation as critical constraints limiting the development potential of the remaining two sites: **Festival Park** and the **Canting Basin**. More detailed analysis is required to identify potential infrastructure investment recommendations to relieve both constraints and bring forward site development for related commercial uses. A cohesive approach between Council Services and the Private Sector is required to ensure the creation of a Clyde Waterfront Masterplan that will fit with the 'Creative Clyde' concept developed by Scottish Enterprise to meet an identified need to set Pacific Quay in wider context and to promote its location as an international investment and business hub.

Scottish Exhibition and Conference Centre Complex (SECC)

The SECC is one of Glasgow's major visitor attractions as a concert, events and international conference venue. It is a key focus of both River Clyde Corridor regeneration and the City's Economic Strategy. Built in the mid 1980s, the complex was added to with the Clyde Auditorium in the 1990s and in 2015 by the SSE Hydro. The SSE Hydro is now listed in the top five entertainment venues in the world. It houses a range of ancillary facilities in the east of the complex, including hotels, multi-storey car parks and commercial uses and, to the west, a large car park site that is currently surplus to requirement. The development potential of the SECC West site is currently constrained by the Clydeside Expressway, poor pedestrian and cycle access and site remediation costs. Further investment is required to unlock the site's economic potential by addressing these constraints, which will also improve connections to adjacent areas.

Glasgow Harbour

Glasgow Harbour was a flagship project for the city's waterfront regeneration in the 2000s. Plans included developing the 130-acre site owned by Peel Holdings in three phases. The first phase of residential development is complete, but development of the remaining phases, which include residential, retail and leisure uses as well as a bridge spanning the River Kelvin, has stalled. This area should act as the core of the regeneration area, as a binding mechanism linking surrounding urban infrastructure and places of interest. Unfortunately, due to poor connections and limited public transport facilities the area is largely isolated and underutilised.

To the south of the River Clyde lies the former shipbuilding community of Govan. This area has suffered severe deprivation as a result of de-industrialisation (among the 3% most deprived data zones in Scotland). Govan requires huge investment in streets and buildings, new businesses and commercial space and mixed-tenure residential development to ensure that it becomes a sustainable working community. The area does however benefit from its rich history, exceptional historic built environment and riverside location. Some 500 new homes have been built to boost the population by nearly 2000 people, and 28,000 square feet of historic floor space has been brought back into commercial and community use and significant improvements have been made to the public realm and historic built environment. If Govan is to capitalise on the markets produced by its immediate neighbours—the Hospital, University and Pacific Quay—then it needs not only to be physically connected to these places but also to be attractive in terms of its physical environment, offer and culture. These objectives can be met by transforming key derelict sites and vacant floor space into commercial and residential areas, improving access to employment opportunities, environment quality to attract new business, residents and visitors, and increasing footfall through the currently isolated area for economic gain.

HISTORY AND HERITAGE

Tierney Lovell

HISTORY OF THE CLYDE

The River Clyde has a unique place in the history and development of the City of Glasgow. It lies at the geographic centre of the city and was instrumental to the success and development of Glasgow's prosperity and identity. In recent years, however, it has ceased to be associated with the economic and social heart of current city life.

The river has been at the centre of a radically dynamic process of urbanisation and industrialisation, followed by an equally intensive process of de-industrialisation and loss of urban population and social functions in the neighbouring communities. The River Clyde has dramatically transformed in form and function over the last 200 years. Broadly speaking this can be understood in three periods:

- Pre-industrial – Up to about 1800;
- Industrial – From 1800 till about 1970;
- Post-industrial – 1970 to present day

Figure 1
The first map of Clydesdale showing Glasgow's formation next to an important river crossing.



Pre-industrial

The River Clyde has always been central to the history of Glasgow, starting from the city's early days as a religious settlement, founded by the Christian missionary Saint Mungo. The city was established in its particular location as a result of its proximity to a natural crossing point over the Clyde, which is evident in early maps of the city showing the town's central spine growing along the axis of the river crossing. The first church (now Glasgow Cathedral) was also established not far from the banks of the river on the Molendinar Burn, a stream connecting to the Clyde. Glasgow was one of a series of settlements located along the banks of the river, along with neighbouring Govan (once a substantial independent settlement that pre-dated Glasgow, but now within the City's boundaries) and Gorbals to the south.

Subsequently and to the west of the original town centre, (around present-day High Street), grew the Merchant City. Before the industrial revolution and by the 16th Century, Glasgow had become a centre for international merchant shipping. Its wealth grew from trading goods such as tobacco, cotton and sugar, fuelled by the slave trade and shipped across the Atlantic from the Americas to be sold throughout Europe. This was enabled by the de-silting of the Clyde in the 1770s which allowed bigger ships to navigate further up the river and towards the growing city centre.

Industrial

Glasgow became a hub of international significance during the Industrial Revolution. By the early 20th Century, one third of all shipping tonnage in the world was being constructed on the River Clyde. The sheer scale and intensity of this activity was the heart of the city's industry and a great source of pride. Many thousands of Glaswegians would come down to the river to see the launch of new ships and, at its peak, the industry employed almost 70,000 workers. The phrase 'Clyde built' became famous worldwide for craftsmanship and quality and produced ships such as the world-famous Cutty Sark, RMS Queen Mary (once providing the fastest Atlantic crossing between Southampton and New York), and the luxury cruise liner the QE2.

The construction of the quays for this industry was a significant feat of infrastructural engineering. Between 1801 and 1881, the quay length grew from 349 metres to nearly 7.7 kilometres¹. Indeed, west of the Clyde's tidal weir (at Glasgow Green) the character of the river within the city boundary is almost entirely defined by the human interventions that have taken place since the start of the industrial era.

However, the river was not only the site of industry—during the industrial period, the phrase sailing 'doon the water' was commonly used in relation to ferry trips and leisure activities along the river. Glaswegians would come down to the River Clyde to take steamer ferries out of the city for cruises and day trips towards the countryside to the west, and to resorts such as Rothesay and Dunoon. Only one sea-going paddle steamer remains (the Waverley), which still takes Glaswegians on trips west every summer.

The Clyde was also a hub for immigration and emigration to and from Glasgow, with many people arriving or departing via boat, often setting sail across the Atlantic for a new life in America or Canada, or making the journey to Glasgow from Ireland in the 19th and 20th Centuries.

During the Second World War, the Clyde became a target for German bombing, and while the Luftwaffe bombing in 1941 did not significantly damage industrial sites as it had targeted, it nonetheless resulted in a significant loss of life and the destruction of built housing stock around the Clyde.

Post-Industrial

By the early 1970s, the financial security of the shipyards was in doubt and the industry collapsed. As a result, the Clyde became a focus for workers' protest and campaigning against redundancies. Particularly famous among these was the Upper Clyde Shipbuilders' protests led by Jimmy Reid and Jimmy Airlie, which were successful in retaining a number of jobs along the river, and a source of great pride to many Glaswegians.

Recent history

Recent decades have seen significant regeneration of the river corridor. This has been driven by an approach to waterfront renewal based on developing Glasgow's role as a service economy centre and developing its residential offering. Key milestones within this post-industrial period of renewal include the Garden Festival in 1988, the development of the SECC complex including the Hydro, the development of the International Financial Services District at Broomie law, public

Figure 2
Jimmy Reid addressing shipyard workers in 1971



realm and infrastructure investment, new bridge crossings, cultural facilities such as the Riverside Museum and new residential development, such as at Glasgow Harbour, which has resulted in a partial renewal of some areas of the river.

While this approach has had some success, spatial development and urban form in significant parts of the River Corridor remain fragmented. There is also limited activity on the water itself. Large areas of the river corridor remain challenging for development due to the wider economic situation and the legacy of spatial issues. The economic collapse in 2008 delayed many of the projects that were to be delivered under the umbrella of the Clyde Waterfront Strategic Partnership of 2003.

Aerial photograph of the Garden Festival in 1988, on the site of what is now home to BBC Scotland and the Glasgow Science Centre. The Garden Festival was held to help regenerate post-industrial land and welcomed more than four million visitors over the course of six months.

Figure 3
STV news archive image from 1988, uploaded to STV news website September 30 2014



Some highly skilled shipbuilding industries remain on the Clyde, mostly at the BAE systems Govan shipyard, where a new programme for building global combat ships has been announced for 2017. There is also a renewed focus on the Clyde by Glasgow City Council, which is looking to revise its River Strategy as a key component of the £1.13 billion City Deal infrastructure investment plan that is proposed over the coming years.

Urban form

As a result of decades of post-industrialisation, issues of contaminated land and land ownership constraints, the urban form along the waterfront is often fragmented and lacking coherence. There are a few historic structures remaining (most famously the Category A listed Finnieston Crane), although many historic buildings and industrial sheds have been removed with others being in a state of disrepair or categorised as 'Buildings At Risk'.

Furthermore, as a result of the intensive industry along the river, the past growth of neighbouring communities largely turned its back to the river. The City Council's Govan Conservation Area Appraisal describes how "the historic core of Govan is primarily inward looking as a result of the shipbuilding industry requiring all available access to the river for shipyards."

For an area so rich in history, it is remarkable how few traces of historic urban form is evident along the river and how little historic character has been retained in its built form. However, understanding the historic development of the Clyde and surveying the area's historic maps, it is clear that the Clyde has a rich heritage that should be celebrated and made more evident, and can provide a wealth of inspiration for future development and the evolution of the character of the river.

TRANSPORT SYSTEM AND INFRASTRUCTURE

Amy Campbell

TRANSPORT SYSTEM

Modes of transport and associated infrastructure in the research area are critical to the connectivity of the River Clyde communities and the prosperity of the City of Glasgow. The transport system within the research area is extensive, however it requires further cohesive management to improve the function of the overall network and its contribution to both the local communities and the wider West of Scotland area.

Considering the existing transport system, within a 16km radius of the city there is an international airport, an array of major road networks and bus routes. There are also two central train stations, Glasgow Central Station and Glasgow Queen Street Station, both serving over ground railway connecting the city to the rest of the UK. Further to this is the subway that operates as a loop around the perimeter of the city and interchanges with the over ground railway and the bus stations at both Partick and Buchanan Street. There are also many cycling routes and pedestrian zones in specific parts of the city. The transport system and infrastructure within Glasgow makes the city an attractive home for dwellers and businesses with many feeling they can access the best of a city without paying the premium expected within other UK cities. Considering each transport mechanism separately will provide a deeper insight into the existing fluidity of the city and the potential for further development to increase the opportunities available to the local communities, their inhabitants, and investors and businesses.

Air

Glasgow is within a one-hour drive of three international airports: Glasgow, Prestwick and Edinburgh. This provides extensive options for domestic and international travelling. Glasgow International Airport is within a 15-minute drive from the research area and is easily accessed by car, taxi and bus. The airport has 200 flights daily with thirty airlines serving over 100 destinations. There are over 300 flights to London per week and the flight takes approximately one hour. Much investment has been spent on the airport to increase the capacity and passenger comfort. It is a critical component in Glasgow's transport infrastructure and contributes to the appeal of living and investing within the Glasgow area.



Figure 1
Aerial view of airport with M8 to the South, and the River Clyde to the West.
Source; <http://www.glasgowairport.com/corporate>

Figure 2
Research Area with key features Source; <https://www.google.co.uk/maps>



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Road

Further investment continues to be undertaken on the road network. In the research area, significant improvement works were undertaken on the Clydeside Expressway to improve access for the Peel Port development areas and to enhance the local road network.



Figure 3
Peel Port Development Area with Expressway to the North-East.

The Clydeside Expressway is an important route, connecting the north and west of the city with the city centre, and linking to the motorway network and the Clyde Tunnel. The road works previously carried out improved the existing road network by creating a system that reduces congestion and improves the overall flow of traffic in the area. The Expressway is still very busy, and traffic numbers are predicted to increase considerably over the coming years. As the road facilitates commuters from a wide geographical area, the route requires advanced future planning to ensure that this area of the City is resilient to population increase and densification.

Through the road network, the Expressway connects with the M8 and the M74. These major roads facilitate access to the rest of the UK. Work on the M74 was undertaken in recent years with the aim to reduce journey times across Glasgow and improve the Clyde corridor. The M74 adjoins with the main motorway, the M8. This route is the busiest motorway in Scotland(1) connecting Glasgow and Edinburgh and bypassing Glasgow city centre. The M8 goes through the heart of the city within a box-like structure sunken from the surface at Charing Cross. Over the years, the road has appeared to define the point between where the city centre ends and the west end begins. There is a clear disconnection between these areas of the city stemming from the presence of a major road network running through the middle. Combined with the environmental effects, this may have triggered the proposals to develop a city park(2) as a covering roof to this section of the motorway.

Rail

Glasgow has the UK's largest suburban rail network outside London and its biggest rail station, Glasgow Central, has connections to all major English cities with a rail travel to London in 4 to 6 hours. Glasgow Queen Street station connects Glasgow to the East and North of Scotland including the major cities of Edinburgh, Perth, Dundee, Aberdeen, and Inverness. Edinburgh is within a one hour reach with eight trains to Edinburgh per hour from Glasgow.

The underground rail system, most commonly known as the Subway, has three city access stations at St Enoch, Buchanan Street and Cowcaddens. The other 12 stations serve key business, culture and leisure areas in Glasgow's west end. The subway



Figure 4
Underground-Suburban Rail interface with River Clyde



Figure 5
Kelvinhall Subway Station upgrade



Figure 6
Bus services and route within research area

trains run every four minutes at peak times and travel across the city in ten minutes.

Both the subway and the over ground network serve an expansive area and are widely used by millions of passengers every year. The presence of stations within a geographical area that are connected to this network adds value to the local real estate and businesses, demonstrating the considered value of the rail network to its users.

Extensive refurbishment works have been carried out at both the underground and over ground railway stations in and around Glasgow. These works encourage public use by creating pleasant spaces that enhance the overall transport experience.

Bus

In addition to the public transport provided by the rail network, Glasgow City Centre is served by 22 bus operators running over 170 daily services in and out of Glasgow to surrounding areas. This not only facilitates the overall public transport network, but also compensates for the absence in certain areas of nearby train or subway service.

Special bus services, which target specific areas or serve a certain purpose, add value to the public transport network. The introduction of the express bus, which improves the connection between the Whiteinch and Scotstoun areas and the city centre by bypassing the busy intercity streets and travelling directly along the expressway, is a key replacement for the missing train link in this area. There is also the designated airport bus and the Queen Margaret University Hospital bus with designated lanes to maintain the specified journey times.

Ferry

Kelvin Harbour is located to the west of the Riverside Museum at the mouth of the River Kelvin where it meets the Clyde. The harbour facilities include a slipway and berthing pontoons. The harbour is being used by the new Govan Ferry, by the Clyde Maritime Trust (for the berthing of its workboats and its collection of small historic boats), the Strathclyde Fire and rescue Service, the Sea Cadets, and the Seaforce Power Boat training centre.⁽³⁾ The ferry service started in June 2011 and runs regularly across the river. During a 24-week season, the ferry service carries up to 72,000 passengers.

The footbridge proposed as part of Peel Ports Glasgow Harbour development would create a permanent connection between Govan and Partick to serve both communities and once again create a connected River.

Cycling and Pedestrian

There are shared routes for cyclists and pedestrians around the perimeter of the River Clyde within the research area. These extend towards Clydebank and eventually The Trossachs in the west and the city centre in the east. There is not a clear course along the full length of the routes and to travel in this method requires some renegotiation of the obvious route to complete the intended journey. Figure 6 presents the cycle route which is the only designated route available for pedestrians and cyclists to travel between Partick and Govan. The river crossing is proposed through the existing Clyde Tunnel.

A footbridge constructed in recent years across the expressway has provided the users of Glasgow Harbour development with access to Partick and its available amenities and transport links.

The footbridge is actively used and provides a stronger link between the Glasgow Harbour and Partick and the West End. The improvements bring the train, bus and subway services at Partick within easy walking distance for the people who live at Glasgow Harbour. The bridge is also used by visitors to the



Figure 7
Govan Ferry Terminal looking towards Glasgow Harbour



Figure 8
Proposed Glasgow Harbour development

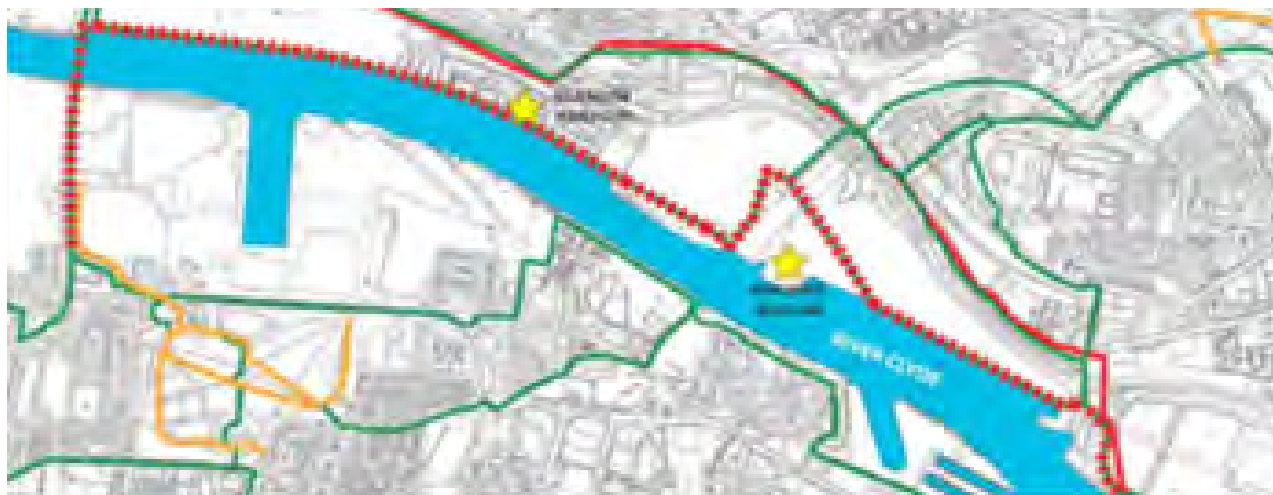


Figure 9
Riverside Cycle Link

Riverside Museum travelling via train or bus through Partick. The full intent of the footbridge however was to fully link the Glasgow Harbour development and create a fluid movement of users either living, working or spending leisurely time there. Due to the delay in the full realisation of the Glasgow Harbour scheme, the bridge remains underutilised.

Summary

Despite the vast array of transport amenities and infrastructure within the research area, there is a significant disconnect with the communities under direct consideration and the city as a whole. The present transport network has the potential to be further enhanced, benefitting the social, economic and environmental pillars of Glasgow's society. Delicate planning in realising the full potential of the transport network will ensure Glasgow becomes a fully cohesive city whose transport infrastructure enables it to operate as one community.



Figure 9
Expressway Footbridge

RIVER CLYDE - GEOLOGY & HYDROLOGY

David Grant

GEOLOGY

Glasgow and the Clyde Valley occupy a large central portion of the Midland Valley of Scotland: a geological rift valley bounded by the Highland Boundary Fault to the north and Southern Upland Fault to the south. These faults are not active and seismic activity is not a major issue within the study area.

Bedrock

The bedrock geology of the Clyde Valley itself is of principally sedimentary Carboniferous formations, which are about 300–400 million years old (MACFADYEN C. & GORDON J. 2006). The strata are typically characterised by repetitive, cyclical sedimentary sequences of sandstone, siltstone, limestone and mudstone, with thin bands of coal (NOWAK P. 2013. and Ó DOCHARTAIGH B É. 2005).

The carboniferous period is arguably the most important in Glasgow's geological history and crucial to the industrial development of the Clyde Valley and the City as we now know it. Several rock types formed at this time (MACFADYEN C. & GORDON J. 2006), including:

- Coal – the fuel which fired the industrial revolution.
- Ironstone – a key resource for the iron and steel industry
- Limestone – used in the steel making process, also baked in kilns in the production of lime mortar and plaster.
- Blonde Sandstone – used in much of the early construction in the City.

Additionally, igneous rocks in the form of lavas and tuffs, which were created simultaneously during the Carboniferous period, form the terraced plateau of the Campsie Fells and the escarpments of the Kilpatrick Hills. Igneous rock intrusions from later in the carboniferous period such as plugs, dykes and sills also outcrop (LAND USE CONSULTANTS. 1999).

Surface Geology

Glacial Erosion & Deposition

The actions of successive glaciations carved and sculpted the landscape. The differential erosion of these harder igneous rocks and the underlying softer sedimentary forms has played a significant role in creating the present day landscape. Complex, heterogeneous sand, silts, and clays were deposited by the glaciers across the Glasgow area within the Clyde valley. Much of the conurbation is built upon a series of drumlins deposited during the last ice age, and the topography they have created has influenced the pattern of settlement in Glasgow and the Clyde Valley. The main superficial deposits found within the study area are summarised below:

Till

Up to five metres of glacial till overlies bedrock along the study area (NOWAK P. 2013), normally comprising a matrix of clay, sand and silt with pebbles, cobbles and boulders. The till, deposited during successive glaciations, is often heavily compacted, over-consolidated and is assumed to provide good engineering properties.

Alluvium

Extensive spreads of raised marine deposits (sands, gravels, clays and silts) are present within the low ground adjacent to the present River Clyde (LAND USE CONSULTANTS. 1999) from periods of different sea levels during the glaciations.

The alluvium underlying the study area is generally between 15 and 20 metres thick, but can reach a maximum thickness of more than 30 metres in areas closer to the river (NOWAK P. 2013). The material is predominantly cohesive in nature, comprising very silty clay with lenses and partings of silt and fine sand (LAND USE CONSULTANTS. 1999). This marine alluvium can be more complicated to work with than the glacial till.

Made Ground

Made ground is generally thin (2m) but it can increase up to 6m around the docks and quay walls where the river has been artificially canalised. The made ground underlying the study area comprises predominantly waste material from industrial processes, generally encountered as sandy clay with brick, concrete and timber exotics (NOWAK P. 2013). Its thickness is likely to be highly variable across short distances throughout the study area.

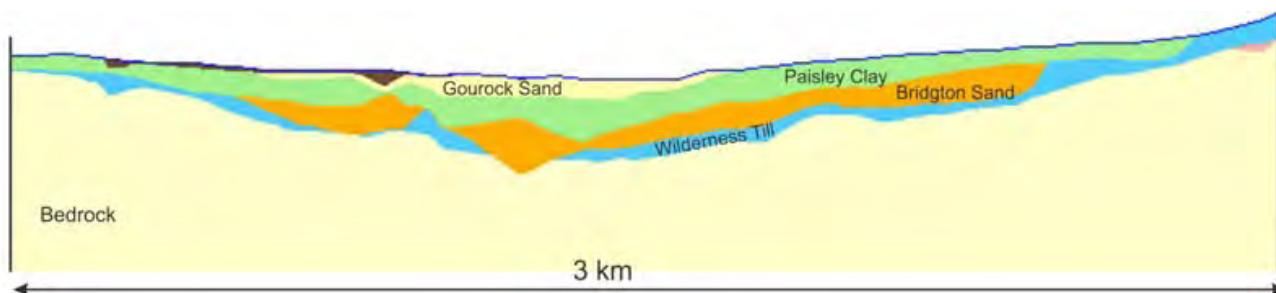


Figure 1
Cross-section across the River Clyde valley in central Glasgow

HYDROLOGY

The Clyde is the largest river on the west coast of Scotland and at 170 km, it is the third longest in Scotland. The catchment has a surface area of 3,200 km² (of which 26.3 km² includes freshwater lochs and reservoirs), and a total length of 4,244 km.

Groundwater

Groundwater has never been widely used for water supply in the Clyde Basin area, partly due to the abundance of surface water supplies and the lack of industrial use. A few boreholes extracted groundwater for industrial use during the 19th century, including three breweries. However, deteriorating groundwater quality, often due to the impact of mining, meant that groundwater abstraction was abandoned in favour of surface water supplies from Loch Katrine (Ó DOCHARTAIGH B.É. 2005). At present, acid mine water discharge is not currently a known problem in the Glasgow city area, and investigations at a number of sites show good quality groundwater in abandoned mine workings.

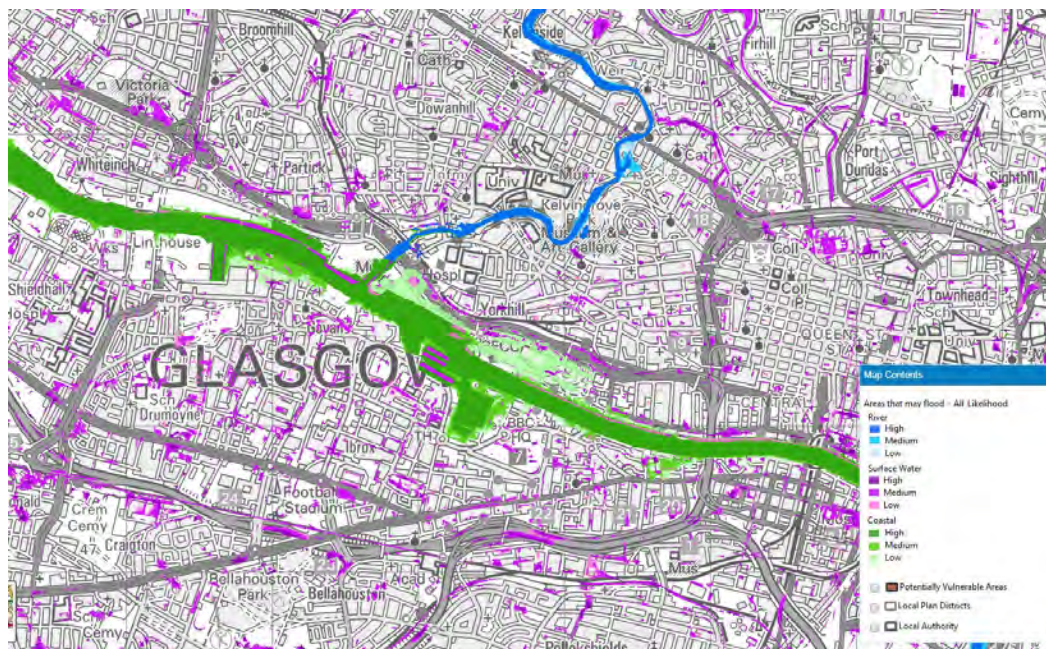
Studies have concluded that Glasgow is the focal point for much of the groundwater discharge from the central coalfield, with the prevailing groundwater flow from the east, northeast and southeast (Ó DOCHARTAIGH B.É. 2005). Depth to groundwater along the river study area is shallow – estimated to be less than 3 m below ground surface. There are no known problems caused by rising groundwater levels in the study area (e.g. flooding basements), but the lack of modern records of groundwater level in the bedrock aquifers means that current groundwater levels in the bedrock aquifer are largely unknown. Suitability of sustainable urban drainage schemes and underground infrastructure need to be carefully considered in the area due to the shallow depth to groundwater.

Tidal and Fluvial Influences

The River Clyde is subject to a tidal range of approximately 5 metres westwards from the tidal weir at Glasgow Green 3 km upstream from the proposed site / in the vicinity of the proposed site.

The hydrological environment is influenced by the fluvial, as well as the tidal system, and both contribute to the potential flood risk in the area. The flood hazard map (see fig.2 below) considers both environments in a 200-year event scale. Areas adjacent to the river are at risk from coastal flooding events. Large tidal swells have also been known to have an impact on the structural integrity of the quay walls, with several notable collapses in recent years. Surface water runoff from surrounding higher land with hard standing is also an issue. The Kelvin corridor is also susceptible to river flood events.

Figure 2
Flood Risk Map of study area



GREEN INFRASTRUCTURE

Frankie Barrett

GREEN INFRASTRUCTURE

Glasgow's vision for Green Infrastructure is anchored in the principles of place making and sustainable spatial development. These are core policy areas of the City Development Plan (Glasgow City Council, 2016) which mirrors the aspirations of the Strategic Development Plan (Clyde plan) to take advantage of the high impact offers of integrated green infrastructure measures. A key strategic outcome for Glasgow, as articulated in the Plan is the delivery of:

| **A green place which is resilient, accessible and attractive**

This vision recognises green infrastructure as a crucial enabler of the delivery of healthy, high quality places and a compact city form that supports sustainable development. As a member of the Glasgow Clyde Valley Green Network Partnership (GCVGN, 2016), Glasgow advocates that a green infrastructure approach is as crucial for city development as grey infrastructure, and is a cost-effective and resilient approach that delivers multiple benefits, which include naturalised water management, useable open space, active travel routes, habitats for wildlife and improved health outcomes (idem.)

Headline city-wide statistics associated with the coverage of green areas, blue/water areas and soil sealing is outlined below. The cumulative coverage of green space has increased by approximately 0.7% since 2009, mainly through the creation of new amenity spaces, community gardens and civic spaces. The blue/water areas have also increased by approximately 2%, due to the creation of additional wildlife ponds and improved surface water management through SuDS ponds.

- Population: 606,340
- Area of Glasgow City: 18,000ha
- Green areas: 4,828ha
- Blue/water areas: 429ha
- Publicly managed green areas: 4,051ha
- Private managed green areas: 829ha
- Soil sealing: 6,391 ha
- Residents living within 500m vacant and derelict land: 60%

The Sustainable Spatial Strategy (2015) of the City Development Plan positions the Govan/Partick area as a Strategic Development Framework (SDF) Area, a process that involves the examination of the local area and the identification of existing opportunities and challenges and of strategies for the application and coordination of interventions. At the same time, the waterfront, and Govan/Ibroy to the south of the focus area are spatial Green Network priorities for the CGVGN through the National Planning Framework 2.

Existing Green Systems

The existing green infrastructure in the Govan/Partick area is comprised mainly of:

- Parks and Gardens
- Private Gardens
- Outdoor Sports Facilities
- Amenity Greenspace
- Green Corridors
- Vacant and Derelict Land
- The River Clyde and River Kelvin

This section provides a local spatial commentary on each key element of existing green infrastructure as shown spatially in Figure 1.

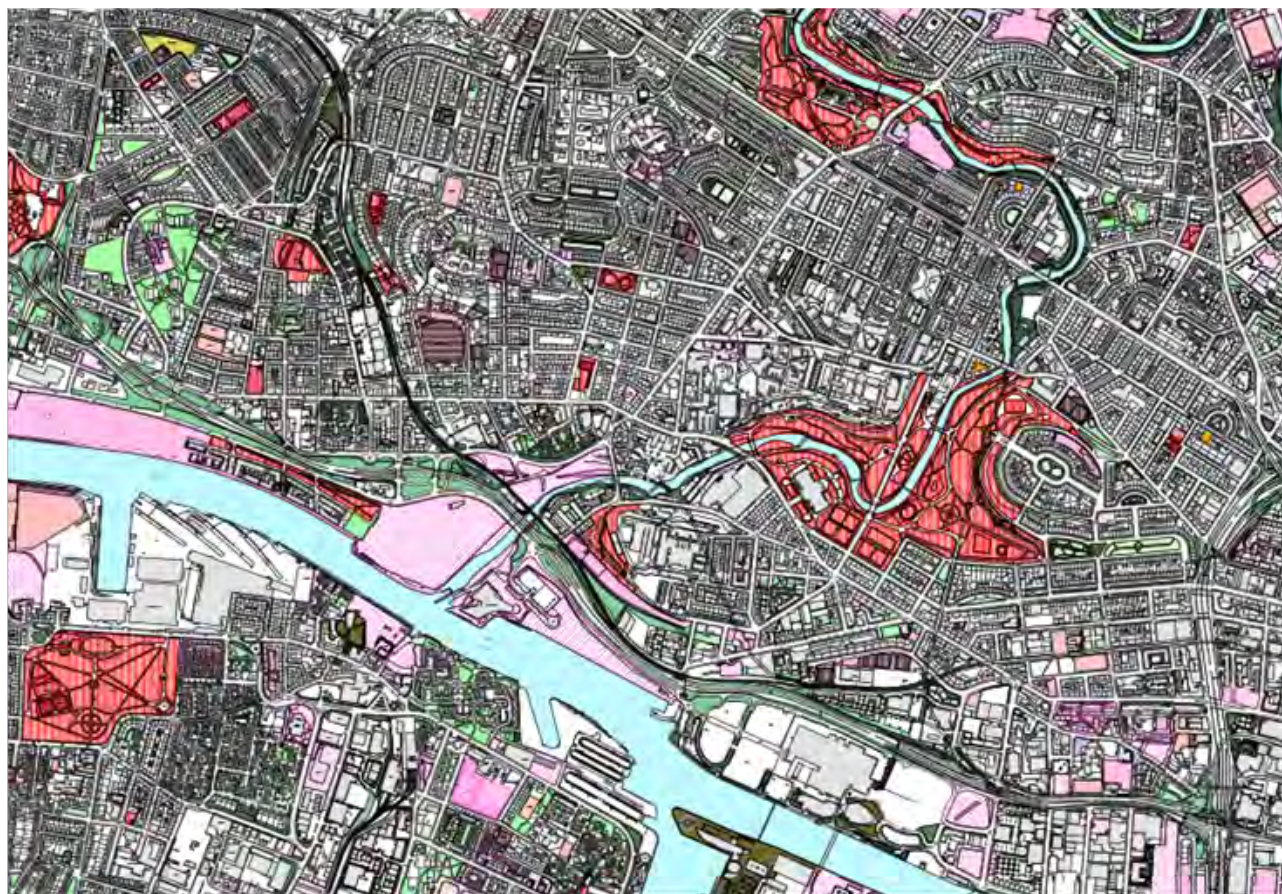


Figure 1
Open Space Map



Parks and Gardens

The Govan/Partick area has a variety and substantial quantity of parks and green spaces. To the north, Kelvin grove Park is one of the city's largest urban parks – covering an area of 24 hectares. The park, which is of Victorian design, is surrounded by some of Glasgow's most historical and culturally significant landmarks including the Kelvingrove Art Gallery and Museum, the University of Glasgow and the Kelvinhall. The park has Green Flag status, the benchmark national standard for quality parks and greenspaces.

The park is part of the River Kelvin corridor that connects with the River Clyde to the south and through to the Botanic Gardens, Kelvin Walkway and Dawsholm park to the northwest.

To the southwest of the study area is Elder Park. Another Victorian park covering an area of 37 acres, the park was established in 1885 by Isabella Elder as a monument to her shipbuilder husband. The park not only offers quality greenspace, but is also of significant importance to the heritage of the area.

The Festival Park to the southwest of the focus area is the only surviving ground of the 1988 Glasgow Garden Festival, which is associated with the beginning of Glasgow's cultural renaissance.

A number of smaller local parks and formal gardens exist, as identified in Figure 1.

Private Gardens

An estimated 59.6% of properties in the Govan/Partick area are either traditional tenements or apartments (GCPH, 2014), meaning that the area has a relatively small quantity of green space compared to similar sized areas in other cities in Scotland. Most of these gardens are privately owned and maintained.

Outdoor Sports Facilities

Several publicly owned outdoor sports facilities are found in Govan and Partick, which are mostly contained within the larger urban parks, local school grounds and the Drumoyne leisure centre – with either natural or artificial surfaces. These spaces include play parks, multi-purpose playing fields, tennis courts and bowling greens.

Both Govan and Partick each have a privately-owned bowling club, Partick the location of the West of Scotland private cricket ground, and Ibrox to the south of Govan is home to one of the City's football stadiums and training centres.

Amenity Green Space

In addition to the private gardens in and around the area, greenspace can be found most commonly, but not exclusively, in housing areas as communal greenspace. Much of this land is owned and maintained by housing associations or private factors.

Green corridors

The Clydeside Expressway running from east to west, parallel to the Clyde at the north side is defined by a green corridor. This corridor then joins the Clyde at the SECC/Science Centre complex where it straddles the river as a footpath and cycleway.

Other quality green space is made up of:

- The Govan Parish Church Cemetery
- Civic spaces in both Partick and Govan and other hard areas designed for pedestrians
- Community Gardens (there is one in Partick)

Vacant and Derelict Land

The largest areas of greenspace in the Partick/Govan area contain vacant and derelict land. Most of this land is fenced off as privately owned land considered unsafe for public access, presenting itself as urban blight and as a barrier to connectivity. This land, which is mostly of former industrial use, is concentrated around the banks of the River Clyde. Much of this space is infill and suffers multiple geotechnical and contamination issues, making it an unattractive option for developers. The majority of the land is outlined in the City Development Plan as being suitable for housing development, although only a small proportion has been the object of recent planning requests.

River Clyde and River Kelvin

The River Clyde is the longest river in Scotland, transecting the Govan/Partick community from east to west. The expansion of these two key ship building communities made the canalisation of the River Clyde possible, undertaken between the mid-18th Century and the 1830s. The river was deepened and narrowed to allow for large ships. During this time, the banks of the river were made firmer. The mouth of the river Kelvin, adjacent to the present-day location of the Riverside Museum and south of Kelvingrove Park was also canalised for industrial activity. Though much of the former docklands have been reclaimed, the rivers in the area have maintained their canalised and industrial form. The water quality of both rivers has improved significantly since the decline of industry.

Community Empowerment (Scotland) Act 2015.

It is worth noting that the Community Empowerment (Scotland) Act 2015, has the potential to transform the way green infrastructure in Glasgow is delivered. The Act seeks to facilitate:

- Stronger community planning processes
- Participation requests
- Asset transfer requests
- Right-to-buy of vacant and derelict land (Supported by the Land Reform (Scotland) Act
- Increased opportunities for community growing.

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FINDINGS

CLYDE CONNECTIONS

John Kenneth Suarez - Michael Doyle - Amy Campbell - Thato Motlhaping - Katarzyna Jasinska (Team 1)

CLYDE CONNECTIONS: OVERCOMING THE BARRIERS OF THE CLYDE

Combining expertise from architecture, planning and engineering, our team sought to develop a concept for the integration of the city fabric located on the north and south banks of the River Clyde. As the area of Clyde is strongly fragmented, the goal is to propose spatial connections, which can ensure spatial continuity and permeability. The project focuses on the existing cultural, social and spatial barriers, which cause disintegration, both between the two banks of the river and along its waterfront (fig. 1). In order to overcome the major obstacles, several specific design concepts are proposed and explained in detail below.

In developing our design proposals, we (along with our colleagues in other groups) established four main principles that would guide and inform our strategies (fig. 2): Integrating the city and the Clyde (a), activating edges (b), connecting the banks (c) and tapping into local potential (d). In discussing our proposals, we will return to these basic principles.

Figure 1

There are four problems our proposal addresses: a) the lack of permeability and discontinuity of public green/grey circulation (pedestrian and cyclist) spaces; b) a rupture in the continuity of the city fabric due to both the expressway and the River Clyde; c) the limited inter-bank connectivity; and d) the lack of surface and subsurface development integration.

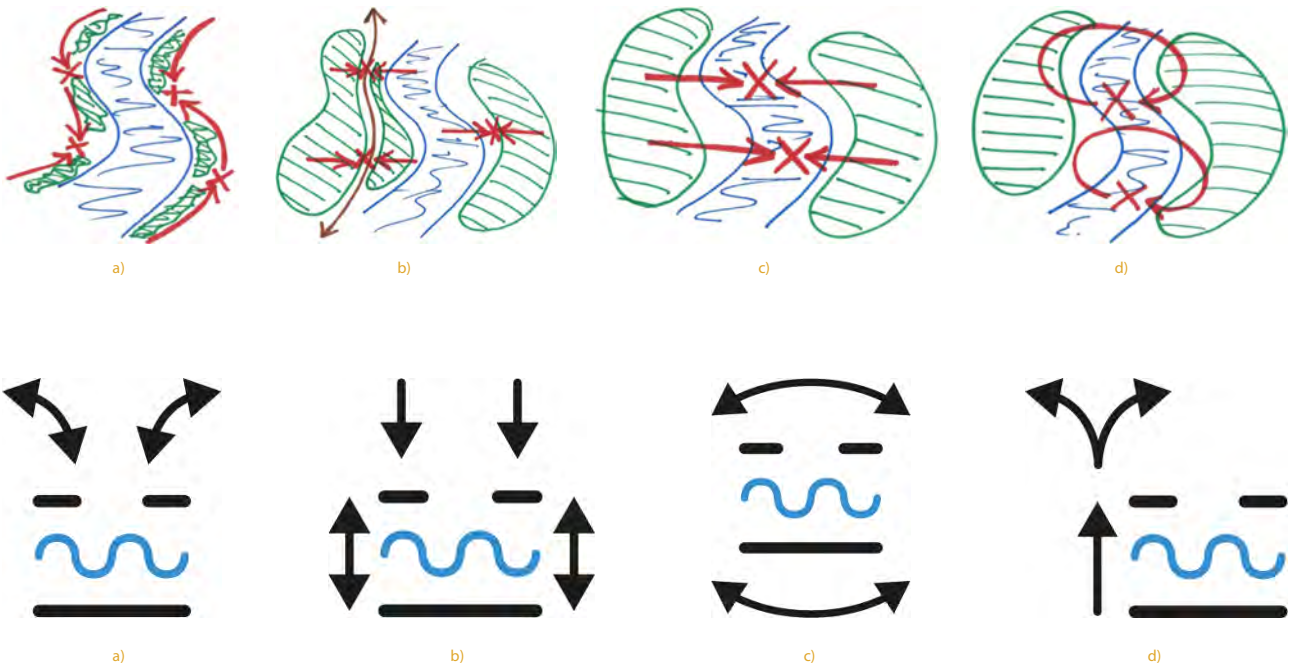


Figure 2

Diagrams (in an abstract section) representing four principles for addressing the relationship between the River Clyde, its two banks and the subsurface.

BURY THE EXISTING EXPRESSWAY

The existing highway, recognized as one of the major barriers in the study area, separates the residential areas from the waterfront and creates a lack of continuity of the urban fabric. Limited pedestrian accessibility to the river prevents a natural movement to the riverfront for passers-by on neighbouring streets. The space between the expressway and the waterfront is isolated, abandoned and consequently unattractive both for inhabitants and for potential future investors. In order to 'give back' or 'recover' this part of the city, our concept looks to the development of underground space in order to free up space on the surface and preserve unobstructed views on the River Clyde. We also propose to bury a section of A814 expressway in an underground tunnel and release surface for the creation of essential pedestrian connections and further urban development of the area. This will open the space for the new investment along the waterfront, which will aid in offsetting the costs of underground construction.

DEVELOP TUNNEL AND BRIDGE CONNECTIONS

The second concept addresses the problem of limited integration between the two banks of the river, which is an obstacle for communities living in the southern part of the city. Currently, the insufficient links hinder communication and mobility and increase spatial and social segregation (fig. 3). We propose the development of new connections—a new pedestrian tunnel, a new pedestrian bridge and the reuse and reinforcement of an existing one.

We focus on 3 key areas, for which we propose specific design solutions:

- 1. An underground tunnel** linking the Partick and Govan communities on either side of the river (fig. 4);
- 2. An open air bridge** linking graving docks and the area of the former site of the hospital (fig. 5);
- 3. The revitalization of an existing connection** and the areas adjacent to the Millennium Bridge (fig. 6).



Figure 3

The Partick and Govan neighbourhoods on either side of the River Clyde currently lack a direct local connection at the riverfront to travel between the communities

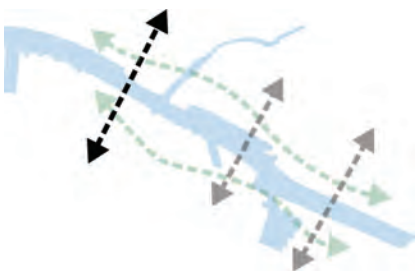


Figure 4
Proposed location of the underground tunnel

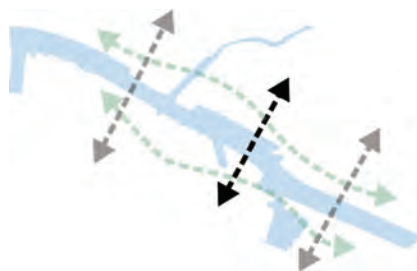


Figure 5
Proposed location of the open air bridge

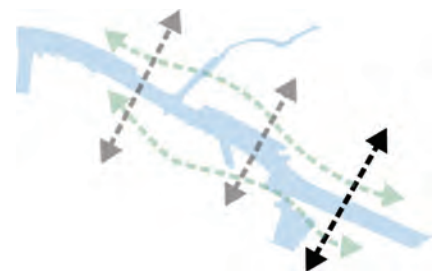


Figure 6
Millennium Bridge - the revitalization of existing connection

INCREASE THE VARIETY OF ACTIVITIES

Cross-river links provide easy access to both banks and can serve as focal points in the area. They cannot guarantee, however, that they enhance activities along the entire waterfront. To activate the banks of the river, we propose to improve the connections along the banks. To attract future residents and replace derelict land adjacent to and between (fig. 7) the public spaces between the existing buildings designated for public use (TheRiverside Museum, The Hydro, Armadillo and La Rotunda on the north bank and BBC Studio and Glasgow Science Centre on the south bank), we propose to create a sequence of interconnected green spaces (fig. 8). Higher permeability, provided by direct pedestrian connections, will enhance walkability in the area. The greenery will also contribute towards creating attractive space to live, work and relax. Finally, we suggest the introduction of mixed use development and complimentary infrastructure on the selected areas of both banks of the river (fig. 9 and fig. 10).

ADD/BUILD UP THE MIXED USE DEVELOPMENT AND COMPLIMENTARY INFRASTRUCTURE

In particular, we propose to:

- Increase density and diversity of activities along the riverfront with the development of mixed-use (residential/leisure/commercial) projects;
- Transform the graving docks into a recreational area with bars and restaurants; Create an eco-neighbourhood adjacent to existing Millennium Bridge on the south bank of the river.
- In order to accomplish this vision for the area surrounding the River Clyde, four strategies have been worked out that combine new and existing infrastructure and an increase in density and diversity of activities. From a site structured by barriers, our strategies propose to create a riverfront that, as a centre in itself, will complement and connect those of Partick and Govan.

Figure 7
Several sites along the riverfront have been declared derelict land and are slated for residential or commercial development



Figure 8
Proposed locations of interconnected green areas

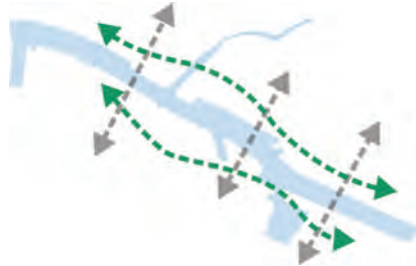
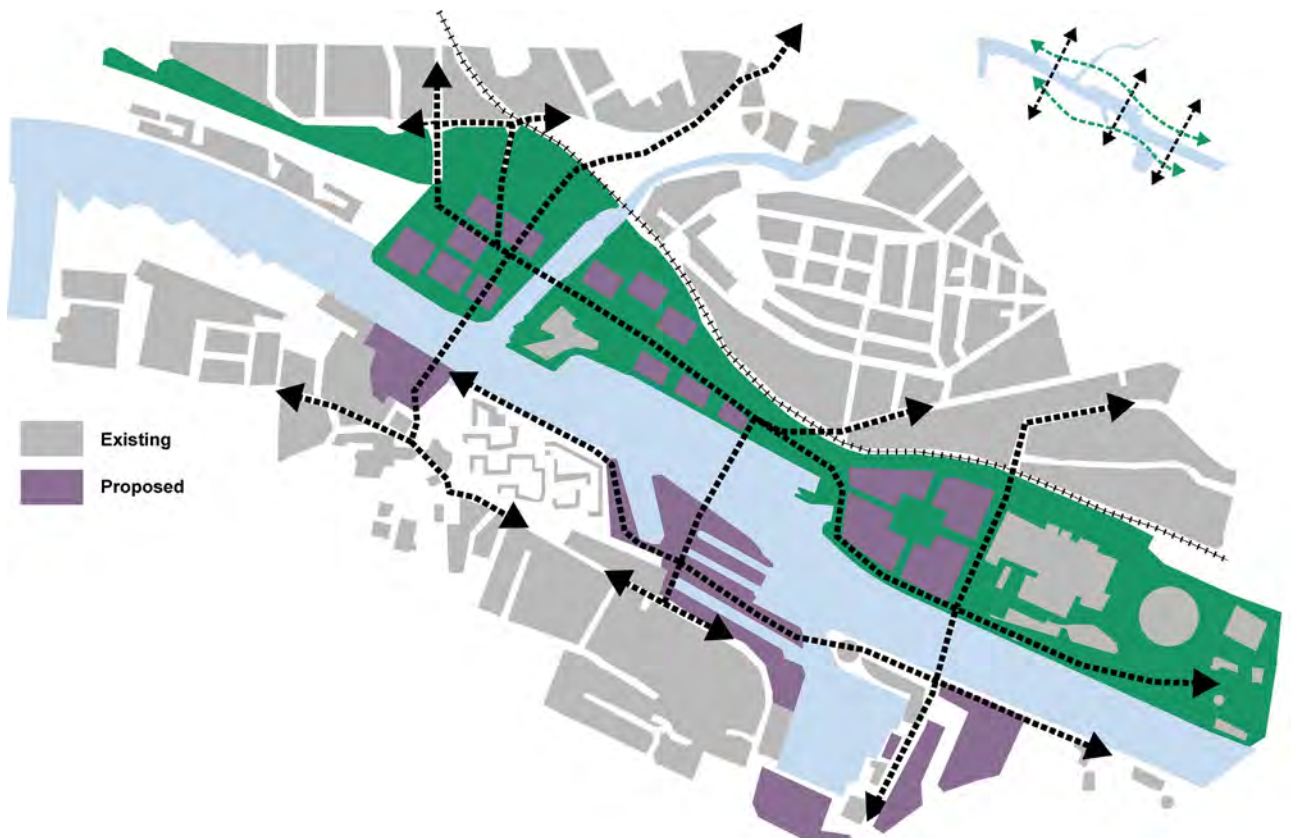


Figure 9
The overall vision with continuous movement networks parallel to and across the River Clyde



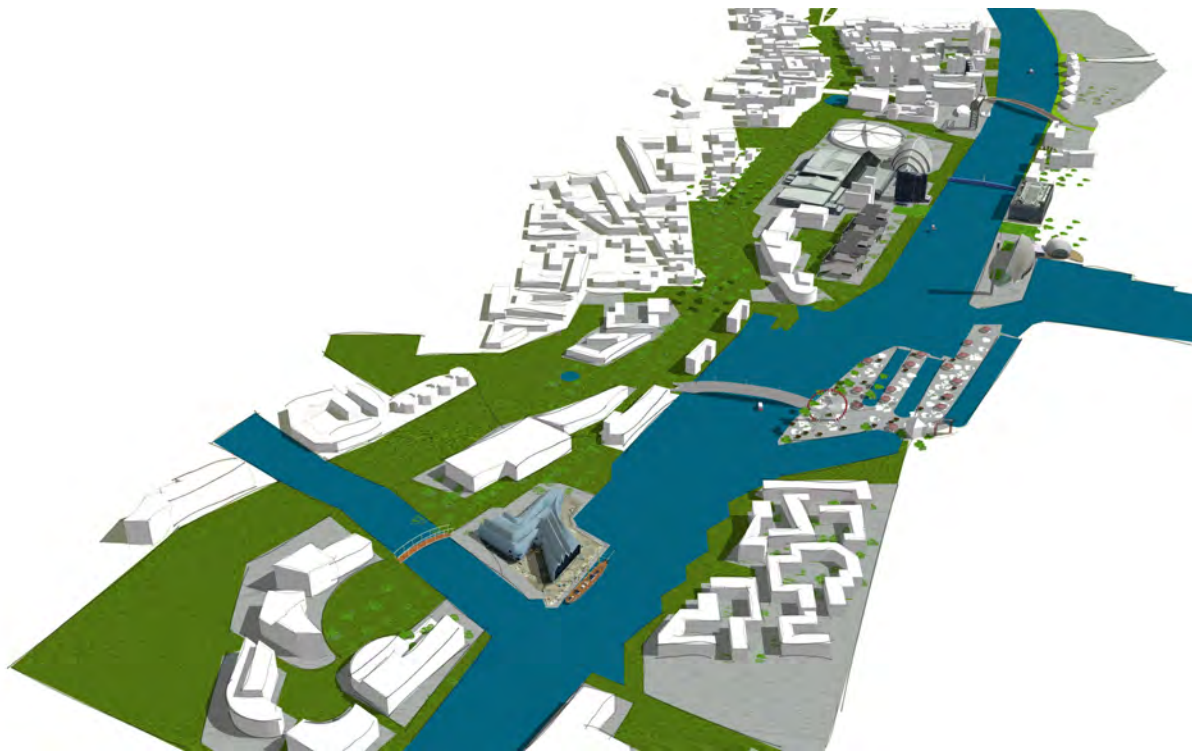


Figure 10
3D representation of the vision looking east over the River Clyde

Strategy 1: Creating underground connections

The main problem in this area is the obvious discontinuity of the communities in the opposite side of the river. People from the other side of the river cannot go directly on the other side because there is no existing connection. If we are to introduce community wide activities, this will be an obstacle. With this in mind, we are going to apply the principles of "Connecting the banks," "Activating edges" and "Tapping into local potential" to solve the problem.

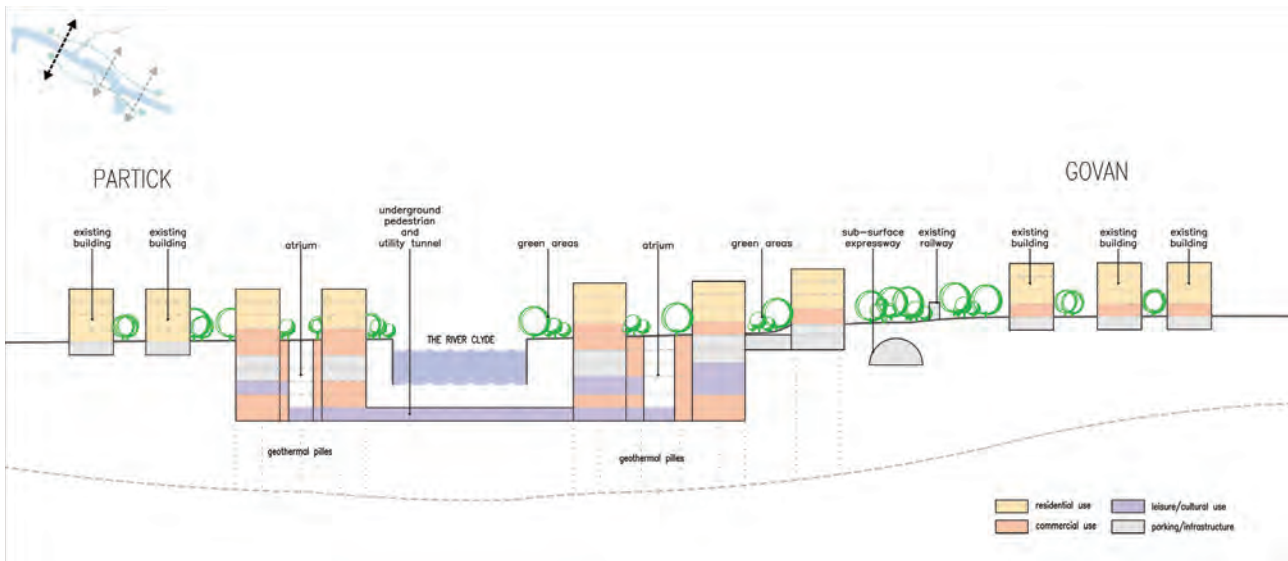


Figure 11
Section from Partick to Govan of the proposed mixed use developments and the underground commercial spaces on either side of the River Clyde, with the multi-utility tunnel passing beneath the river.

One of our proposed projects connecting the two sides of the river, also our boldest idea, is building a pedestrian tunnel under the River Clyde, thus "Connecting the banks" (fig. 11). It will also act as a utility tunnel to carry utility lines such as sewer pipes, water supply pipes, electricity, and communications utilities like telephone cables, cable television and fibre optics lines. In order to provide a more convivial atmosphere for pedestrians, the tunnel will also double as a gallery for the display of artwork from local and international artists (a similar strategy has been integrated in the Naples metro, see fig. 12). The history of the River Clyde and of Glasgow, recounted using visual media, can also be displayed in the tunnel. It can also house shops or specialty stores to attract additional visitors. This underground pedestrian tunnel will make way in "Activating edges." It will free up the space needed for variety of activities along the river such as terraces, walk ways, parks and playgrounds. Small establishments can also thrive in those areas.



Figure 12

Although a place for mostly through-movement, art installations give passers-by reason to pause in the Naples metro



Figure 13

The indoor and underground commercial spaces of Toronto are frequently organized around an atrium space, bringing light down from the surface

The tunnel will also connect the two proposed sub-surface mixed use commercial/leisure/residential facilities. Each will be organized around a central atrium space, bringing light into the underground. A similar strategy has been employed in the cities of Toronto and Montreal (fig. 13). To reduce the cost of electricity and optimize the use of underground heat, geothermal piles are also proposed. Geothermal piles are combination of pile foundations and closed-loop ground source heat pump systems. The purpose of these piles is to provide support to the building (which are necessary to account for the geological

conditions around the River Clyde), and also as a heat source and heat sink. It will enable the building to store unwanted heat and allows heat pumps to warm the building during winter (Boënnec, 2008). By doing this, we are "Tapping the local potential" of the area.

The proposed underground tunnel will leave the river free for activities and ship movements and show that Glasgow is at the forefront of thinking the city 'volumetrically'.

Strategy 2: Developing open air connections

The graving docks are abandoned, despite a certain quality and potential. On the opposite side of the river, the A814 expressway acts as a barrier connecting the northern neighbourhoods to the River Clyde. These are the problems we encounter in this area. To solve those problems, we will be using the principles "Connecting the banks" and "Activating edges" (fig. 14).

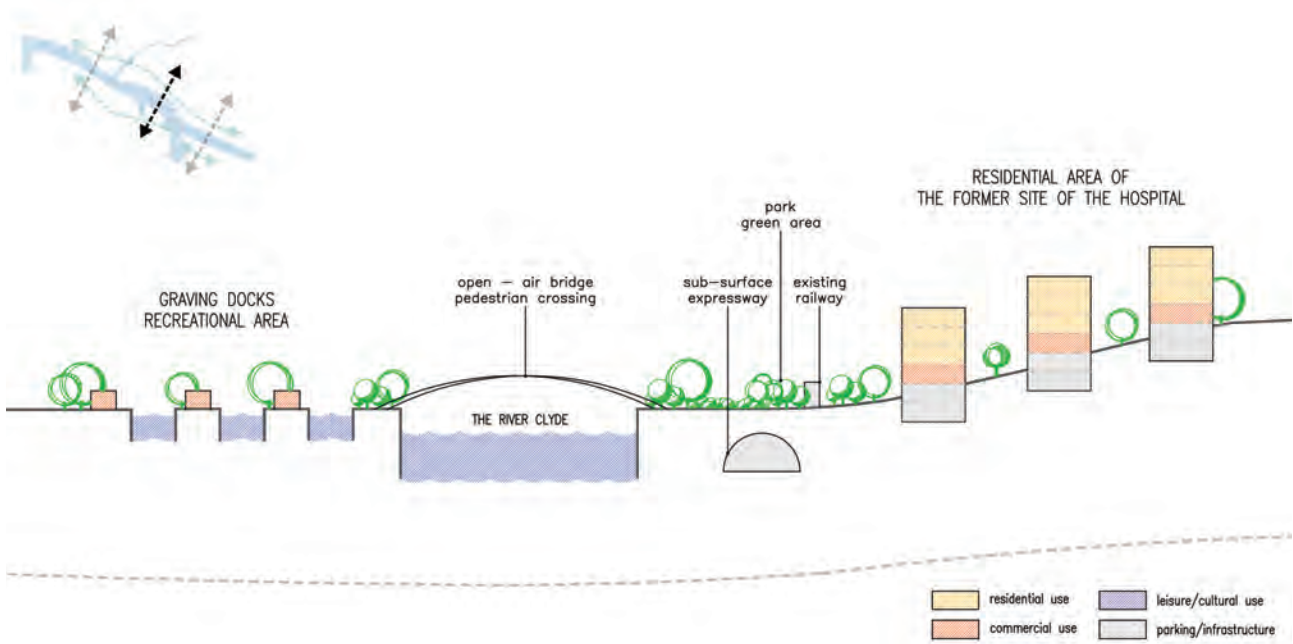


Figure 14

Section through the graving docks showing the new bridge connection to the Partick side of the River and the residential area on the former site of the hospital.

Our proposal in "Connecting the banks" is to build a bridge over the River Clyde where it will connect park or green area from one side to the proposed graving docks recreational area on the other side. Our proposal is to transform the old graving docks into a recreational area where there are pubs and restaurants, and other facilities that can offer activities throughout the year (fig. 15).

Placing the highway along the River Clyde in an underground tunnel will open up space along the river. We are therefore also proposing “Activating edges” by turning that open space into a green space much like what was done in the Madrid Rio Project (fig. 16). A large section of Madrid’s inner ring-road was moved underground leaving an 820-hectare open space along the Manzanares River. This area was converted into a linear park, which includes urban beaches, rowing lanes on the river, walks, bicycle paths, kiosks, cafes and restaurants, terraces, cultural and sports facilities and children’s play areas. Beside the green space, we are also proposing a residential area with underground parking. This way we can bring more people nearer to the River Clyde. Also by introducing underground parking in that residential area, more open spaces will be available for other activities like food markets and music festivals.



Figure 15

The graving docks could recreate the strategy used in the NYC neighbourhood of Tribeca to bring residents to the water by placing restaurants and bars on boats



Figure 16

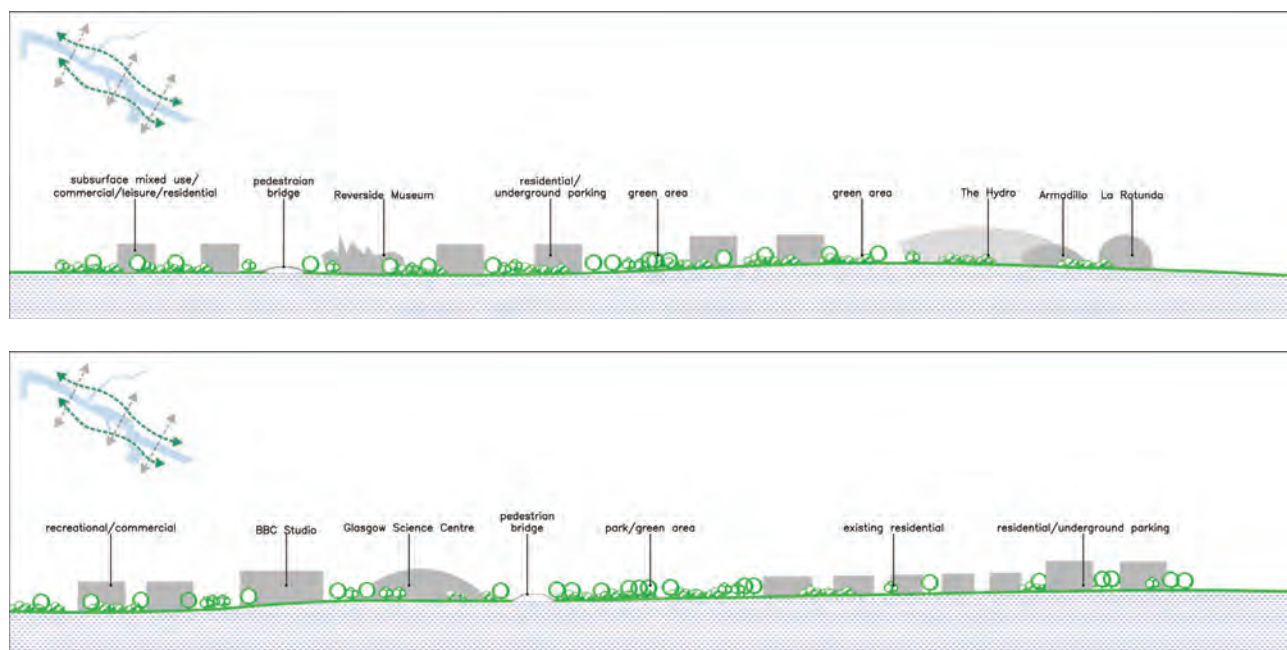
The Madrid Rio project to bury a portion of the city's inner ring-road, before (left) and after (right) project completion

Strategy 3: Connecting the Waterfront

Currently the A814 - Clydeside Expressway acts as a barrier that separates the north side from the Clyde banks, generating a discontinuity in the city fabric, interrupting and limiting local mobility, especially for pedestrians arriving to or from the River Clyde.

Figure 17

Inserting additional activities, from commercial to residential, between existing ones will help create a continuous active edge along the north (above) and south (below) banks of the River Clyde.



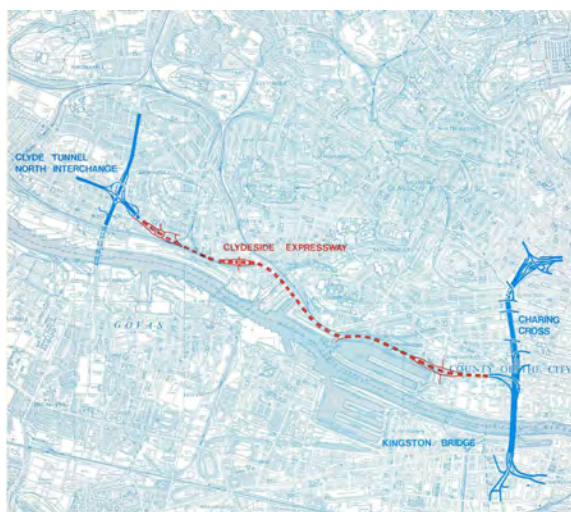


Figure 18
Burying a portion of the Clydeside Expressway between the Whiteinch interchange and just west of the Kingston Bridge (the Castle bank petrol station) will help to increase permeability and ease of access from Partick to the riverfront

The proposal recommends creating a boulevard (Linear Park) with continuous public access along the river Clyde waterfront (fig. 17); this could be achieved by tunnelling a section of the A814 - Clydeside Expressway underground and developing the surface land as a linear park stretching approximately 2.5 km from the Whiteinch Interchange all the way to Castle bank service station to achieve the objective of a cohesive and permeable waterfront, while at the same time weaving the city fabric, thus integrating the city and the Clyde (fig. 18), similar to what was developed for Madrid (fig. 19).

“Park East Freeway, Milwaukee, USA: Halting construction of the freeway preserved Juneau Park. Taking down the highway has opened 26 acres of land to be redeveloped and added back into the tax coffers. Land values have risen faster than in the rest of the city and the area is now reconnected with Milwaukee” (Bocarejo, LeCompte, & Zhou, 2012).



Figure 19
Example of a mixture of ‘grey’ and ‘green’ urban elements in developing an urban axis where local traffic is combined with bike paths and pedestrian and park areas

As previously mentioned, the burying of the expressway would free up a strip of land for green and grey spaces. The boulevard (linear park) could be an activity corridor in the form of parkland bringing vibrancy through various sporting, leisure, environmental and cultural facilities. It would combine hard and green spaces with linkage to various amenities. Surrounding neighbourhoods can be integrated into the waterfront by utilizing existing connections to strengthen connectivity between destinations. View corridors along the boulevard would be created and existing ones will be strengthened when possible. Existing links and alleyways through street blocks would be retained and enhanced where feasible to allow for continuous public view sheds and mobility. New and existing public spaces within the boulevard waterfront area can be protected and enhanced to provide locations and a variety of options for locally-desired activities that appeal to a broad spectrum of ages and backgrounds.

Natural systems (e.g. drainage channels) can be integrated in an ecologically sustainable manner, with more indigenous trees planted to help sequester CO₂ and reduce greenhouse gas emissions. The transition between built areas and green areas shall be ensured with green infrastructure that is sustainable and meets both ecological and amenity needs. Directional and interpretive signage to include names of historical figures, markers of memorial/significant places or events to help rediscover the Clyde history and culture, or other creative implementation features, which facilitate access and add visual interest to the waterfront would be incorporated into all designs to create a memorable pedestrian experience.

If implemented, this strategy has the potential to lead to an increase in land values along the Clyde riverfront, decrease air and noise pollution in the area, creating a safer and more pleasant space for pedestrians and an improved quality of life (Bocarejo, LeCompte, & Zhou, 2012). The linear park would also increase visibility to the river with developments overlooking the park and the Clyde, ensuring informal surveillance and consequently averting crime in the area.

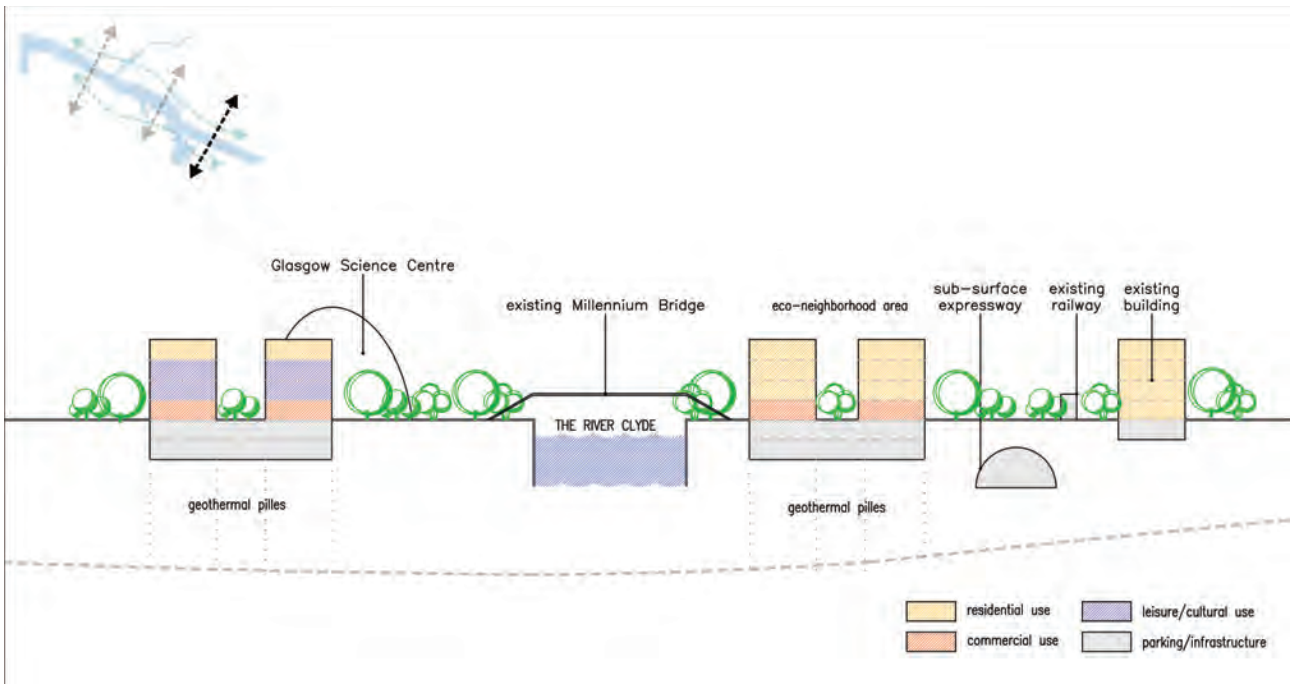


Figure 21

Strategy 4: Revitalizing existing connections

The local resources of the Clyde area present many potential opportunities. River, wind and solar, if harnessed, could create green and eco-friendly neighbourhoods. The eco-neighbourhood would promote energy conservation and efficiency in buildings through air tightness, appropriate use of glazing, high insulation standards and more efficient heating, optimizing passive solar gain and reducing the need for artificial lighting and space heating (fig. 21).

An interesting and innovate strategy could be to incorporate renewable energy harvesting, for example the use of active solar systems on building roofs and small scale wind turbines (Tree Wind Turbine) to reduce dependency on costly, polluting fossil fuels (fig. 22). Rain and run-off surface water harvesting through a permeable walkways and roofs would play a role in flood relief as the excess water could be utilized for domestic (flushing of toilets, washing machines and general outside use) and district heating/cooling for the neighbourhood. The rest would be channelled into the storm drainage system. Urban community gardening could foster community networks, sense of ownership also provide health benefits for the Glasgow communities in general (Martin, 2015).

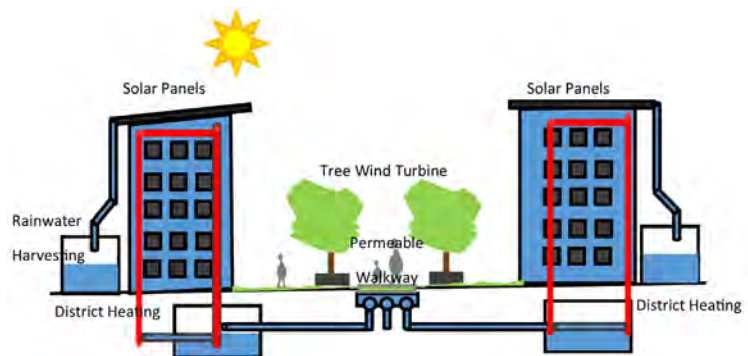


Figure 22

A schematic section of some of the combined principles to be incorporated into the new residential areas around the Clyde.



Figure 23

Wind turbines in the form of trees can produce energy while providing a human-scale urban design strategy

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FIGURES

Figure 19. <https://s-media-cache-ak0.pinimg.com/736x/9f/e2/cb/9fe2cbcdcb3334226eee197f65f4e831.jpg>.

TEAM MEMBERS

From left to right:

John Kenneth Suarez
Michael Doyle
Amy Campbell
Thato Motlhaping
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WELDING THE WEEGIE WATERFRONT

Juan David Herrera - Tierney Lovell - José M P Sánchez - Wouter Pocornie - Nicolas Ziv (Team 2)

THE STORY OF LUCY

Why the Clyde?

As a result of decades of industrial decline, the Clyde waterfront is lacking in vibrancy, coherence, built character and a sense of place. There are a significant number of vacant and derelict sites, large areas of surface-level car parking, a number of sizeable monolithic land uses and little sense of the area's historic legacy.

In addition, the site examined has particularly poor pedestrian connectivity. Both as a result of the Clydeside Expressway, poor east-west connections along the river walkway, poor north-south connections across the river and little access or visual connection with the river itself. This has created a sense of isolation away from the vibrant and diverse neighbourhoods around it, particularly Govan and the West End.



Figure 1
Heritage

The site has a rich heritage of great significance for Glaswegians (see section 2.3), although little tangible built evidence of this remains. Our group title 'Welding the Weegie Waterfront' makes reference to the area's historic past, where the term 'Clyde Built' was once a world-renowned description of ships built with outstanding craftsmanship and quality. It is our intention to explore how the regeneration of the Clyde could take a similarly carefully-crafted approach that is rooted in the area's sense of place and can once again become an area for which Glaswegians can take pride.

The site investigations that informed this report explored the extents of the area, from the City Centre to the working Govan shipyards, including both north and south of the Clyde. Surveying Finnieston, Partick, Govan and Pacific Quay, as well as the Riverside Museum, Govan Graving Docks and a number of vacant and derelict sites, we navigated the barriers of water and motorway infrastructure in the process. Evidence was gathered from conversations with local users of the river, and by getting down onto the water itself, with a boat ride. Both these particular perspectives have been primary inspirations for our strategy for the Clyde.

This has led to an approach that re-frames the city from the point of view of the river and re-examines the river from the perspective of the people of Glasgow themselves (or 'Weegies' - a perhaps controversial but familiar local term).

In line with this approach, we have created a persona through which to test our strategy for the site. While there will be more than one person's perspective of the site, for the purposes of this study, we have explored one experience in detail. She has become an example of a Weegie who is exploring the Waterfront. We have called her Lucy MacDonald.

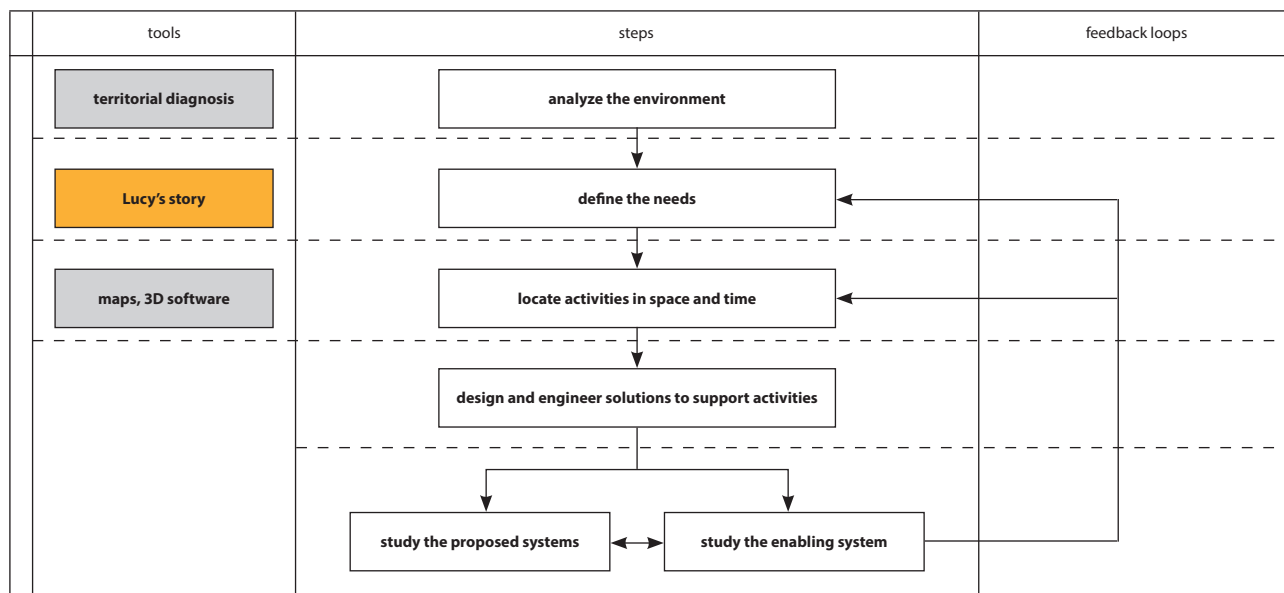


Figure 2
Methodology

THE METHODOLOGY

The methodology we have developed during the workshop is based on systems engineering and systems thinking. Our methodology is summed up in the diagram above:

Study the environment – site visits, maps and GCC presentations

The first step of the methodology consists of analysing the environment by a territorial diagnosis; both its constraints and its opportunities. Due to time limits and the format of the workshop, we analysed the environment with the help of Glasgow City Council's (GCC) presentations, maps (provided by GCC) and two site visits. One visit was alongside the river walkway by foot and another one was by boat on the river itself. This analysis allowed us to define the present state of the Clyde waterfront:

- Activities (site visits + GCC presentations)
- Climate (site visits + GCC presentations)
- Topography (site visits + map)
- Built environment (site visits + maps)
- Urban form (site visits + maps)
- Geology (maps + GCC presentation)
- Space use (site visits + maps + GCC presentation)

Define the needs –Lucy's story

The next step in our methodology consisted of defining people's needs near the Clyde waterfront. We asked the question - what do people want to do on, and near the waterfront? This focuses on assessing needs through desired future realities. This approach could be considered a 'bottom-up' approach because it emphasizes citizens as primary stakeholders. What would we (as planners consulting the Council) like the people to be able to do in this area? This approach is more 'top-down' as it emphasises the public institution of the Council as a point of departure. Using both of these approaches - 'bottom-up' and 'top down' - will help to shape the future activities alongside the Clyde Waterfront.

A problem with urban planning is that needs are related to spaces, however, spaces are shared resources and people all have different needs. Therefore, it could be very difficult to satisfy every citizen of Glasgow with limited available space. Importantly, the renovation of the Clyde does not only require the determination and analysis of needs, but also frames the area's evolution over time. For example, for the next 20 years or more.

In order to understand how the site could be attractive to Glaswegians, we wrote the story of a fictional character: Lucy MacDonald. She's a young woman who represents one experience of living on the Clyde Waterfront in the year 2040. Within the YPTDP workshop, we chose to imagine what life would be like for the people of Glasgow in the next 20 years as well as what could inspire them. During this workshop, we imagined one week* of Lucy's life on the waterfront (but other timeframes could also be explored further - one day, one year, etc.). In essence, we are using Lucy's story as a narrative for city development. This narrative could be further researched and more extensively analysed and enriched. Lucy is adopted as a persona that represents a specific demographic, and investigative research can help to build her story: What are her needs in 2040 that would help to attract this demographic to Glasgow?

In this workshop, we only used one persona. We used the story of Lucy, but stories of other Glaswegians with different characteristics (varying demographics - gender, age, socio-economic background, etc.), could also be imagined to explain the needs of other Glaswegians. While infinite stories could be told, for the purposes of this planning tool, the number of personas should be limited and carefully targeted, in order to explain the necessary variation of experience, while allowing people to focus on the planning proposals. The story should be used to assist the planning process. It's an enabling system that allows the principal focus in the project to remain at the centre: Rethinking the Clyde Waterfront. In our project this is: Welding the Weegie Waterfront.

Ideally, even Lucy's story itself is written by Glaswegians themselves. If made possible, Lucy's story could be used as a participatory tool.** Glaswegians writing the story themselves could be arranged, for example, by using a combination of big data and social media. Popular channels on social media could enable various ways of interacting, rating, and providing content. Examples of these are Facebook, Pinterest, Tumblr, Instagram, and Twitter.



Lucy's week starts off in the weekend:

On Saturday, Lucy goes to a festival and meets a friend for drinks afterwards. That night, she decides to stay at her brother's house: the new waterfront apartments at Glasgow Harbour. She crosses the Clyde by ferry. Focal point activity is culture (music).

On Sunday, Lucy goes jogging alongside the river Clyde. Later that afternoon she goes down to the river to row in a competition. She's moving both alongside the banks and on the river. Focal point activity is health & sports.

On Monday, Lucy studies at the University's Knowledge Centre on the Waterfront. In addition, she works at her part-time job at a locally popular restaurant, 'Fish N Chips'. She stays on the Waterfront. Focal point activity is education.

On Tuesday, Lucy meets an investor at the new subway station for a quick brunch. From there, they decide to visit the new art gallery. She travels underground to reach it. Focal point activity is culture (arts).

On Wednesday, Lucy is 'entrepreneuring' intensively at Glasgow's most effective co-working space. She also attends a brainstorm session at the local incubator facility, residing at the old shipbuilding yard, which has a strong visual connection to the Clyde. Focal point activity is business (start-up).

On Thursday, Lucy visits her new-born niece, Aileen MacDonald, at the Queen Elizabeth University Hospital. She travels by subway. Focal point activity is health.

On Friday, Lucy hosts a friend from Medellin, Colombia. They take a trip to Dumbarton. They travel with a self-driving regional taxi boat. Focal point is mobility.



Lucy in a participatory approach

Lucy's story could also be a participatory planning tool which allows Glaswegians to project themselves into the planning process. It provides a way to imagine their potential future life near the Clyde. It creates an imaginary world in which people can project their dreams. It touches upon the emotions of Glaswegians. Potentially, this is a more valuable tool for engaging people than, for example, surveys. It does not exclude conventional tools such as questionnaires, but this participatory tool links imagination to public opinion.

In addition, this tool provides the population with a sense of ownership within the regeneration process. Glaswegians can become aware of future developments and have a stake in various projects. Subsequently this means Glaswegians provide and gather insights, voice their opinion/vision, and become stakeholders.

Follow the persona Lucy on social media:

 @lucy2040clyde
on Instagram

 Lucy | Welding the Weegie Waterfront
on Pinterest

**PEOPLE
MAKE
GLASGOW**

Locate Lucy's activities in space and time

Lucy's needs are then translated into activities. This step consists of assigning spaces as well as a specific timeframe (i.e. time of day/week/year) that allow activities to take place. Activities are allocated to space and time independently. Since one of the objectives by GCC was to implement place-based solutions, we use the Clyde as our main spatial departure point. Looking from the Clyde, we explored potential zones along the Waterfront, crossing the banks and, in so doing, reactivating them. Lucy's story provides this perspective from the Clyde to the city.

Allocate activities on the surface

The first space allocation takes place on the surface, on the banks of the Clyde, above ground. During the workshop, and as a direct result of site analysis undertaken, we created a series of layered maps allocating various activities to different spaces. Each map layer explored one type of activity distributed along the waterfront.

As a starting point, we identified where Lucy's activities were already present near the Clyde and developed them, where necessary, by improving or expanding their program and functions.

For new activities to the Waterfront, sites were allocated in relation to the varying spatial requirements for different activities. These were then strategically coordinated in order to have activities throughout the day (and night) alongside the Clyde.

Allocate activities in time

One objective of the Glasgow City Council is to transform the Clyde Waterfront into a vibrant place. According to this statement, activities should be allocated to have activities on the Waterfront throughout the day. Certain activities had to be re-allocated to meet this requirement.

Allocate activities on the ground, above the ground or underground

The result of this methodology was that different activities were superimposed on the same space. The following possibilities were formulated:

- To use the same space for different activities at various parts of the day
- To use underground and aboveground spaces for a multitude of various activities
- To combine both possibilities

Design and engineering

After activities have been located in both space and time (in a way that addresses citizens' needs as much as possible), it is then necessary to develop spatial solutions for each defined activity. This moved the process from planning towards more architectural- and engineering-based conversations. Within the group, architects and engineers then worked together to define the best solutions within the technical constraints.

These engineering and architectural constraints then led to further strategic conversations around the allocations of activities in both space and time. There were two main types of constraint; the constraints arising directly from the product itself (structural constraints, technological constraints, geological constraints, etc.) and the constraints caused by the enabling system (organizational, regulatory, contracting, financing, etc.). During the development of the product, they both interact and influence each other. In system engineering this process is explained by the "Vee-cycle" development tool.

This cycle explains the classic development of a product starting with defining the needs towards its operation, and later the destruction/reuse. It starts with formulating "system requirements" towards "component" requirements in the evolution of the project. During the workshop, we only studied the system requirements due to time constraint. We can see that both constraints from the proposed system and the enabling system can influence the solution. For example, at times, we decided that it could be useful to have two underground storeys and four aboveground storeys to house the activities defined by Lucy's needs. However, due to geological constraints 2 underground storeys were not possible (this constraint comes from the proposed system) and because of the Local Development Plan it is not possible to have more than 3 floors (this constraint comes from the enabling system). Then we will have to find another solution to undertake the activities, for example to find a new space on the Clyde, or to lower the quality of service related to the chosen activities. There is a feedback loop between the citizens' (personas like Lucy) needs and the architectonic solution developed by architects and engineers.

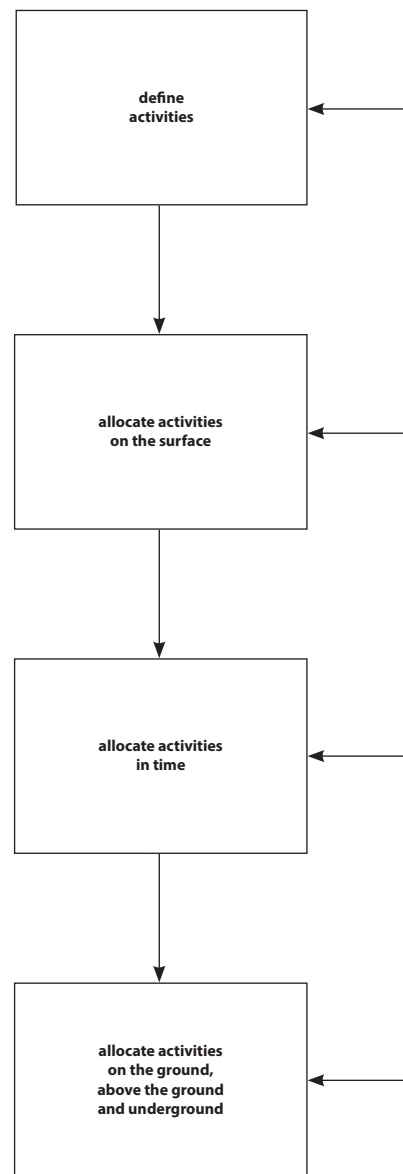


Figure 3
Steps

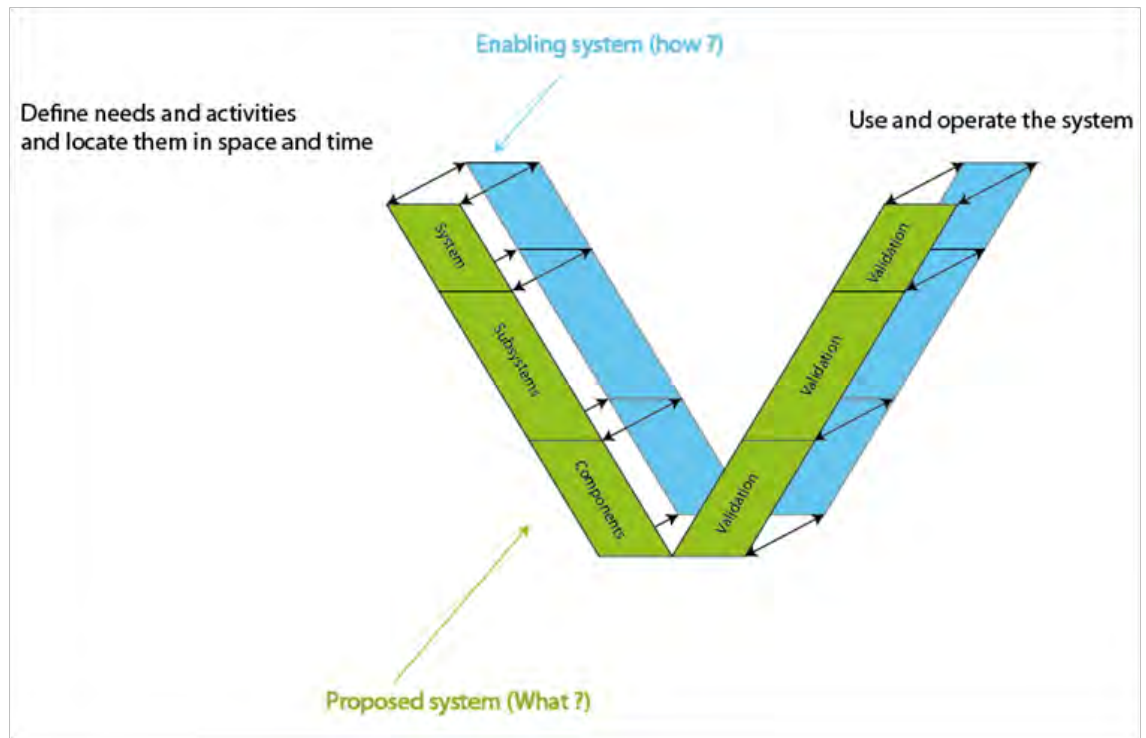


Figure 4
Vee-cycle
development tool

LUCY ON THE WATERFRONT

During our analysis and site visits, we were able to experience the river directly from the water. Our perception of the river was transformed when viewed directly from a boat rather than from the more conventional viewing points along the riverbanks. We also noticed that the river is unique in its ability to connect the city from east to west. In order to change the role of the waterfront in the city and to reactivate it, we decided that it was crucial to work with the edges and to capitalize upon the river's potential to connect the city from east to west.

In our story, Lucy Macdonald is able to spend her whole day along the waterfront. In this imagined future, it is possible to be by the river, experience different interactions with the water and enjoy the unique atmosphere found along the Clyde. At the moment, the riverbanks work almost exclusively as a fast bike-lane. People use it to travel east-west, from the outskirts to the city centre. One of the goals of our proposals is to complement the existing program, creating spaces where people would like to stay, not just pass by quickly.

Lucy's typical day would begin in a new start-up hub, next to the shipyards, where an opportunity area has already been detected by the municipality. After an entire morning working in her new company, she would then cross the river to go for a run. Lucy could cross the Clyde with a new ferry service or the Clyde Tunnel, now improved and more pedestrian-friendly. On the north side of the Clyde, she would jog along the river enjoying the widened and improved public space that now continues more seamlessly to the city centre. Later, she could either study in the knowledge centre, meet a friend in a café or go shopping in a new retail area.

Figure 5
RDM Campus in Rotterdam



The Edges – Active topographies

The quay walls of the river Clyde currently act as a vertical barrier that keep the people far from the water. To improve this situation, we propose to deconstruct these edges, creating a “soft” transition between the river level and the city level. Bringing people closer to the water, and ‘softening’ this transition is, we believe, crucial to the redevelopment of the Clyde. Within the site boundary, several locations where the idea of platforms at different levels could be implemented, were identified. These varying heights could allow a more intense integration of different programs, creating a complex and “active” topography.

The following images illustrate different examples of urban waterfront regeneration, bringing people closer to the water. One example, Lyon, creates several typologies of public spaces by the water, where people can stay, run or play. These lower spaces offer protection from the traffic existing on the ground level and give people a new perception of the river and their city’s relationship to it. Chicago has adopted a similar approach, but on a different scale. The river, which clearly has an urban character, is far lower than the street. Making the most of this height difference, it was possible to implement a program of cafés and restaurants under street level and closer to the water. This intervention has brought life and diversity to the river bank. It is no longer just a place for sports but also a place to go out at night or have coffee after lunch. Working with different levels brings a panoply of possibilities, from educational programs to roof gardens. The Ewha University of Seoul provides an example of the possible integration strategy the Knowledge Centre where Lucy might study could adopt. The possibility of reading, studying or seeing an exhibition while also looking at the Clyde is a luxury that should be explored in Glasgow.

The aforementioned idea requires certain features that are not available along the Waterfront. For this reason, our approach has been tailored to specific sites, and some locations require a totally different approach. On the western section of our intervention area, the new Glasgow Harbour residential development is situated. These new buildings are located close to the river’s edge, making it harder to implement the idea of the deconstructed edge. However, the main goal of experiencing the Clyde from different perspectives can nonetheless still be achieved. Instead, increasing the existing public space with a cantilever platform would also bring people closer to the water and to the centre of the river. This intervention would help to strengthen the continuity of public space along the waterfront, creating an atmosphere that is civic and public. In different places on both banks we noticed the feeling of privatisation of common space. The edge was in some cases fenced and impeded the parallel circulation and connection. The new platform could also be complemented by a second floating element along the same section. Here people might be able to touch the water or engage with boats and other floating elements. These ideas, which could also be implemented in other areas along the river, aim to regenerate the relationship between Glaswegians and the water.

Identity on the waterfront

Our proposal is titled “Welding the Weegie Waterfront”. This term appeals to the vernacular of Glasgow and Glaswegians. It refers to a sense of place based on local identity. We believe the plan to be developed in this city should respect and enhance its existing heritage and identity. Along the edges of the river, the idea of identity and heritage is found in remnants of the river’s shipbuilding past. For example, the different former shipyard ramps could offer a third type of interaction with the water. These elements, on both banks, are presently abandoned. They present interesting characteristics that could provide another dimension to the waterfront: the connection with the past.



Figure 6
Riverfront of Lyon by In Situ Architectes Paysagistes



Figure 7
Chicago Riverwalk by Sasaki



Figure 8
EWha University Campus by Dominique Perrault

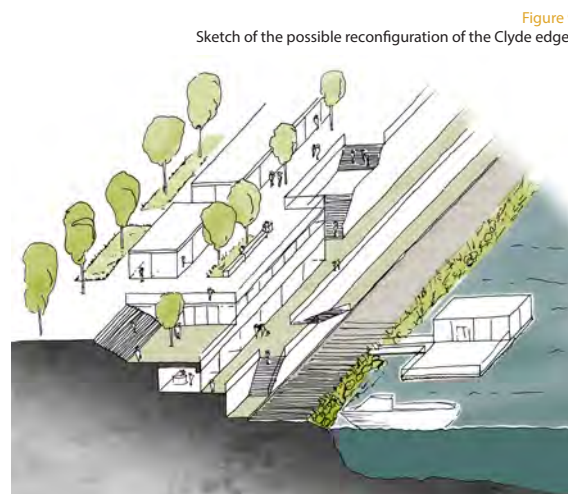


Figure 9
Sketch of the possible reconfiguration of the Clyde edges

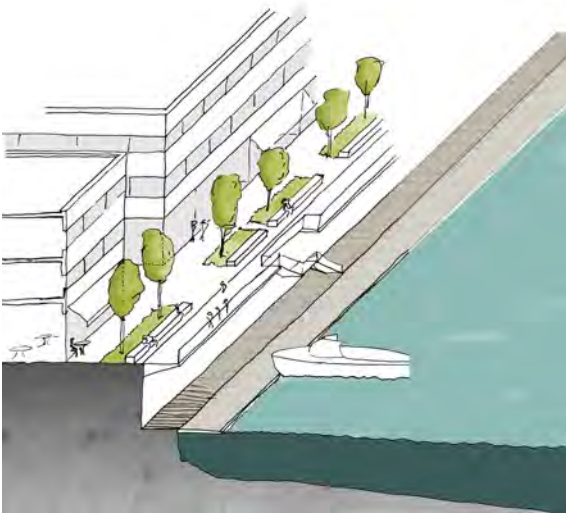


Figure 10
Sketch of an alternative reconfiguration of the Clyde edges

The final idea for the edges, which affects the entire Waterfront from east to west, is to develop a common identity for this part of the city. The use of a common design language could improve Glaswegians' perceptions of their river, and could also emphasize the history of the activities that took place in the past along the waterfront. Despite their absence, they continue to contribute to the identity of the city. Remaining heritage elements, from the crane to the former shipyards and the bridges, are currently isolated episodes along the Clyde. An intervention that celebrates the area's historic assets could improve the quality of the space and the mental image of the Waterfront. We can find an example of this approach in Oslo, where the Havnepromenade works to connecting the entire waterfront. This project stretches along 14 km, linking 14 stations, which explain the history of the local industries along the river. A common language could also be found for urban furniture, graphic design and the design of public spaces. This intervention would be able to, on the one hand, respect different character areas along the waterfront, while also 'welding' the river's edge in its entirety on the other. It would result in a more coherent image of Glasgow in the mind of Glaswegians and visitors.



Figure 11
Havnepromenade by White arch. and Rodeo arch.



Figure 12
Oslo Havnepromenade by Grid.

SITE PROJECTS

Lucy's needs and activities have helped define the main features that may need to be developed along the banks of the Clyde and its vicinity. This section focuses on the site-specific approaches that have been developed at three sites along the river. Building on the approaches outlined in the previous section, a multi-level/multi-purpose approach has been developed to give the river back to the "Weegies" and to weld their roots, needs and wellbeing.

Clyde river banks and Quay walls

Here is where Lucy's story showcases a new way to interact with the Clyde river. As outlined above, the intervention alongside Glasgow Harbour could be enriched by the use of cantilevering platforms and floating pontoons. In other zones along the river banks, the quay walls may be able to be modified in order to allow a softer transition between the water level and the current street level. In those locations, the use of concrete structures and prefabricated modules may help to establish a strong water connection for both the north and the south banks of the Clyde.

Another important approach to the quay walls is maintenance. In some places of the Clyde river, there are some quay walls that have failed or are showing some structural affectation. This could be a unique opportunity to implement new structures that connect the street level and the river. They would be less robust than the actual walls and more durable (time). Referring to relevant hydraulic information of the Clyde river would help define where this kind of solution is feasible, taking into account the new uses the river will have (there is no need to have strong quay walls to support the ships docking, etc.), thereby giving to the community a new space for commercial activities.

Some complementary works and further exploration of the particular characteristics of the structures (water resilience, easy cleaning, etc.) will need to be carried out in order to create a new environment that can withstand water level variations as well as enable more active uses of the river banks.

Multi-Level North-South Multilevel Connection (MLNSC)

Even given the short time surveying the Clyde, it became evident that between the "Clyde Arc" bridge and the Clyde tunnel there exists an immediate need to establish stronger physical north-south connections. In developing this idea, it became apparent that two important landmarks could define destinations and zones where this new infrastructure could be placed. The Kelvin river, which flows north to south, and the Riverside Museum standing isolated where the Kelvin meets the Clyde, provide a strong axis and key nodes for what we will call the Multi-level north-south connection (MLNSC).

In order to define the characteristic of this MLNSC, there are two main features that have to be evaluated. The first is the Clydeside Expressway; the east-west motorway along the north bank of the river, and the second is the River Clyde itself.

One common approach could be to bury at least two kilometres of the highway to create a new pathway for north-south connections. However, there is another opportunity that could also overcome the highway "barrier" as well as delivering new useful and weather-protected spaces to Glasgow. This alternative is an underground gallery which starts near the Yorkhill hospital development site between Finnieston and Partick and ends to close to the Clyde river quay walls in front of the Govan Graving Docks.

Is important to note that this underground gallery is conceived and designed as thoroughly integrated with surface level activities. Instead of being conceived as underground, it is viewed as a shifting ground plane. Indeed, the "interface between the above and below ground realms appears to be a critical factor in the acceptability and success of underground spaces." In this kind of underground work, Glasgow has the advantage of easily excavatable geological conditions in which several tunnels and underground passages have already been developed.



Figure 13
Site Project 1: Clyde river banks and Quay walls

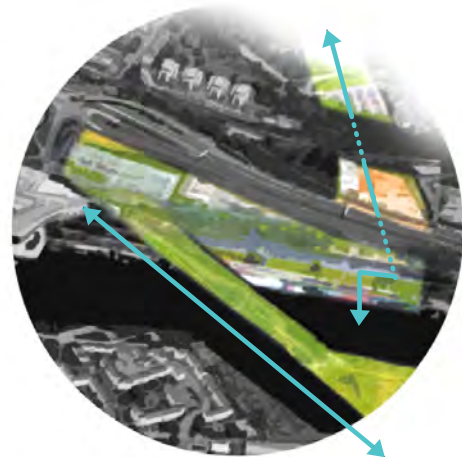


Figure 14
Site project 2: MLNSC



Figure 15
Proposed location for the MLNSC

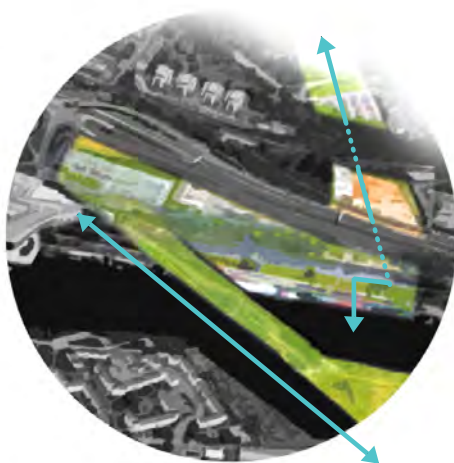


Figure 16
Schematic drawing of the MLNSC

The other main feature of the MLNSC is the crossing of the Clyde river from the north bank (next to the underground gallery exit) to the Govan graving docks. This connection is conceived as an elevated 'green' bridge, with no intermediate pillars nor cables that could interfere with the view from the bridge to the river and the new public spaces along both banks. The use of high strength materials (concrete, steel, etc.) must be considered during the detailed design of this structure.

Finally, the MLNSC will need to be complemented with multi-storey and active buildings that facilitate accessibility to different levels and hence 'activate the section'. These developments should be used to strengthen the connection between 'underground' and elevated passages as well as the 'deconstructed river edge' as described earlier. These shifting ground planes will establish new relationships with the river and help Glaswegians to get in touch with the water once again.

Figure 17
Site project 3: Govan Graving Docks



Govan Graving Docks multipurpose, heritage-focused activities

The Govan Graving Docks offer a significant opportunity to bring new activities into the existing heritage structures to both reflect Glasgow's important history of shipbuilding, and host new and diverse events.

First, a renewal of the old dock gates will be required in order to guarantee their watertight function. Next, the emptying of water out of the docks will provide new and unique spaces to the city to be used for local markets, commercial venues, cultural meetings, etc.

Another use for these newly revitalized Graving Docks could be a water retaining structure. A new connection to the sewer system, based on a complete hydraulic design, could enable this empty space to retain excess water during rain periods, allowing the collected flow to be disposed to the Clyde river in delayed stages. The purpose of this design is to ensure that the total flow in the river channel would never exceed its design capacity. As a stand-alone water retaining structure, the Govan Graving Docks could not be the city's sole method of flood control, but if complemented with similar spaces located elsewhere along the Clyde river course, the cumulative effect could be of great help in mitigating Glasgow's flood risk.

CONCLUSION: WELDING THE WEEGIE WATERFRONT TAKEAWAYS

Our proposal is a way to address the core issue in planning the Clyde waterfront: its lacking in vibrancy, coherence, built character or a sense of place. The proposal aims to improve the connectivity through 'welding', which is a process of connecting various areas across the Clyde via new and existing infrastructure. The process is rooted in place and referencing the legacy of the place's history.

The workshop provided the opportunity to explore how the regeneration of the Clyde could take a carefully-crafted approach that is rooted in the area's sense of place and can once again become an area for which Glaswegians, or Weegies, can take pride. This approach can consist of a planning methodology that adopts the persona of Lucy MacDonald and recounts her daily activities in a narrative style.

This methodology could very well be expanded to allow more participants from Glasgow to be involved and become stakeholders. It has a potential to become a participatory tool in planning and our proposed channels are social media and big data. Therefore, Lucy's story is an approach that re-frames the city from the point of view of the river, while re-examining the river from the perspective of the people of Glasgow themselves. From the perspective of implementation, the story should be used to assist the planning process as an enabling system, which allows the principal focus in rethinking the Clyde Waterfront to remain: Welding the Weegie Waterfront.

It is place making through systems thinking. In systems thinking, two types of constraints must be taken into account: the constraints arising directly from the product itself (structural constraints, technological constraints, geological constraints, etc.) and the constraints caused by the enabling system (organizational, regulatory, contracting, financing, etc.). During the development of the product they both interact and influence each other and, in systems engineering, this process is explained by the "Vee-cycle" development tool.

Our vision is to change the role of the waterfront in the city and to reactivate it. In essence, the project site is both the problem and the solution. Our strategy could be understood as threefold:

- 1. Lucy's story** provides a persona and narrative that focus principally on the Clyde Waterfront. Lucy MacDonald is able to spend her whole day along the waterfront. In this imagined future it's possible to be by the river, experience different interactions with the water and enjoy the particular atmosphere we find when visiting the Clyde.
- 2. The Edges – Active topographies** are examples of urban waterfront regeneration, where the result is bringing people closer to the water. In order to achieve this it is crucial to focus on the edges and also to capitalize upon the river's potential to connect the city across the river.
- 3. Identity on the waterfront:** interesting characteristics that could provide another dimension to the waterfront, which enable the connection with the past. In terms of the image of the city this component aims to unify the area on a larger scale through a design language.

Our proposed approach to planning and our strategy are illustrated with three site projects:

- 1. Clyde river banks and Quay walls** is primarily reconsidering the the edges of the Clyde river. It aims to create a new environment that can withstand water level variations as well as enabling more active uses of the river banks. In other zones along the river banks, the quay walls may be able to be modified in order to allow a softer transition between the water level and the current street level.
- 2. Multi-Level North-South Connection (MLNSC)** portrays the potential of involving engineering in urban design in a early phase. To restructure major infrastructural components, for example by shifting ground planes, new relationships with the river will be established. This will enable Glaswegians to get in touch with the water once again.
- 3. The Govan Graving Docks** look at the potential redevelopment of the docks in Govan, south of the Clyde. It has a high potential for becoming a water retaining structure and if integrated into wider city networks it could reduce the risk of flooding.

TEAM MEMBERS

From left to right:

Juan David Herrera
José M P Sánchez
Tierney Lovell
Nicolas Ziv
Wouter Pocornie



THE CLYDE BOULEVARD: A ROAD FOR PEOPLE, NOT FOR CARS

Andrea Pamsl -David Grant - Aryan Hojjati -Maria Alina Radulescu- Ringo Reboucas (Team 3)

URBAN DESIGN STRATEGY

Several key issues concerning urban connectivity and the disconnection between communities were identified during the workshop and deemed to be the main issues in preventing this section of the Clyde waterfront regeneration project from reaching its full potential.

URBAN DESIGN ISSUES IN THE STUDY AREA

One of the most acute problems recognised, is navigating this part of the city as a pedestrian or a cyclist on a north south axis. The issues centre around three major corridors of transport infrastructure, as follows:

Crossing the Clyde

The River Clyde no longer functions as a major commercial port and the city has been slow to adjust. The river itself is a major barrier to movement between the communities to its north and south.

- There are currently no fixed crossing points for pedestrians west of the Millennium Bridge at Finnieston and the ferry services, which were once common along the river banks, have also ceased.
- Pedestrians travelling from Govan to Partick face long detours via the bridges at Finnieston or the Clyde tunnel at Whiteinch– whilst they can elect to use the Subway, this comes at their own financial expense and excludes the poorest members of society.
- The experience of the water's edge along the Clyde is quickly being lost with development ignoring its presence.

Clydeside Expressway

The Clydeside Expressway (A814), built during the early 1970s, has been identified as one of the main barriers;

- Its construction severed the historic street patterns and disrupted the urban tissue– especially evident in the neighbourhood of Finnieston and Anderston.
- It has created a barrier to free movement of people, activities, economic activity and buildings. The communities to its immediate north and to the south are segregated from the river front.
- The urban design currently places vehicular movement as the primary spatial priority, which has resulted in impermeable urban conditions for pedestrians and cyclists. There are very few opportunities to cross the road and the few that do exist are often unwelcoming, illegible and unpleasant.
- The result is a cycle of car dependency. For example, recent developments such as the Riverside Museum and Glasgow Harbour are easier to reach by car because of their poor pedestrian connections to nearby neighbourhoods, public transport and services. This has created a situation whereby the road is seen as a necessity rather than part of the problem.

Railways

The North Clyde Line from Glasgow Queen Street Low Level and the Argyle Line from Glasgow Central Low Level converge at Kelvinhaugh Junction in Yorkhill before entering Partick Station.

- The railway junction at Kelvinhaugh poses a connectivity issue. The junction involves the railways splitting and separating in both a horizontal and vertical plane behind the SECC complex. The result is an isolated triangle of land which is separated from the Expressway behind the SECC by the split-level railway lines.
- To the East of the SECC both railway lines are tunnelled and are not seen as an issue.
- To the West of Kelvinhaugh Junction, the railway enters Partick upon an arched viaduct, which has been identified as presenting several opportunities for reinvention, revitalisation and reconnection.



Figure 1

1958 Ordnance Survey Plan showing the original street pattern that existed before the city invested heavily in motorways



Figure 2

Present-day map, showing the de-densification and dislocation of the areas along the Clyde

URBAN STRATEGY - THE CLYDESIDE BOULEVARD

The key issues identified are contrary to the City's Placemaking Policy, emerging in the new City Development Plan. The Clydeside Boulevard aims to alleviate the issues and problematic urban conditions which have created an effectively landlocked piece of the city.

The Clydeside Boulevard presents a vision for a thriving and sustainable public realm for all citizens, residents and visitors of Glasgow, with particular emphasis on remodelling the Clydeside Expressway (A814) into an urban boulevard by providing safe and pleasant routes from the Northern towards the Southern Communities, across the river.

The concept aims to return the Clyde waterfront to the people of Glasgow, to make them feel as if it is a place where they feel comfortable and safe, a place that resembles a urban living room, an urban area that embodies the distinctive character of Glasgow's industrial past and highlights a future that utilises this history to build it into a modern community area.

The proposal's key aims, presented below, are directly linked with key outcomes set by Glasgow City Council in the new City Development Plan, set for adoption in early 2017 (GCC, 2016, Page 17, <http://www.glasgow.gov.uk/CHttpHandler.ashx?id=35882&p=0>, last accessed 14/11/16).

Key Aims:

A Connected Place

- Return the “street” to the City by remodelling the Clydeside Expressway into a slower urban boulevard, creating an urban culture where people and vehicles coexist on an equal basis.
- Improve the legibility and the quality of the environment for pedestrians and cyclists alike.
- Repair the severance and dislocation between the communities to the North and South of the River by providing safe and pleasant routes across the river.

A Vibrant Place

- Unlock the potential of the development land between the River Clyde and the Clydeside Boulevard to create a vibrant, integrated district.
- Develop a continuous promenade that affirms the waterfront as a public resource.
- Create a new district where people can live, work and play.
- Provide a variety of activities and opportunities for citizens across the duration of a 24-hr period, avoiding the monoculture approach of previous regeneration initiatives.

A Green Place

- Introduce multifunctional green infrastructure, which is integrated into the design of streets and spaces.
- Create new green corridors that integrate and enhance the existing green grey and blue networks.
- Reduce traffic-related CO₂.

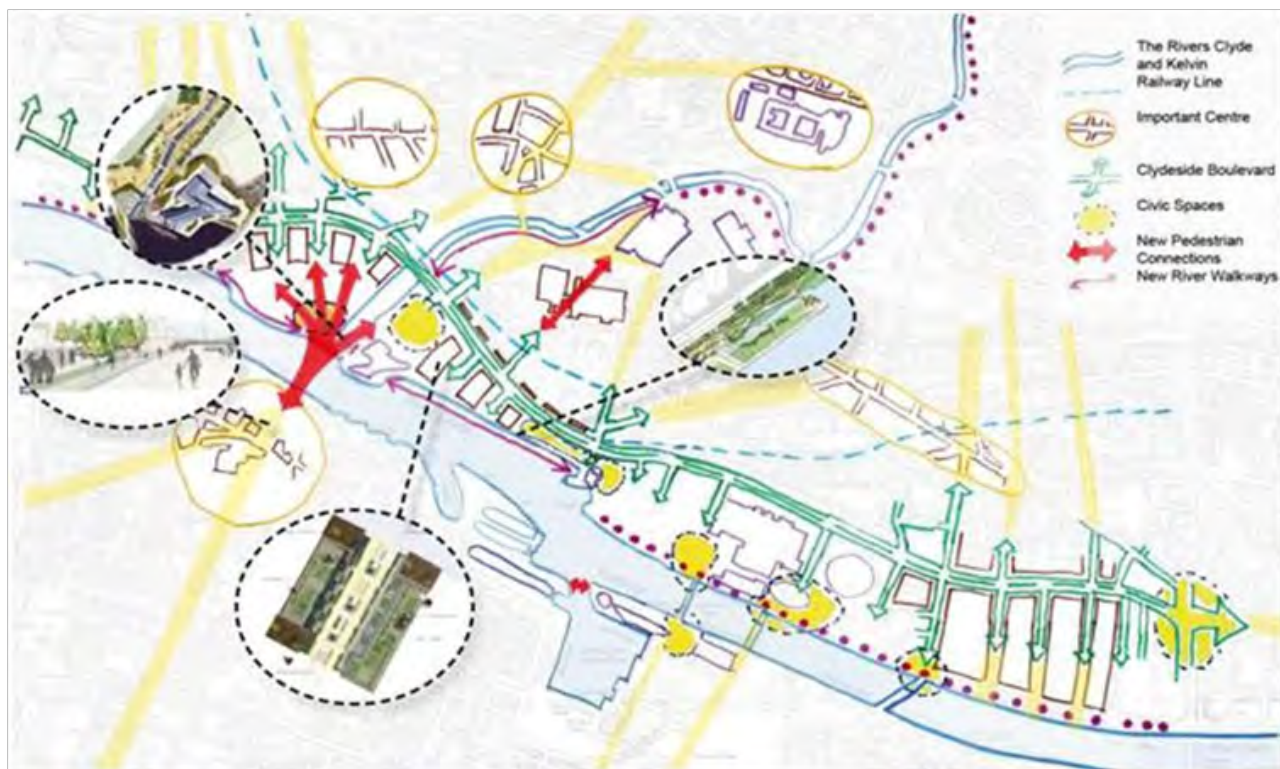
A Sustainable Place

Use the opportunity of remodelling the Expressway and the creation of a new district to integrate holistic subsurface engineering solutions which will deliver resilience, including;

- Utility tunnels
- Grey water storage dealing with surface run off
- Geothermal energy extraction
- Maximising opportunities for district heating – including, the new distillery, the S.E.C.C. campus, and Glasgow University campus expansion.

Our proposal aims to facilitate a cultural shift away from Glasgow’s car dependency towards walking, cycling and public transport.

Figure 3
Concept development – proposed sub-areas



Clyde Boulevard

The Clyde Expressway and the adjacent railway line will be transformed from barriers to the waterfront into permeable urban spaces that accommodate people and facilitate their movement towards the water's edge. The following are the main design aspects that are addressed through this proposal:

- The Expressway will be transformed into an urban boulevard by reducing the number of lanes and the speed limits that allow for a larger number of pedestrian crossings from the northern part towards the river waterfront district, by introducing bike lanes along it, and accommodating public transport. In this way, the boulevard becomes a place that favours sustainable, non-motorised means of transport and fosters human interaction.



Figure 4
Proposed cross-section of the Clyde Boulevard

- The Railway line, acting presently as a barrier, will be rendered more permeable by opening the arches underneath it and by transforming this additional space into a vibrant area that visually and physically reunites the northern community with the waterfront. The space between the arches will be designed as a mix of open, permeable areas and enclosed spaces that will host not only fashionable bars and restaurants, but also start-ups. The viability of this kind of transformation has been witnessed in other British cities (e.g. London, Newcastle and Manchester), where entrepreneurs are attracted by the aesthetic value and quirkiness of the railway arches, as well as their practical advantages.

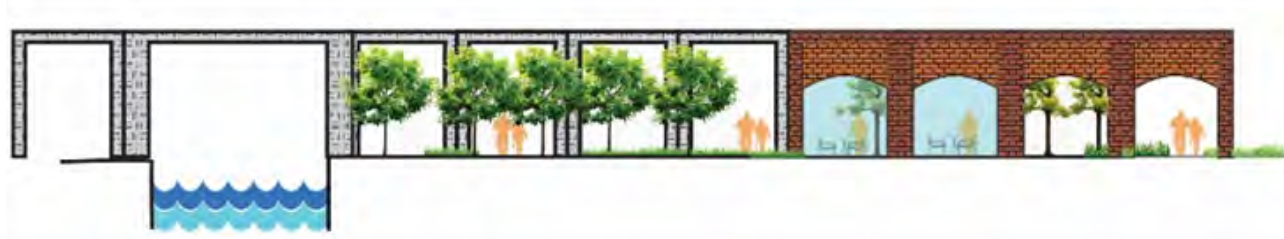


Figure 5
Proposed longitudinal section along the Clyde Boulevard

Clyde Waterfront District

The Clyde Waterfront District will be composed of a linear series of plazas, buildings, parks that provide and facilitate direct access to the water's edge.

- The waterfront district will be mixed-use, hosting commercial and professional services, storefront retail on the ground and first floors and housing on the top floors.
- All new buildings along the waterfront will express a sense of creativity and a connection to the past (using new interpretations of traditional building styles), while incorporating innovative construction techniques and systems (e.g. green roofs, green walls, etc.). Buildings should be planned so that they create outdoor public spaces like plazas, pocket parks and weather-protected areas oriented towards both the waterfront and the boulevard.
- Locating parking areas on the surface (as in the current development state) will be discouraged in the future and underground parking places and alternative locations should be provided for all new developments. However, the impact of the surface parking areas that will be provided should be minimised by designing them to be compatible additions to the waterfront experience (e.g. using a combination of trees and shrubs to create landscaping buffers). Until the entire district will be transformed, some of the parking areas that now exist could be temporarily used as a festival space for community events, thus attracting people towards the river front.
- The urban design of the waterfront district will play a key role in reserving views from the Clyde Boulevard to the Clyde waterfront. The waterfront will be connected both physically and visually to the Clyde Boulevard. The primary pedestrian routes perpendicular to the waterfront will provide a minimum space free of constructions to maintain unobstructed views of the waterfront. These pedestrian routes will integrate landscaping features, public lightning, public art and urban street furniture.



Figure 6
Clyde Waterfront District illustrations



THE CLYDE WATERFRONT PROMENADE

The Clyde Promenade will give continuous open public access to the water's edge for people of all ages and abilities. It will provide the city of Glasgow, and especially this area of the Clyde, with a unique identity that could also contribute to generating social cohesion among the communities to the North and South of the River. This area will become a city-level destination, a place where all members of the community can walk, bike, enjoy the waterfront and re-connect with the city's history and cultural heritage.

- The waterfront promenade which will be designed in accordance with Glasgow's climate and will reflect its heritage, will accommodate the following: dedicated pedestrian paths, dedicated cycle paths, cafes and outdoor seating areas, landscaping and green areas, lighting and signage features.
- A floating boardwalk will be built on the river in order to re-create the connection with the water.
- Provide strategic focal points – civic space (the yellow areas on the vision map above) near the waterfront that offers opportunities for social interaction and promotion of culture and heritage.
- A new pedestrian banana-shaped bridge will be built to connect the two sides of the river.

Figure 7
Illustration of Clyde Boulevard



TRAFFIC MANAGEMENT

When rebuilding the urban space along the Clyde Waterfront, the need for re-thinking traffic management strategies and interactions within the surrounding areas will be important once transport systems and policies serve as the main drivers to establish connections between the Clyde Waterfront area and other locations of Glasgow.

Therefore, the Pointhouse Road, a motorway designed only for vehicles, was identified as the main barrier for providing accessibility to the River Clyde. Hence, the proposal is to transform this motorway into an open boulevard with shared spaces for pedestrians, cyclists, motorcyclists and cars, bordered by lively, green and open public spaces.

The proposal, with respect to traffic management, includes the creation of one lane for vehicles, for pedestrians and for cyclists in each direction with green space between them. The deceleration of traffic will be encouraged by implanting new pedestrian crossings and public transport stops along the boulevard. Nevertheless, the measures connected to traffic reduction in the interest area will not provoke disturbances in traffic in other locations once excess traffic can be shifted to other motorways outside the city centre.

In addition, a third lane for vehicles is considered for bearing the increased traffic during peak hours, with the feature of changing its direction throughout the day. However, a reduction on traffic volumes is expected due to the additional space available for non-motorized modes of transport. Therefore, vehicles which are commuting to the city centre or are travelling for locations outside Glasgow can use the highway M8, which would have enough capacity to deal with the increased demand.

Moreover, green corridors, the existing bridges and a new one connecting both embankments of the River Kelvin create an extensive walkway network, with connections to underground car parks and public transport services. Traffic lights and zebra crossings, as well as the reduced speed, contribute to traffic safety in the Clyde Waterfront area.

CONNECTIONS

In order to enhance the Clyde Waterfront area as a place where Glasgow's citizens can meet, new physical and social connections must be provided. Indeed, connecting regions and social spaces do not always require massive infrastructure, but rather efficient systems and cost-effective materials.

Therefore, being an important development area of Glasgow, there is a lack of attractive points of access for pedestrians along River Clyde. The existing bridges are not enough to attract pedestrians from both embankments of the river and the space actually reserved for cars disrupts the pedestrian flow.

In addition, people do not enjoy the River Clyde itself. However, in most cities around the world, the rivers have a paramount importance for cultural and social activities. Moreover, rivers have the potential of enhancing economic, environmental and social sustainability of busy cities (Everard and Moggridge, 2012; Karr and Chu, 2000; Petts et al., 2002). It is necessary to bring people as close as possible to water in order to create lively environments where children, adults and elderly can share experiences and learn important values directed to social inclusion, environmental preservation and sustainable development.

PHYSICAL

Regarding physical connections, a new pedestrian bridge connecting both embankments of the Kelvin and Clyde rivers (banana shaped) is necessary to extend the green corridor which stops at the meeting point of the two rivers. With this measure, new opportunities for sports practice is opened up, with the provision of housing areas and open spaces nearby the bridge.

In addition, a floating walkway nearby the Riverside Museum provides a connection between people and water. It is an opportunity to bring people to the water for swimming, kayaking, sailing and other water sports.

Tram or bus stops and lines along the Clyde Boulevard offer connections to the city centre and surrounding areas. New pedestrian walkways connect the walking areas to public transport and underground car parks, creating also an important connection to the underground space.

Social

To create social connections, the communities of Govan and Partick are brought to the boulevard in order to invite other communities of Glasgow to explore the refurbished area. By creating a social network between the communities, the Clyde Waterfront area will be highlighted as one of the main urban social areas in Glasgow.

Moreover, the mixed use buildings and spaces play an important role on the mission of social inclusion (Montgomery, 1998; Rowley, 1996). Nevertheless, the areas destined for housing keep the Clyde Waterfront enjoyable throughout the day. In addition, through social connections, new opportunities of knowledge development and exchange can be created. Hence, these connections are crucial to maintain and revitalise the Clyde Waterfront in the future.

GREEN SPACE AND WATER MANAGEMENT

The concept of the Clyde Boulevard includes the integration of the city within nature. If Glasgow has a lot of rainy days, why not make them colourful? The idea is to create green islands and bridges instead of concrete sealed surfaces. In addition to typical park structures, there is room to provide the local communities with space for urban farming. Trees are aligned next to the streets and houses are covered by green roofs. For the Hundertwasser for example, an Austrian artist and architect, created some of the most outstanding designs for greener cities (see Figure 1) and provided inspiration for future architectural works.

Figure 8
Hundertwasserhaus Vienna



Figure 9
Rogner Bad Blumau, Styria



Project Evergreen [1] gives an overview of the economic and environmental advantages as well as the lifestyle benefits of bringing nature back to the cities. Just to name a few examples:

- Green space filters pollution and dust from the air.
- It provides water quality and flood protection by reducing surface runoff.
- The property values are improved and roadside businesses are easier located when they are framed by trees and vegetation.
- The promotion of landscaping projects causes an increase in self-esteem and a decrease in vandalism.
- Green spaces create safer neighbourhoods and strengthen the social communities.

Coming along with those green spaces is the implementation of an integrated watershed management, which is the process of managing human activities and natural resources on a watershed basis [2]. In the case of the Clyde Boulevard, the intention is to collect the water runoff from the higher regions of Partick and Kelvinhaugh along the boulevard, especially at locations where the area tends to flood (please see YPP October 2016 – Map 7, SEPA Flood Risk Surface Water) and redistribute it to the new developments between the boulevard and the River Clyde. These developments have systems in place that capture runoff for watering urban farms (quality control system required) and green spaces, as well as for flushing and for works where no water of drinking quality is needed[3].

Regarding flood prevention, cities like Philadelphia, New York and Seattle rely not only on piped systems and sewage treatment, but also on new green infrastructure techniques at street level [4]. Introducing green space and trees along the roads is a step in the right direction. By further applying “porous streets” like Philadelphia has, water and especially storm water can penetrate through the pavement, where it is then stored underground.

UNDERGROUND SPACE

Urban Underground Space provides clear positive impact and advantages for the prosperity of growing future cities like Glasgow. Greater use of underground space in urban areas could lead to a minimisation of adverse environmental and social impacts of above ground space as well as great improvement in access, connectivity and service delivery in order to provide lasting economic viability (Hunt et al, 2016). Therefore, greater use of underground space is highly recommended to be incorporated into the Clyde Waterfront long-term planning process. Main specific recommendations include: the use of underground space for car parking, use of Multi-Utility Tunnels (MUTs) alongside and underneath the proposed boulevard to provide an integrated means of service provision to residents and businesses in the area, the use of geothermal energy as a renewable energy source, and the construction of underground storage for surface water collection.

Also, following observations were made for the existing underground features of the Clyde Waterfront area: Within the area of interest, there are currently three shallow tunnels in operation, connecting both sides of the River Clyde. Two of them serve the tube network, whereas the third one is used for road traffic.

There are other abundant tunnelling systems, which can be found underneath the city. At this point, it is worth mentioning that the Rotunda, which formerly connected both sides of the river, consisted of several tunnels, which were may have been backfilled except for one.

Numerous boreholes can be found in the surrounding area. Although they are described by coordinates giving their exact position, it is assumed to be difficult to locate them on site. Depending on their dimension, purpose and the prevailing ground conditions, it is likely that the majority is no longer open anymore.

Multi- Utility Tunnels

Multi-Utility Tunnels (MUTs) can provide a smart resilient and sustainable solution for provision of urban utility infrastructure (Makana et al., 2016). This type of infrastructure provides clear advantages for new developments along the Clyde waterfront, particularly in the long-term. These include but are not limited to:

- Eliminating the future need for further excavation for installation, maintenance and repair of utility services in the future
- Provisioning for ease of placement of new services (e.g. district heating, pneumatic waste collection) – The MUT provides far greater degree of flexibility to cater from changing demands and change of service provision
- Allowing for 365 days / 24 hours access in a workable environment
- Allowing visual inspections and deployment of sensor systems in order to enable a programme of cost-effective planned maintenance
- Ending the larger set of adverse consequences of traditional trenching practices (Rogers and Hunt, 2006), including:
 - Removal / replacement of excavated material
 - Lane occupancy, traffic disruption, traffic diversions and delays
 - Disruption of access to businesses and local facilities
 - Visual intrusion, noise, dirt and dust

More detailed recommendations on assessment of whole life costs as well as short-term and long-term benefits of alternative solutions (including MUTs) for underground utility service provision within a broader urban underground asset management system are discussed in Hojjati et al. (2016).

The following considerations are also highlighted for the proposal of Multi-Utility Tunnels along and underneath the Boulevard:

- Backfilled docks and their massive concrete structures as well as piles are likely to be encountered, when excavating the proposed utility tunnels. Also, layers of ash and brick must be taken into consideration.
- The still open tunnel from the Rotunda can be remediated and connected to the utility tunnel network to provide access to the other embankment.

Renewable energy

Renewable energy is the future, but only if introduced in a reasonable and responsible way, and adapted to the environmental situation. It is also important to keep in mind the life cycle of renewable technologies, the raw materials that are crucial to their production, the availability of those materials, and the circumstances under which they are excavated and processed. For the Clyde Boulevard, subsurface technologies are emphasised, but it is recommended to elaborate a strategic development of the underground space before first actions are set in place.

Shallow Geothermal Energy

Shallow geothermal energy (<400m) is a reliable system and has the main advantage of being installed underground, therefore producing only a small footprint on land and no noise or vibration. Raw material consumption and energy input for its production is in general less critical than for wind or photovoltaic systems, for example, but environmental impacts remain [5]. An excessive energy production of a shallow geothermal systems can be fed into a district network, connected by the proposed utility tunnels.

Piles

Buildings founded on piles along the waterfront of the River Clyde can function as an integrated solution for flooding precaution as well as energy and power supply[6].

Tunnels

Since a considerable amount of surface area is in contact with the ground, tunnel structures have a high geothermal potential. Tunnels situated close to offices, homes and commercial businesses can provide this shallow geothermal energy for heating and cooling. Metro and utility tunnels are suitable for this application. An example is the Metro Line 6 in Stuttgart, Germany [7].

Heat Recovery

Scottish Enterprise highlights the economic opportunities for Scotland from a low carbon environment by utilising heat recovery[8]. The planned, new distillery close to the exhibition and conference centre will be a main source for industrial waste heat and can be integrated into a district heating network in combination with the suggested utility tunnels.

Tidal Energy

Since the River Clyde is influenced by the tidal system, tidal energy production could be combined with a bridge connecting Partick and Govan. There are already different applications in place to maintain shipping traffic, if needed[9].

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FIGURES

Figure 2. Map produced by Glasgow City Council based on an ordinance survey map. Crown copyright (2016)

Figure 8. <http://www.kunsthauwien.com>

Figure 9. www.blumau.com

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URBAN GARDEN

Filippo Imberti - Negar Ahmadpoormobarakeh - GT Senthil Nath - Rosanne Verloop - David Grant (Team 4)

BACKGROUND TO THE PROPOSAL

One of the most powerful tools used to develop this proposal were the voices of Glaswegians themselves. On day one of this project, our team decided to take a walk from Glasgow city centre, along the Broomielaw, passing the SECC complex and former graving docks to Govan. On the way, we conducted casual interviews with twenty people, asking them to share insights into their relationship with the Clyde. The responses were varied with three key themes emerging: 1) people feel proud of the river and what it stands for; 2) people are happy with how the river area has improved; but, 3) there is not much to do other than travel from one place to another. These perceptions became guiding pillars of the design process, whereby each solution developed builds on a sense of pride and place while at the same time providing opportunities for recreation and social connections.

The study area of this proposal takes into account the neighbourhoods of Govan and Partick and the infrastructure that either divides or connects them. This portion of the city, intersected by the River Clyde was once one of the greatest production hubs in the world. It provided the city with wealth and opportunity, securing Glasgow's reputation as one of the finest ship-building cities on the planet.

However, as the industry declined, the world turned its back on shipbuilding. Govan and Partick could no longer offer what they once did. The area began to decay. As outsiders to the area, and Glasgow, this was felt intuitively by the team during a visit of the site. An intense sense of vastness, emptiness and loss is felt from walking around the former graving docks and basin.

Figure 1
Glasgow Urban Garden



This proposal is centred on a concept of developing the area as an urban garden. It builds on the existing assets and capacity to create, supply and strengthen the local area for the benefit of the rest of the city. The strategy is circular – both in terms of long-term regeneration of the area as well as the solutions delivered on the ground.

The area of focus is also one of Glasgow's Thriving Places, receiving significant attention from city Community Planning Partners to address the local challenges associated with deprivation. This proposal builds on the aspirations of Thriving Places, proving opportunities for local people, improving health outcomes, empowering local people and strengthening physical and cultural assets.

The proposed development area centres on the former graving docks and the Prince's Dock basin and includes the river itself and the area to the north, around the Riverside Museum and the adjacent vacant and derelict land, and the area to the south which is currently a mixture of residential and commercial use. Delivery will connect the central point, which proposes a floating market and floating garden, with the surrounding communities and the city centre.

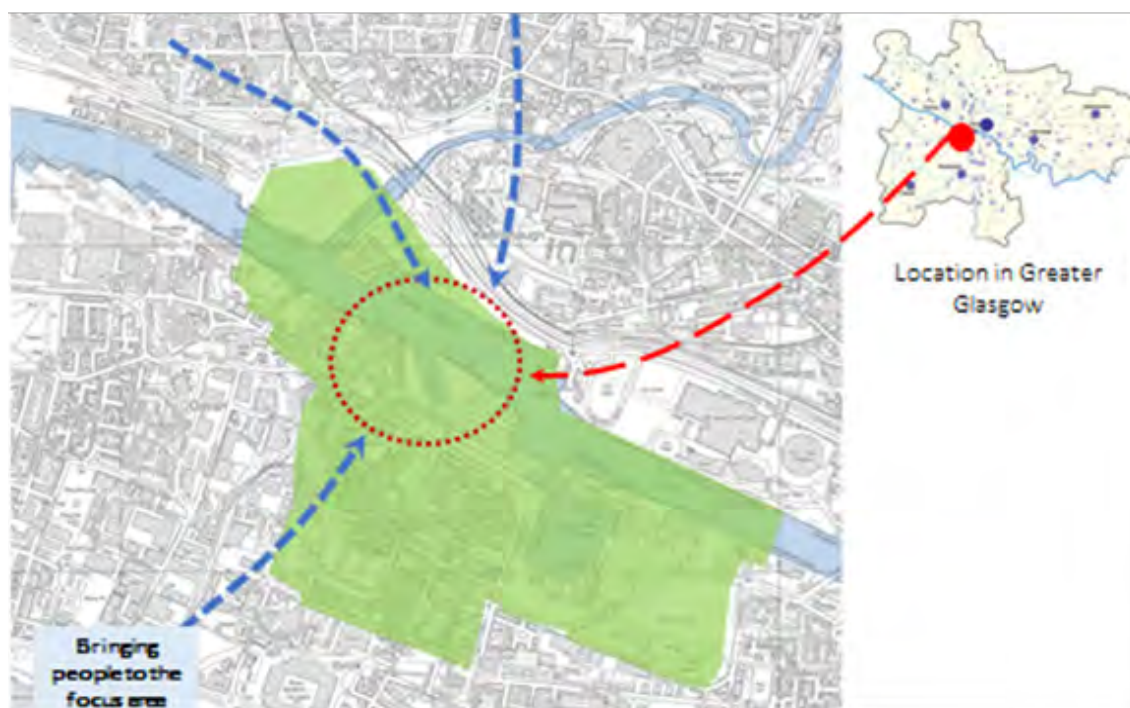


Figure 2
Bringing people to the focus area

PROPOSED SOLUTIONS

Heritage and Landscape

Many of the former docks in and around the functional study area have been demolished with the land reclaimed for alternative use. The graving docks and Govan basin that remain are culturally and historically significant, the character of which should be retained and showcased. As such, all solutions are sensitive to the look and feel of the area. They breathe new life and energy into the place. At the same time, they are not permanent and both the floating market and floating garden can be dismantled.

Floating Market

The central idea for this proposal is to create a floating market in one of the three graving docks. The structure is to be retrofitted into the existing infrastructure which is currently abandoned and inaccessible. The vertical movement of the platform between high and low tides will be harnessed to generate energy, which could sustain the electricity needs of a small market.

The docks surrounding the market could be programmed for multi-purpose utility, providing spaces for recreation, for example as a temporary beach or lido in the summer and ice-skating or fun fairs in the winter.

Green infrastructure

A green corridor that acts as an active travel route will connect the area to key spatial nodes including the University, the SECC complex, the west end museums, the city centre and the Partick and Govan public transport hubs. It will provide an attractive link that softens the look of the hard infrastructure such as roads and the river bank, whilst taking into account resilience challenges such as climate change, carbon emissions, air quality and flooding. The green corridor is not only about the flows of people along the banks of the river but also about drawing people to and across the river.

Growing Space

It is crucial that the solutions proposed at the waterfront not be delivered in isolation. The local community are encouraged to input into, and benefit from, the use of the space. On both sides of the river, there are pockets of vacant and derelict land that are suitable for growing. It is recommended that these assets are transferred to the local community to develop and manage with opportunities to sell the produce at market.

At the same time, local businesses should be approached to donate food waste, which could easily be converted into enough fertiliser to sustain the gardens. Also important are links with education providers, schools and universities to provide training, skills and jobs to local people. A community laboratory is recommended which should be used for research and outreach purposes.

Floating Garden

The challenge of connecting both sides of the river can be addressed through the delivery of a floating garden. The garden, which has been implemented in Rotterdam with success involves floating planters containing trees or other vegetation. The greening of the water is a continuation of the green corridor and a visual connection between river banks. The floating garden can also be used to generate small amounts of energy.

Geothermal Energy

Geothermal potential requires significant exploration. The heat beneath the ground could be drawn out to warm the water required for the garden and market. Surplus energy should be stored or could be connected to housing for heating purposes.

Bridges

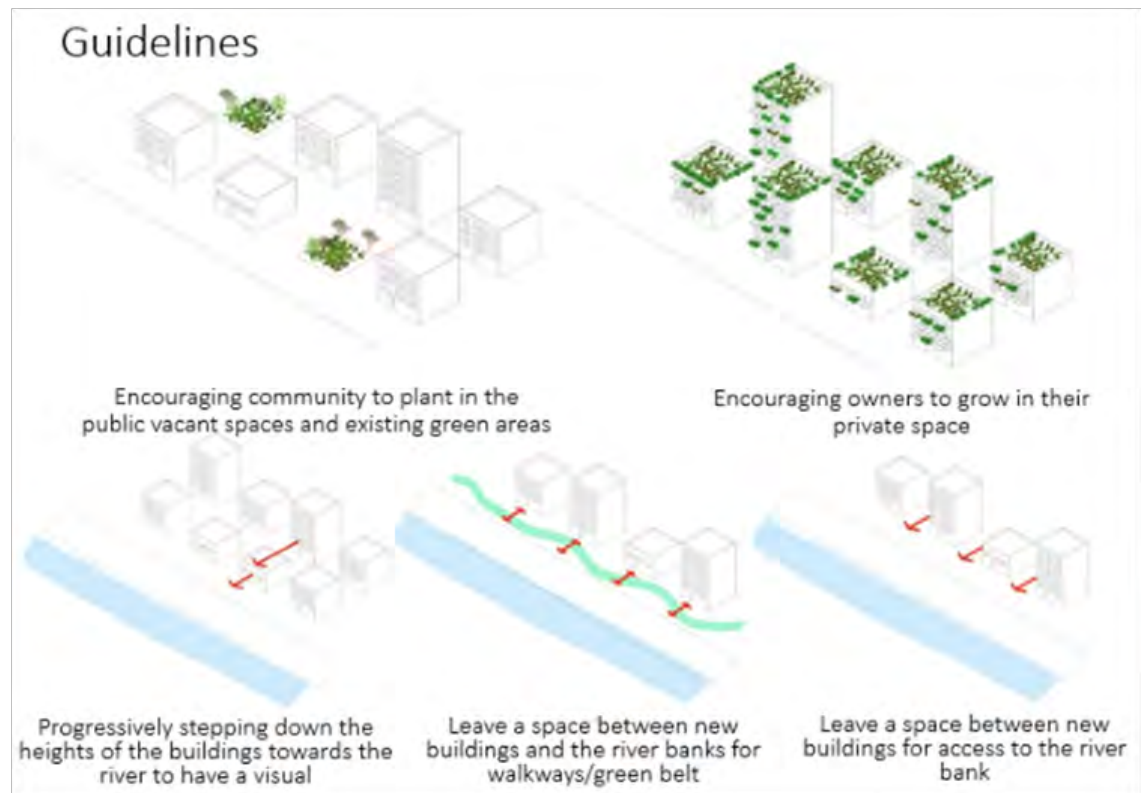
A foot bridge is required to join the communities of Partick and Govan and facilitate movement to the central point of the floating market. The bridge should be constructed with vegetation and greenery as a continuation of the green corridor. The construction of a crescent shaped bridge could connect the SECC (current car park area) with the Science Centre and the graving docks. Clams and mussels will be introduced to the subaqueous structure of the bridge, strengthening the structure as well as helping to clean the water of pollutants.

Tidal and Fluvial Influences

The River Clyde is subject to a tidal range of approximately 5 metres westwards from the tidal weir at Glasgow Green 3 km upstream from the proposed site / in the vicinity of the proposed site.

The hydrological environment is influenced by the fluvial, as well as the tidal system, and both contribute to the potential flood risk in the area. The flood hazard map (see fig.2 below) considers both environments in a 200-year event scale. Areas adjacent to the river are at risk from coastal flooding events. Large tidal swells have also been known to have an impact on the structural integrity of the quay walls, with several notable collapses in recent years. Surface water runoff from surrounding higher land with hard standing is also an issue. The Kelvin corridor is also susceptible to river flood events.

Figure 3
These guidelines should be part of the planning requirements for new builds in the functional study area. At the same time, retrofitting of existing properties should be recommended and incentivised through small grants and tax reliefs.



GUIDELINES

As supplementary guidance that facilitates delivery of the proposal and supports the City Development Plan, a set of principles should be embedded in the local planning policy framework. These guidelines address new and existing developments with aims to ensure:

- Buildings are greener and more climate resilient
- Shared space provides opportunities for growth and community connections
- The river is accessible and is not blocked from view
- There are sufficient walking paths connecting the river to the areas around it.

OUTCOMES FOR GLASGOW

As described in this report, this proposal has been developed to deliver outcomes that benefit the people of Glasgow and the local communities. These outcomes are not limited to improved places but include:

- **Increased sense of pride in place**
- **Connection with the heritage and cultural significance of the area**
- **Increased skills, knowledge and training**
- **Engaged communities that participate in the design of local services**
- **Improved health outcomes**
- **Connected communities**
- **Safer and more accessible places**
- **Investment and economic growth**

TEAM MEMBERS

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G.L.A.S.G.O.W.

3.5

Jana Vydrova - George Doulikas - ... - Jamie Shields - Donagh Horgan - Matej Buzekls (Team 5)

“A GREAT, LIVELY, ACTIVE, SMART GATEWAY ON THE WATERFRONT”

DATA GATHERING

Both areas, Govan and Partick (see the “Urban Structure” chapter), have been the focus of the City Council and other stakeholders for quite a long time and in the next several years the proposed visions will slowly become a reality, bringing both areas closer again, both socially and economically.

In order for the project to identify the best approach, it was essential to first investigate the problems currently faced by the communities of Govan and Partick. Thus it was necessary to gather as much information available as possible to know exactly what to look for in our proposal.

During the workshop, we had several opportunities to gain the required data and gather information, which formed the foundations for our work. In addition to several site visits, during which we had the opportunity to learn about the main issues and differences between the two locations on opposite sides of the river Clyde, we also drew information from a myriad of maps and previously conducted urban studies.

A number of sessions with local specialists who contributed in the workshop provided us with precious information on the existing infrastructure that is currently being unexploited, as well as the potential of each area. Furthermore, our team gathered vital insights through conversations and casual discussions with inhabitants in both Govan and Partick.

When drawing up the project, we focused on the current situation. It was evident to us that, although the area is mainly comprised of housing, transport infrastructure and business centres, the river banks lack a “local spirit.”

On the other hand, it was important to examine the history that formed the region as it is today and, if possible, to capture the time when the river banks were in a moment of their greatest glory, both financially and socially, and to try to highlight those factors which were influential for the former prosperity.



Figure 1
Glasgow Garden Festival

	Predicted percentage change in population (to 2024)	Predicted percentage change in number of households (to 2024)	Predicted percentage change in number of jobs (to 2024)
Govan	-6% to 0%	4.62% to 5.89%	-5.49% to -0.06%
Partick	0% to 8%	5.89% to 11.15%	-16.53% to -5.49%
City Centre (north bank of Clyde river)	20% to 35%	24.16% to 38.88%	15.3% to 22.24%
City Centre (south bank of Clyde river)	66% to 176%	57.74% to 161.75%	-5.49% to -0.06%

Figure 2
Table of various predicted percentage changes in Glasgow city parts

Data collection was focused on:

- **Unused river banks** – Clyde river banks were regularly used until public access to the banks was interrupted by several roads, heavy traffic and other car-focused facilities such as parking lots.
- **Unused Tunnels (Harbour Tunnel, old rail tracks, etc.)** – the main problem of accessibility to the river banks is the heavy traffic in this part of Glasgow. To enable pedestrian access to the site, several unused tunnels were allocated, which could be easily re-opened since these are in a good condition and not so much funding would be needed to use them again.
- **Maritime industry heritage** – Glaswegian maritime industry is still world-renowned, but the legacy of Scotland's former maritime centre is gradually declining. It would be more than beneficial to bring the maritime back, although in a lesser or different form than it was before. This could bring back trading routes, willingness of Glasgow citizens to live closer and to an increase of the potential of the whole area.
- **Cultural / leisure / educational centre** – the perfect example and demonstrative situation when the area of north Govan was enjoyed as a vibrant leisure, educational and cultural centre, was the time of the Glasgow Garden Festival held between 26 April and 26 September 1988 (see picture below). After the exhibition, a development boom was expected, but the situation then was not settled and the majority of the site remained derelict until this day. However, parts were redeveloped for the headquarters for BBC Scotland and Scottish Television, Glasgow Science centre or Pacific Quay.

It is interesting to note that the residents of Glasgow themselves want some change as evidenced by several workshops, conferences, and various community happenings conducted, for example the Govan-Partick Charrette held on 16 to 19th March 2015. [1]

Results and conclusions of this charrette are the same as our own findings: "Residents in Govan and Partick are calling for a new bridge to be built over the Clyde to reconnect the once inseparable communities" (by Mary McCool, published on 24 March 2015.[2])

Another example, to prove that the transition is already imminent, is also the article "Plans to Bridge the Gap Between Govan and Partick: Multi-million Investments are set to change the Clyde Waterfront" by Gillian Loney, published on 13 April 2016.[3]

When the history and former characteristics as well as the current state were analysed, we focused also on future development through demographic predictions and planning forecasts. Referring to the Glasgow Local Development Plan (2014), important data are summarized in table below. It is easily recognizable that a growing difference between Govan and Partick and the rest of Glasgow, is predicted, if a significant change is not undertaken soon to prevent the further intensification of disparities.

To counter these negative trends, it is important to encourage residents of Glasgow to move from the city centre to either Govan or Partick. And to achieve this effect, it is essential to redevelop the neighbourhood, to rethink the infrastructural system, to focus on smart approaches and on a feasible way to begin the transition from a grey and industrial part of Glasgow to a greener and sustainable part of the city.

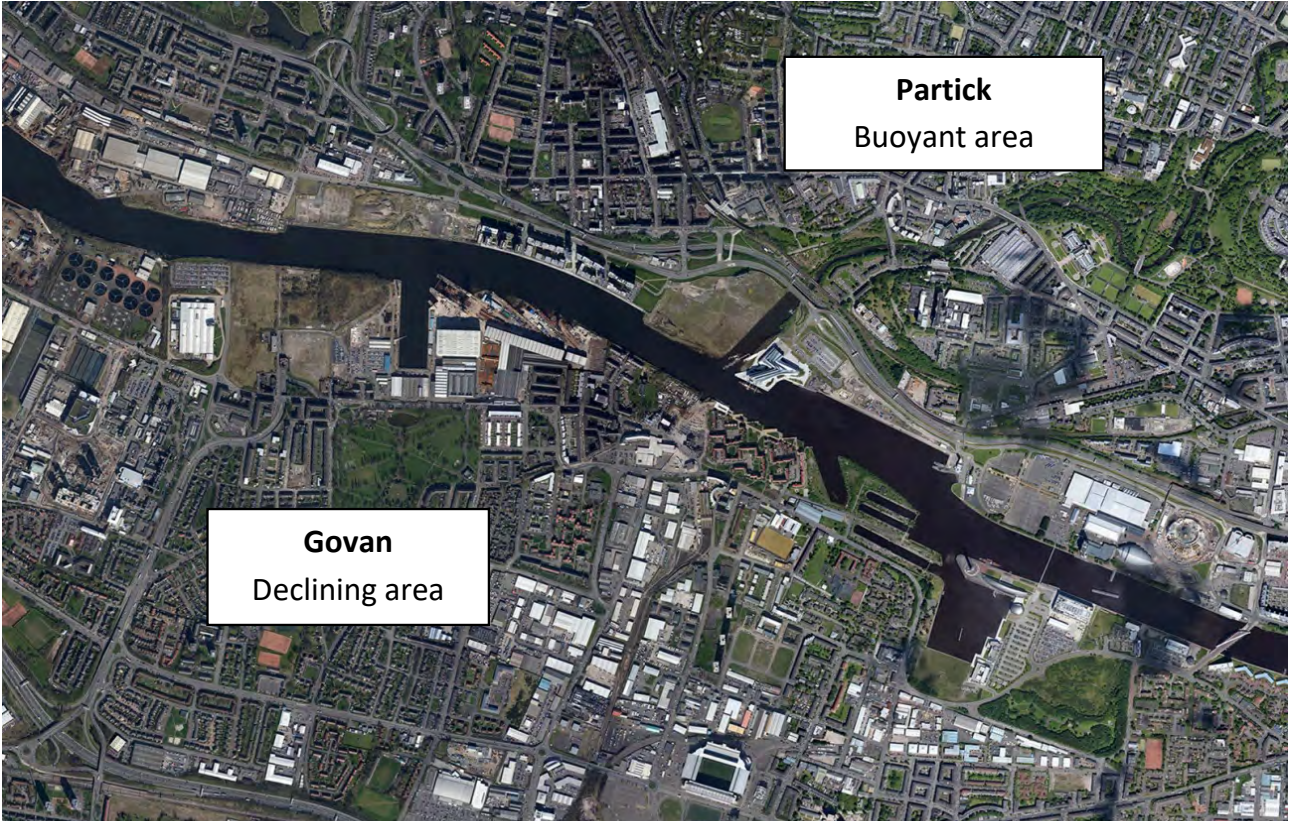


Figure 3
Satellite view

WORKFLOW

On the first day, all the participants of the workshop were gathered for an induction to the venue (The Tontine) and attended introductory presentations to the issue at hand. Later on the same day, we followed a guided walk along the northern riverbank up to SSE Hydro and then continued on the southern bank to the Govan underground rail station. The objective was to get an initial impression of the area to be studied. Indeed, this rather short field trip was adequate for the majority of the participants to feel what is really needed and where to focus their ideas. Upon returning to the venue, five teams of five professionals and academics were randomly formed by the tutors.

Our group consisted of five young professionals of different backgrounds, covering fields of specialisation from architecture and urban planning to geotechnical and civil engineering and tunnelling. One local (Glaswegian) team member provided the rest of the team with useful insight. The language used throughout our collaboration was English. By the end of the day, we had been provided with geological, hydrogeological, historic, urban, road and rail maps of the Glasgow City Centre and Govan and Partick Districts. Disposable office material to work on was provided as well and immediately the group started to put what they had noticed during the guided tour on paper.

On the second day, each member came to the worktable sharing his or her ideas on the focal points and the issues of priority that had previously been identified. When all proposals had been listed, we began discussing the severity of each problem to be solved, the ways in which the solutions would benefit (or not) nearby districts, the sustainability and cost effectiveness and the overall appeal to not only the local population but also to the City Council. Furthermore, we discussed the social consequences of the impact of our ideas, while at the same time receiving additional input from the tutors and other workshop contributors and experts. By the end of the day, the group was asked to present their initial idea, mostly giving out their main direction according to the members' first impressions.

In this first presentation, the acronym G.L.A.S.G.O.W. was adopted, indicating our perspective, to develop a modern, attractive, environmentally and socially sustainable place by the riverside—the heart of the city.

The third day kicked off with multiple brainstorming sessions to formulate our proposals in a feasible and complete context. After consultations from the tutors at the venue, we were able to adapt our solutions on the existing urban fabric, taking into account the connections between them and the identified focal points. As a result, we used the map to detail our working site as well as the social connections to be achieved between the districts of Govan, Partick and Yorkhill. Later that day, the group returned for an additional visit to Govan and Partick, in order to get a closer look at the challenges as well as opportunities and to further define our vision on future social and spatial development of the site and the neighbouring areas.

On the fourth day, having numerous ideas, strategies and directions in mind, we elaborated on the detailed construction of the whole picture of our proposal. The team produced detailed drawings and sketches, depicting all the focal points, networks, measures, solutions and the general development actions we recommend. Moreover, an ambassador was elected out of each group, with the duty to transfer feedback between the groups and the tutors, in order for every group to produce a presentation of a similar structure. At the end of the day, a clear strategy towards

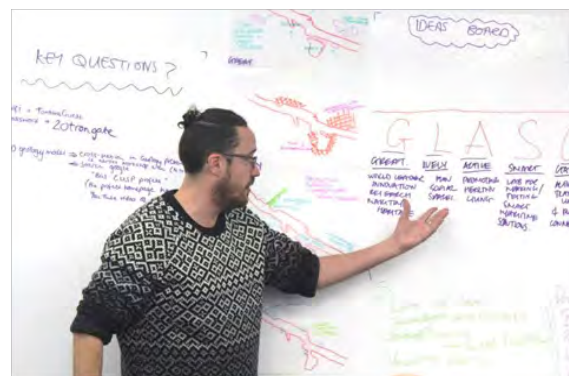


Figure 4
Donagh presenting the initial view of the team



Figure 5
Drawings produced by the team



Figure 6
Consulting the local experts

Figure 7

George, presenting the final proposal of the team

our aim was obtained, with a sum of primary objectives, secondary assets and a possibly expected impact of our intervention. Intermediate presentations and feedback discussions with the tutors and the other teams hugely contributed to our progress.

The last day before the final presentation was full of intensity, with our team working full time on structuring, illustrating and preparing the final presentation, putting through the main points of our proposal. The team members shared duties in order to work more efficiently on the final product.

IDENTIFYING THE FOCAL POINTS - DEFINING THE NEEDS

There are several points of interest on the map, both venues and monuments, with currently underexploited surrounding space in the area. In order to attract people and to create a place where they will want to spend time with their friends and family and interact with each other and the facilities, further development must be considered. What is required is a place where people can spend a whole day, not only a few hours. Thus a sense of the need to be there has to be promoted, by further developing the following focal points, and a network of connections between them.

Focal Points - First and foremost, the focal points of our choice are mainly located on the banks of The River Clyde. The river is not used as it could be; there is little life on the river. Other cities (for example Prague, Paris, or Detroit) embrace their local rivers as social corridors to connect people and entire urban districts.

We believe that The River Clyde Waterfront Regeneration is an ample opportunity to bring people together and that it is feasible to bring life back again to what originally gave life to Glasgow.

The SSE Hydro (located on the river's north bank) is an architectural gem and a multi-purpose indoor arena. One can visit cultural events like exhibitions, concerts and events from artists and celebrities from all over the world. For instance, the internationally renowned Scottish tennis player Andy Murray, made a special event there on September 21st, 2016. Murray invited his tennis friends and they competed in exhibition matches. All money earned was donated to charity.

Another visitor attraction is located on the south bank: The Glasgow Science Centre. The centre is one of Britain's most popular places to visit. The Science Mall, Glasgow Tower and IMAX Cinema create an attractive concentration of activity spaces. Queen Elizabeth II herself opened Glasgow Science Centre on June 5th, 2001.

Another visitor attraction is located on the south bank: The Glasgow Science Centre. The centre is one of Britain's most popular places to visit. The Science Mall, Glasgow Tower and IMAX Cinema create an attractive concentration of activity spaces. Queen Elizabeth II herself opened Glasgow Science Centre on June 5th, 2001.

Moreover, people in Glasgow can also visit The Riverside Museum on the north bank, designed by world class architect Zaha Hadid. The Riverside Museum is the current location of the Glasgow museum of Transport, which showcases rare cars, locomotives and ship models of a former era. There is also a fully restored Victorian Sailing Ship docked by the museum. The museum also hosts maritime-themed exhibitions, tours and a mini cinema.

During the team field walks, we also saw some other important monuments. One of the most stunning was the Finnieston Crane on the north bank in front of the SSE Hydro. This unique monument not only represents a feat of British engineering, but strongly recalls the history of Glasgow and should be definitely integrated into waterfront renovation strategies. To combine history with new modern and digital approaches might be the key for bringing younger and older people together in one place.

Furthermore, derelict plots of land on the banks of The River Clyde serve as multiple points of focus. The banks are potentially an excellent place to attract people near the river.

Last but not least, there is a University of Glasgow campus on the north bank of The River Clyde. Many young people live and spend time there. These students are potentially important contributors to bringing life back to the river and the waterfront. However, there are no attractive connections between the waterfront and the campus. There are some abandoned tunnels in this area connecting the campus area and the river, providing a safe and short passage. In addition, there is a naturally appealing canal, upon which it is safe to boat. The key to bringing students to the waterfront may be to use these tunnels and canal as pedestrian routes.

These remarks bring us to several issues, which are derived mostly from the need to efficiently connect the focal points and districts with each other. Among the main issues is definitely the lack of connection between Govan District and Partick District. People from these districts have no immediate way to cross the river, because there is no physical connection such as a bridge or tunnel between the districts within walking distance.

Another connectivity issue is the lack of pedestrian link between the bank where the Glasgow Tower is located and the Govan District. During our informal interviews, residents told us that it is not appealing at all to walk along the entire dockline, when travelling from the Glasgow Science Centre to the Govan District.

In addition to what is mentioned before, during a walk across the eastern part of the riverside, we experienced a feeling of crossing through a "ghost town." An immediate issue is the lack of activity on the riverfront and the need to drive there, not only for occasional visits to the individual focal points like the SSE Hydro, the Glasgow Science Centre or the Riverside Museum, but to develop lasting bonds with the place that inspire a feeling of belonging. From our point of view, what people can do every day on the riverside should be among the primary



Figure 8
SSE Hydro



Figure 9
The Glasgow Science Centre



Figure 10
The Riverside Museum



Figure 11
Finnieston Crane

objectives of the plan.

There is also a need to bring greenness back to the city, which is inspired by a worldwide urban planning trend. Our team observed a lack of places where one can enjoy the river surrounded by a green, friendly and recreational environment. Nowhere along the riverfront can Glaswegians and visitors have a picnic or barbecue with friends, jog, get involved in outdoors activities on their own or with friends and family.

In order to ensure that not only a renovation but a complete regeneration of the waterfront is successful, noise pollution should be seriously considered. Cars and lorries on the A814 (north bank) produce a significant amount of noise and, as we experienced, has a negative impact on the overall appeal of the riverside.



Figure 12
The Vision of the Waterfront in Paris

VISION - G.L.A.S.G.O.W.

Our vision for the section of the Clyde River that crosses Glasgow City Centre is built upon a number of strategic principles, formed into the acronym GLASGOW, making them easier to understand and remember. These values tie together a holistic vision for change based upon sustainable social innovation and transformation through new links and connections:

Great – Promoting the unique qualities that make Partick and Govan special parts of Glasgow, one great destination

Lively – Helping the community programme new community spaces, entertainment and activities that allow for lively dialogue and exchange among citizens.

Active – Providing numerous opportunities for sports recreation and active living along the river and connecting to green linkages across the site.

Smart - Developing and testing local solutions using smart technologies, green energy and transport strategies that focus on a better built and social environment for users.

Gateway – Positioning this part of the Clyde as a gateway to Glasgow, to Govan and Partick, as a crossroads that provides new connections for the west of the city.

On – Bringing a whole host of new audiences, new community uses and 24-hour activity to the area that ensures a safe and secure neighbourhood that is always on.

Waterfront – Reimagining the river as a common asset to the entire city that can provide more delightful public spaces, but also new enterprise and employment opportunities.

Taking these ideas into consideration we have devised a programme that ties together new uses and activities. We have chosen to focus on a large area, zooming out to take a view of the entire context of Govan and Partick. While the river currently forms a hard border between the communities, we have scoped out a number of interventions that aim to bridge the two and create new opportunities for exchange. As an exercise in place-making, it is important to bring to the fore the unique qualities of both neighbourhoods: the world heritage of Govan and the bustling creativity of Partick. Our proposal seeks to bring these places together in a common vision for the west of the Clyde. We believe that with the right ingredients, this area can become a destination that offers an alternative to visiting the centre of Glasgow.

We have identified five core sites that can be developed over a phased strategy, through engagement with their local communities informing co-production of new service and delivery models.

I. Govan Green Bridge – One of the most important features of our plan is a green bridge to link both banks of the Clyde. Part of our strategy is to build a number of pontoon like connections that form green public spaces that can link either side of the river. The main green bridge to the west of the Riverside Museum will contain a regular farmers market that brings residents of Partick down to the Clyde. Smaller connections are flexible and can bridge the Riverside Museum to green areas on the Govan side. All of these floating bridges are to be made at on-site workshops.

II. Maritime Museum and Makerspaces – In order to guarantee a sustainable legacy for Govan we must bring new use to the shipyard in the form of smaller scale makerspaces that maintain the cultural heritage of the area. Engaging the local community in designing a maritime museum, which tells their story, interactively and among the renewed and bustling shipyard. Workers will also build the pontoons and party boats that will take small groups and parties boating among the floating islands between the banks.

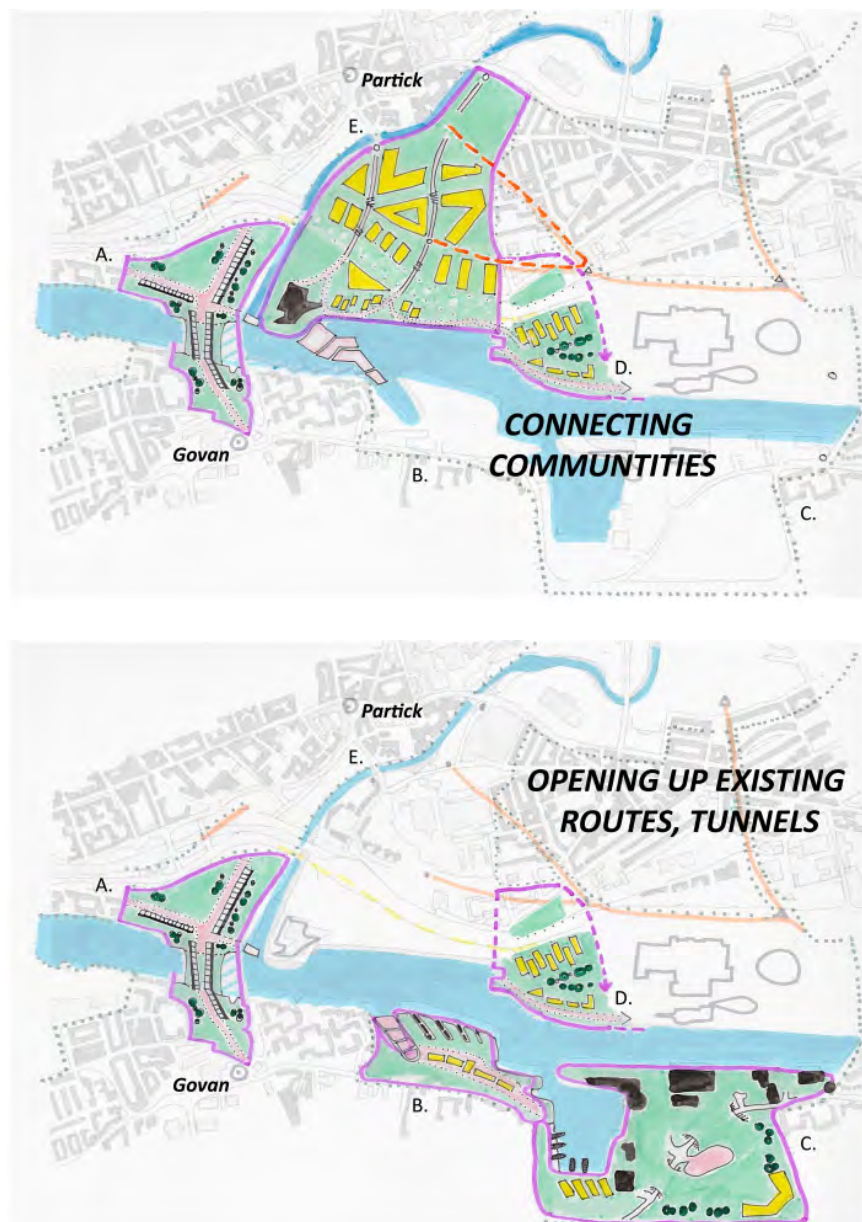
III. Innovation and Ecology Park – In order to build upon a renewed culture of making and enterprise for Govan, we propose an innovation park for sustainable start-ups and businesses. This area will be developed as a learning lab, mixing parkland and green spaces for active living, with spaces for enterprise, research and innovation. This will help to bring new audiences and opportunities to Govan.

IV. High-density mixed use – On the Partick side of the river, a key element of our proposal will be mixed use residential, retail and entertainment alongside the existing exhibition centre. In addition to activating the river edge for cycling and active use, we propose new leisure and entertainment uses providing visitors to adjacent attractions with a reason to stay and quality residential accommodation.

V. Mixed-programmed neighbourhood – The large former hospital site at Yorkhill represents the biggest opportunity to connect Partick to the river and with Govan. There are already a number of student housing developments under construction along the narrow canal-side greenway. Bringing these communities down to the river will knit together more residential areas with large and open terracing. Covering the road with a green and glazed walkway will remove the barrier currently imposed by the expressway. Lining the promenade with pop-up shops and restaurants will breathe new life into the Clyde.

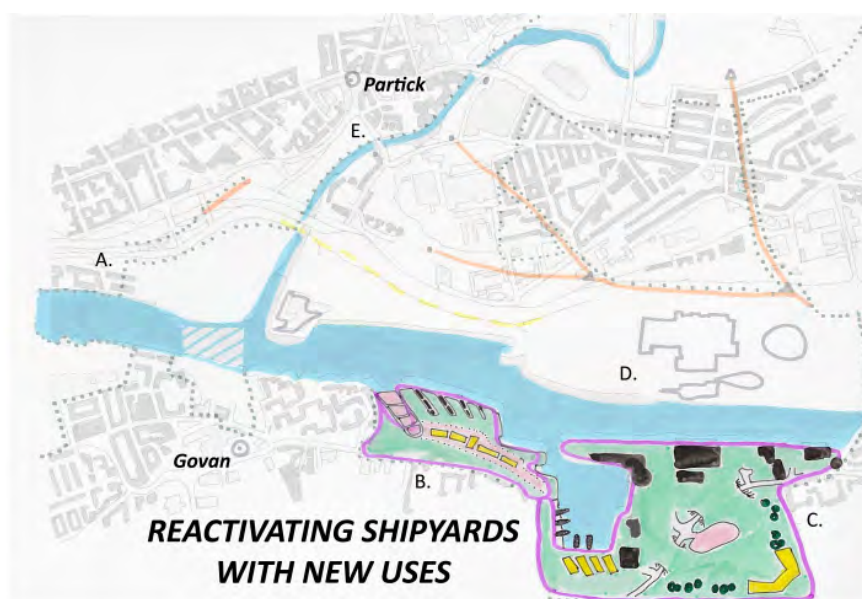
The G.L.A.S.G.O.W. vision has been proposed as a holistic strategy that can be planned and funded as phases in an open and collaborative process with diverse stakeholders across the key sites we identified. Without question, central to the success of this strategy will be the unlocking of a vast amount of resources that exist – human capital and infrastructural functions that can reduce costs and make for more sustainable regeneration.

Figure 13
Main proposal depicted



Some of these resources include tunnels under the Yorkhill site, which can be reimagined as connections between new functions and spaces. Other tunnels under the river can be connected in an integrated system of walkways and cycle paths, both open air and covered. This network of new routes is intended to bring additional visitors from Partick and elsewhere to the riverside and across to Govan. We would also propose that a light-rail system be built along the old tram sections, thereby connecting residents along a circular route around the area.

While our proposal has defined some key interventions, we understand that these are seeds for strategies that should be refined and developed in detail with the relevant citizen groups and stakeholders. True ownership and buy-in for transformation must be achieved through open consultation and co-design processes that will help locals shape a sustainable strategy for them to deliver themselves. As the group has found, bringing together a number of different disciplines, professions and perspectives in collaboration makes for well-considered and responsive solutions.



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FIGURES

Figure 1: https://upload.wikimedia.org/wikipedia/commons/1/1a/Glasgow_Garden_Festival_panorama.jpg

Figure 3: <https://maps.google.com>

TEAM MEMBERS

From left to right:

Jamie Shields
George Doulikas
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CONCLUSION

SUMMARY

David Guggenheim

CONCLUSIONS OF THE WORKSHOP

Around thirty to forty years ago, Glasgow was an important port and industry city. Now this has dramatically changed.

The heavy industry and along with it the port has disappeared. The River Clyde, a former source of pride, has lost its importance.

The municipality of Glasgow, along with ISOCARP and ITACUS, came up with the idea to hold a planning workshop in which new ideas (from thinking out-of-the-box) would be suggested to revive the river area and the “vanished” port.

A group of 25 young designers was invited – architects, planners and engineers from different countries – for an intensive week of design idea development, which would redefine Glasgow by changes made to the river area. Along with them, four mentors were invited to accompany the design process.

The Glasgow municipality members introduced:

- The physical state of the area.
- The main problems with the area.

The team mentors presented the urban idea approach to the workshop:

- The workshop should hold a broad discussion on the different meanings involved in the interference to daily life, which obviously involves the design, architecture, planning and constant development and growth of the urban environment.
- A profound and genuine dealing with the question of the development of the modern city, a question that brings complex challenges with aspects that deviate far beyond the specific design.
- A discussion of the city’s ability to rephrase itself as a necessary condition for its survival in the context of a complex environmental area, with a background of damaged ecological systems, complicated social relationships and dwindling land and natural resources.
- Observing the possible redefinition of the city, not in a technical way but rather in a poetical one, Allowing basic cultural concepts to define the area and leading to an opportunity to identify and create a specific urban space, establishing a stable development that would not destroy human and natural resources. At present, the development of the area risks leading to such a destruction.

The group was divided into five teams, in which each team developed its own urban design idea which included:

- Reference to the urban design planning.
- Developing a program of values and a social program.
- Developing a transportation system.

TEAM 1 CLYDE CONNECTIONS BY OVERCOMING THE BARRIERS OF THE CLYDE

In similarity to team 3, this team also saw the passing of the highway through central Glasgow to the west as a severe rift and separation between the city, the river, and the port.

To overcome this rift, the team suggested moving the highway to an underground tunnel. In this manner, two significant goals will be achieved:

- An open space would be created (above the tunnel), which can be used for various activities.
- A natural connection between Glasgow city and the river.

The new space would include:

- Sub-surface mixed use commercial/leisure/residence;
- Green areas;
- Over ground railway above the Sub-surface expressway;
- Residence w/underground parking;
- Bridge River crossing;
- Park/Green area;
- Graving Docks recreational area (bars, cafés);
- Mixed use commercial/leisure/residence w/underground parking.

Glasgow would achieve an integral connection between the city, the river, and an ethical new urban space, through which Glasgow could be redefined.

TEAM 2 WELDING THE WEEGIE WATERFRONT

The team developed a plan for the area, by analyzing events, which could be developed in the future, by means of imaging.

They created an image named "Lucy" who is active and lives in the area.

They developed a program of activities, based on a program of values and experience.

The space was designed as a web of sites/spaces in which various urban events take place, such as:

- Sports, jogging, and open walking space along the riverbank;
- Culture and Leisure – Public buildings and open public space;
- Employment – Work space;
- Residence – Housing clusters.

This design, a result of analyzing events, provided a wide picture of the physical living structure.

TEAM 3 MAKE THE CLYDE WATER FRONT OUR "LIVING ROOM" BY CREATING GLASGOW'S BOULEVARD

The previous highway development from central Glasgow to the west has caused a severe rift and separation between the city, the river, and the historical port. This rift has led to a situation in which the city, on one hand, does not really enjoy the charming river and, on the other, has caused a degeneration of the river and port environment.

The team suggested a revolutionary proposal: change the highway into a lively city boulevard – not a "river" of cars, but a space for human beings, pedestrians, cyclists and cars.

The new boulevard, like many main boulevards in cities worldwide (the "Champs-Élysées" in Paris, "Broadway" in New York City, the "Ramblas" in Barcelona and many more), would become "Glasgow's" new "living room." Through the boulevard, Glasgow would be renewably rephrased and a lively urban space including both historical Glasgow and the port space would combine residential, employment, and leisure spaces.

TEAM 4 GLASGOW URBAN GARDEN

The team suggested to develop the river space as a “green city”—a planning design based on city agriculture and on “green” environment values. This is an antithesis to Glasgow’s grey and polluted industry dating from the beginning of the 20th century.

This design plan would enable the city of Glasgow to receive a new “face”, to become a city that places the quality of the environment as the city’s new urban vision and as a top priority. In this manner, the river and the historical port would be the basis for “green” Glasgow. The adjacent river spaces would be developed as agricultural gardens; the old port would become a floating market; new residents along the riverbank would represent “green” building and would include components of LEED standards—preserving energy, recycling garbage, sewage etc.

The renewed river space would be a model of a 21st century city, with environmental values leading the design planning process.

TEAM 5. G.L.A.S.G.O.W – GREAT, LIVELY, SMART, GATEWAY, ON THE WATERFRONT SUSTAINABLE CONNECTIONS FOR SOCIAL INNOVATIONS

The plan suggests the development of the site as a new urban network based on the above concept-
Creating an urban tissue including:

- A new gate to the city, from the west situated on the river and its environment;
- A space for mixed use – “Hi Tech” employment;
- An active space of the river banks.

The design plan would be based on the following actions:

- Tapping into local potential;
- Mixing city and the river;
- Activating the edges;
- Unlocking green resources.

In summary, it seems that all the teams visualized a design plan for the city and its architecture, which is a response to the geographic location of the city and its culture—open to outside influences. As planners, the teams regarded the buildings, the urban tissue and the social dimension as integrated parts of a continuous cultural, economic, design planning process and as an authentic expression of place and time.

LESSONS LEARNED

Petr Salak

AN INSPIRING EXPERIENCE

The Young Professionals' Think Deep Programme workshop organised by ISOCARP, ITACUS, Think Deep UK and the City of Glasgow on "Rethinking the Clyde Waterfront", was held in Glasgow, United Kingdom, from 23 to 28 October 2016. The event was an inspiring experience and remarkable example of what a cross disciplinary design approach can bring to our cities.

Professionals in urban planning, architecture, tunnelling, geology, civil and geotechnical engineering came together with city officials to research, discuss and design multiple solutions for the brownfields redevelopment. The results of the workshop are innovative, environmentally friendly, comprehensive and daring.

The main benefits of the cross disciplinary design approach observed during the workshop are listed below:

- Multidisciplinary knowledge and application of different disciplines can lead to greater creativity,
- Some issues can fill in the 'gaps' between the traditional disciplines,
- Critical thinking skills are used and developed as participants look across disciplinary boundaries to consider other viewpoints,
- Overall solutions are robust and feasible,
- Exploring topics across a range of subject boundaries motivates people to pursue new knowledge in different subject areas.

From an organisational point of view, we need to remember that this is an urban planning exercise focussing on underground space and how it can become part of urban planning. The split between participants with an ISOCARP background and an ITACUS background was now 50/50. For future workshops it is recommended to make this split more 60/40 in favour of those with planning experience.

This workshop was the first one of this nature and it should be recognised that this requires courage from all participants and most certainly from the City of Glasgow, which provided financial support for the workshop. Well done for being the first and for leading by example.

There is no doubt that the City of Glasgow will benefit from over 1,000 hours of work by a team of 20 international professionals supported by three tutors and representatives from both ISOCARP and ITACUS.

Young Professionals' Think Deep Programme - YPTDP

