

CASE STUDY

SINGLE OPTION DEVELOPMENT



Cardiff Central Station is the busiest station in Wales and is a key sustainable transport hub for the South Wales Metro network.

The station links the centre of the city to the suburbs as well as providing connections between urban centres and major cities within the UK. However, the station has long suffered from issues of overcrowding, outdated infrastructure, poor accessibility, and limited capacity to accommodate future growth.

Around 40% of the jobs in Cardiff are taken up by people commuting into the city. In 2016, this amounted to 89,600 residents commuting daily into the city from outside the local authority boundary, with another 27,800 travelling in the opposite direction to work across the city region.

Typically, the jobs in Cardiff are based in or around the city centre. Currently, most commute into the city by car, significantly impacting the road network of the entire city region. With Cardiff being one of the UK's fastest-growing cities, the need for a modern, resilient, and inclusive transport hub has become increasingly urgent.

The Cardiff Central Enhancements Project (CCEP) was conceived to address these challenges and support the city's ambitions for sustainable development, economic regeneration, and improved public transport integration.

PROJECT DETAILS

Client: Welsh Government

Funding Partners: Department for Transport, Cardiff Capital Region, Welsh Government

Delivery Agent: Transport for Wales

Designer: Mott MacDonald

Project Value: c £140 million

Contract: NEC3 PSC Option C

The project aligns with the Welsh Government's Well-being of Future Generations Act and the Wales Transport Strategy, aiming to deliver a station that is fit for the future.

The design has been developed through the option selection and single option development stages and is aligned with the Metro Central Programme, integrating with wider regeneration efforts and transport infrastructure such as Cardiff Crossrail and the new bus interchange.

What is an Exemplar project?

An 'Exemplar' is defined as 'something worthy of being imitated or copied' and this is exactly what we continue to seek to achieve with this programme.

Exemplars are intended to offer good practical examples of how to achieve Best Value Sustainable Construction solutions. An Exemplar considers all aspects of sustainability, including economic, social and environmental, demonstrating that the scheme is well rounded and has incorporated best practice and collaboration.

Our approach to Exemplar has been updated to reflect the Wellbeing of Future Generations Act

and to provide greater value as well as inviting a programme approach to the process. It is anticipated that embarking on the Exemplar process will, in itself, lead to higher value being obtained from a project.

Case studies are normally prepared at 3 Key Stages; Design stage, Construction phase and Post-occupation, but we have recently added a Pre-design phase to our programme.

Addressing these phases ensures that lessons learnt can be demonstrated throughout the development of a project.



What will be delivered

The CCEP is a comprehensive redevelopment initiative to transform Cardiff Central Station into a modern, multi-modal transport interchange. The key proposed interventions include:

- **Northern Entrance:** Consolidated gatelines which improve visibility for subways. New retail areas on the paid and unpaid areas of the concourse, decluttering and reinstatement of heritage features with staff facilities relocated.
- **Platform Buildings and Canopies:** Decluttered platforms, rationalised passenger facilities and increased waiting areas with improved retail offering. Cleaning and refurbishment of canopies.
- **Fish Jetty and West Wing:** Reshaping the existing Fish Jetty with a new lift and stair arrangement with access to the Northern Concourse. New station service yard to meet the requirements of the enhanced station.
- **Platform 0 Extension:** Extension to 173m and widening to improve operational flexibility and accommodate longer trains.
- **Southern Entrance:** Replacement of the existing southern entrance with a larger building for enhanced civic presence. Pedestrian area outside with an added canopy to ease navigation towards Cardiff Crossrail. Staff accommodation consolidated into new southern entrance.
- **Cycle Hub:** Provision of 150 cycle parking spaces to further promote active and sustainable travel.

Collaborative working

The design of the station has undergone significant refinement and detailing through close collaborative working between Transport for Wales (TfW), Network Rail and Mott Macdonald alongside funding partners, Welsh Government, Department for Transport and Cardiff Capital Region.

The Principal Designer, Mott Macdonald together with Weston Williamson and Partners delivered a comprehensive package of designs that covered the civils, structural, signalling, telecoms, electrical and power and geotechnical elements of the project. These designs utilised key information about the site such as Environmental Appraisals and Assessments, Ground Investigation works and topographical surveys.

Regular interdisciplinary workshops and coordination meetings have ensured alignment across technical, operational, and strategic domains, whilst collaboration with accessibility panels, community groups, and transport operators has informed inclusive and user-focused design. The project team has also worked closely with developers of adjacent schemes, including Central Quay and Cardiff Crossrail Phase 1a, to manage interfaces and optimise outcomes.

This has resulted in a design submission to Network Rail for the provision of an Approval in Principle (AiP) and the issuing of an Engineering Compliance Certificate (ECC) which are both significant and key documentation in the development of railway infrastructure projects.

In addition Listed Building Consent and Prior Approval from the local planning authority Cardiff Council have been secured.

This collaborative approach has enabled the project team to navigate complex challenges, maintain stakeholder support, and deliver a cohesive vision for Cardiff Central as a modern, multi-modal transport hub.





Key challenges

The CCEP has faced several significant challenges throughout its option development. One of the primary issues has been balancing the ambition of the scheme with available funding. The project team had to make strategic decisions about scope prioritisation and value engineering to remain within the budget.

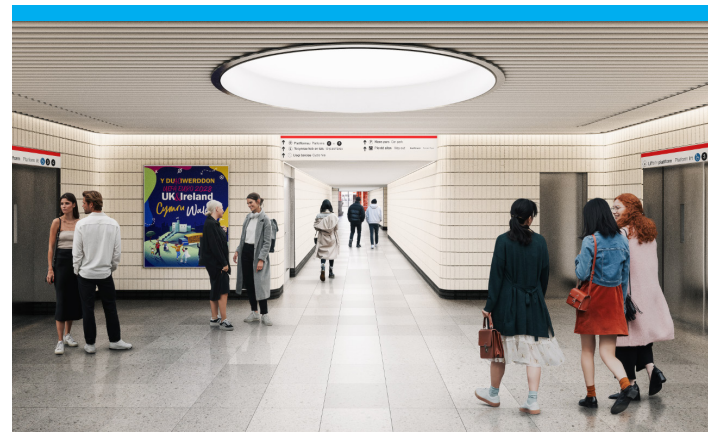
Technical challenges included integrating new infrastructure with existing heritage elements, addressing fire safety compliances, and ensuring accessibility improvements meet modern standards. Stakeholder alignment has required extensive engagement to reconcile differing priorities and ensure a unified vision.

Additionally, the project team had to be flexible to adapt to evolving passenger demand forecasts and policy shifts, particularly in the context of post-pandemic travel patterns and decarbonisation goals.

- **Platform 0 Constraints:** Required extension and widening to meet future service needs.
- **Fire Safety Compliance:** Existing infrastructure did not meet new standards.
- **Passenger Congestion:** Subways and gatelines were pinch points during peak and event days.
- **Integration with Other Projects:** Coordination with Cardiff Crossrail, Central Quay, and the new bus interchange.
- **Funding Certainty:** Managing scope and phasing to remain within the budget.

Looking forward the complexity of upgrading a live, operational station while maintaining passenger services and safety will form a significant challenge.

Whilst this has been considered throughout the early design stages, the team recognise that the constrained site, surrounded by ongoing developments such as Central Quay and the Cardiff Crossrail Phase 1a, will require careful phasing and coordination.



Stakeholder Engagement

The project team has carried out extensive and ongoing engagement with a wide range of stakeholders. Key partners include Network Rail, Welsh Government, Department for Transport (DfT), Cardiff Council, Cardiff Capital Region (CCR), and train operating companies such as GWR and CrossCountry.

Funding and delivery partners have been engaged through the Metro Central Board and the Station Enhancements Delivery Group, ensuring coordinated decision-making and alignment with wider regional strategies.

Regular workshops, briefings, and one-to-one meetings have been held to gather input and secure buy-in.

Technical stakeholders have contributed to the development of design options, risk assessments, and operational planning. The engagement process has also included accessibility panels, such as the Accessibility and Inclusion and Built Environment Accessibility Panel (BEAP), to ensure inclusive design.

Stakeholder feedback has shaped key elements of the project, including the prioritisation of interventions, the integration with surrounding developments, and the approach to construction phasing.

This collaborative approach has been critical to the success of this stage of the project's development and will continue throughout delivery.

Innovation

The CCEP team have incorporated a range of innovative approaches in both design and delivery. Technological innovation is central to the project, with the integration of smart ticketing systems, including tap-on/tap-off functionality, and enhanced digital information displays to improve passenger experience.

The design process has embraced Building Information Modelling (BIM) and digital twin technologies to optimise planning, coordination, and stakeholder engagement. Virtual reality tools, such as Matterport and AIVR, have been used to visualise station layouts and gather feedback from stakeholders and the public.

The project team also identified the use of renewable energy technologies, including solar panels and air source heat pumps, to reduce operational carbon emissions.

The South side redevelopment includes a 150-space secure cycle hub, representing a forward-thinking approach to active travel infrastructure.

Additionally, the project's phased delivery model and proposed use of NEC4 ECC Option C contracts demonstrate innovation in procurement and risk management, allowing for flexibility and cost control throughout the construction process.



Community Engagement

Community engagement has been a cornerstone of the team's approach to the preliminary design process for the CCEP, ensuring that the voices of local residents, passengers, and businesses are reflected in the project's development.

As part of the Stakeholder Engagement Strategy Plan, a bilingual digital engagement platform, Commonplace, was used to gather feedback from the public. Over 400 contributions were received, highlighting key concerns such as accessibility, station layout, and the surrounding public realm.

The feedback directly influenced design decisions, including the consolidation of gatelines, improved wayfinding, and enhanced accessibility features.

The engagement strategy was designed to be inclusive, reaching a wide demographic and ensuring that protected characteristic groups were represented.

Future engagement activities as detailed within the stakeholder plan are planned to take place throughout the construction phase to maintain transparency and manage disruption.

The project also aligns with the Well-being of Future Generations Act by promoting long-term community benefits, including improved access to employment, education, and cultural opportunities.



Lessons Learned

The CCEP project team have drawn on lessons from previous TFW and Network Rail projects and engaged with:

- **Birmingham New Street Station** redevelopment
- **Oxford Station** Phase 2 Project
- **Northumberland Line** Enhancements
- **Manchester Airport Station**
- **Gatwick Airport Station** Project
- **Leeds Station**
- **Bristol Temple Meads**

Lessons learnt from these schemes have been introduced into CCEP and the key lessons include:

- The importance of early and continuous stakeholder engagement to build consensus and manage expectations.
- The use of digital tools for design visualisation and public consultation has proven effective in enhancing transparency and inclusivity.
- The value of flexible procurement strategies, such as phased contracts, to manage risk and cost uncertainty.
- Coordination with interfacing developments has underscored the need for robust interface management plans.
- Accessibility and inclusivity have been prioritised from the outset, informed by feedback from accessibility panels.
- The importance of integrating sustainability and carbon reduction measures early in the design process.

These lessons are being documented and shared across TFW's portfolio to support continuous improvement.



Sustainability

The concept of Sustainability has been embedded by the team throughout the development of the CCEP, aligning with the Well-being of Future Generations (Wales) Act 2015 and the Wales Transport Strategy.

The project promotes modal shift not only by ensuring capacity growth for additional services, but also by improving access to public transport and active travel, including a 150-space cycle hub and enhanced pedestrian connectivity.

Environmental sustainability measures include the use of low-carbon technologies such as solar panels, air source heat pumps, and LED lighting. A Whole Life Carbon Assessment has been undertaken, with further refinement planned during the next design stage.

Social sustainability is addressed through inclusive design, improved accessibility, and enhanced public realm. Economic sustainability is supported by increasing station capacity, enabling future growth, and unlocking development potential in the Cardiff Central Enterprise Zone.

The project team also recognise that the project's sustainability credentials will be further reinforced by its ongoing participation in the CEWales Exemplar Programme.



Health and Safety

Health and safety considerations have been central to the CCEP's design and planning.

A comprehensive fire strategy has been developed, addressing non-compliances associated to changes in standards and introducing a new track-level emergency walkway to provide a secondary means of escape.

The design includes improved lighting, CCTV coverage, and emergency communication systems to enhance passenger safety.

Accessibility improvements, such as new lifts and step-free routes, also contribute to safer station navigation.

The team have planned that during construction, phased delivery and detailed sequencing plans will minimise disruption and ensure safe operations.

The project has undergone rigorous hazard identification and risk assessments, with mitigation measures integrated into the design.

Stakeholder input, including from unions and accessibility groups, has informed safety planning.

The project complies with CDM regulations and includes a robust safety verification process.

Health and safety considerations will continue to guide construction and operational planning, ensuring a safe environment for passengers, staff, and contractors.



TfW Exemplar Programme

CEWales has set up an Exemplar programme with TfW. A number of projects, at varying stages of development, are identified for inclusion in the annual programme.

In this fourth year (2023/24) there are five projects. The Cardiff Central Enhancements Programme is the fifth and final case study completed for the year.



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