Design Manual
NR/GN/CIV/200/02

NetworkRail

Design Manual for Medium to Small Stations

Document Approval

Authorisation

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How to use the guidance suite

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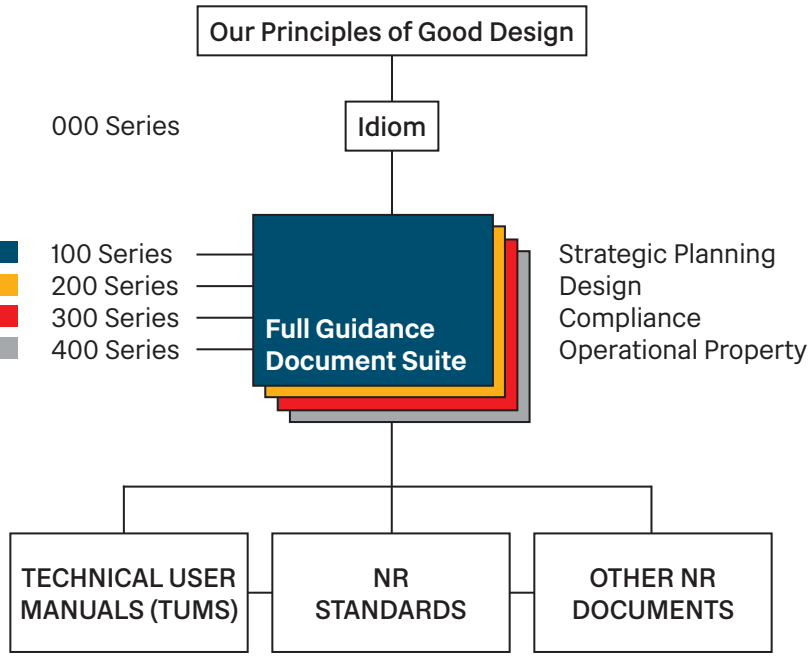


References to other documents

- Code of Practice Guidance
- National Standard
- Network Rail document
- European Standard

Example:

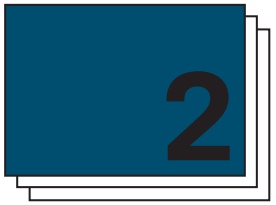
Network Rail Document
Inclusive Design NR/GN/CIV/300/04

A full list of relevant documents, and other guidance suite documents is contained in the appendix.

About this document

Section 1
Introduction

Describes the scope and context of this design guidance document.

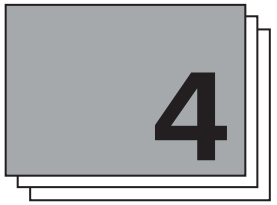


Section 2
Vision and Concept

Sets out the vision for future stations and outlines the HUB Station concept.

Section 3
Community

An overview of community involvement in the design and use of stations.



Section 4
Toolkit

A manual for the application of the HUB Station Kit of Parts.

Section 5
Design Strategy

Summary overview of key design and engineering strategies.

Section 6
Cost and Procurement

Overview of HUB Station cost benchmarking and cost and procurement guidance.

Section 7
Appendix

Supporting information and tools including briefing matrix and material palettes.

Contents

Additional supporting information available on request from NR Buildings and Architecture, Technical Authority:

- Design Drawings
- Engineering Design Reports
- Cost Estimate
- Constructability Review
- ExploreStation Consultation Report

Figure 1.1
Princeton Transit Hall inspired the HUB Station competition concept

1

Design Manual for Medium to Small Stations
Introduction

1.1 Purpose of this Document

This document outlines the HUB Station concept for small and medium stations - a design manual and kit of parts aimed at the Sponsors, designers and planners of new and upgraded railway stations across Britain.

The document is intended to be read in conjunction with other Network Rail guidance and includes references where relevant.

The HUB Station concept is intended primarily for small to medium category D, E and F stations. This includes approximately 80% of British railway stations - over 2,000 stations.

- D - staffed medium-sized stations with 0.25–0.5 million passenger trips per year. There are approximately 300 across Britain.
- E - small staffed stations with under 0.25 million passenger trips per year. There are nearly 700 across Britain.
- F - small unstaffed stations with under 0.25 million trips per year. There are approximately 1,200 across Britain.

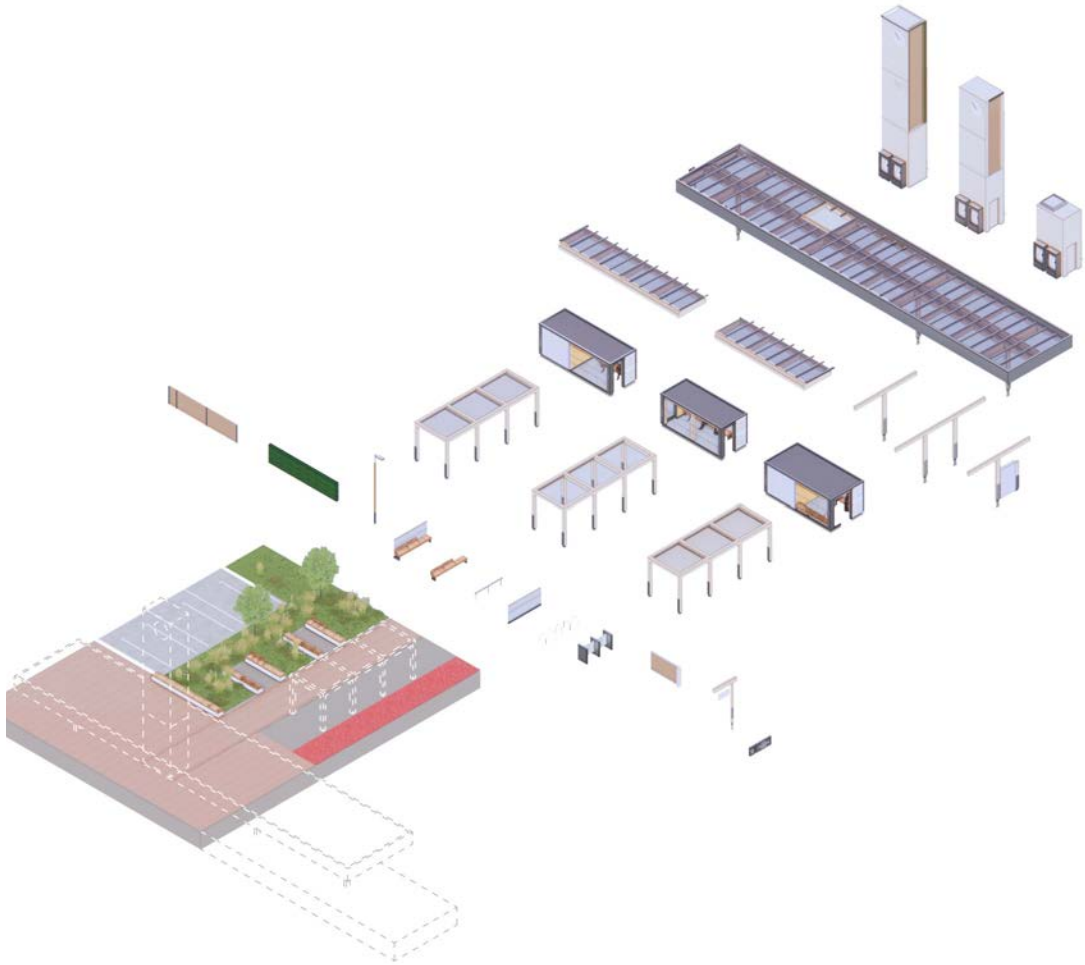


Figure 1.2
HUB Station Kit of Parts

1.2 Design Manual Development Process

Through the Re-imagining Railway Stations Competition, Network Rail invited proposals that will challenge and re-imagine what a 'station' could become in the 21st century.

7N Architects' winning concept, selected from over 200 international entries, envisions stations that celebrate the railway as a progressive, sustainable mode of transport with a pivotal civic role in serving communities throughout Britain.

7N Architects led a design team working with Network Rail to develop the competition concept and produce this design manual and accompanying toolkit. The team includes:

- 7N Architects - Architect
- Arup - Structures, M&E, Lighting
- LUC and Lisa MacKenzie - Landscape
- Gardiner and Theobald - Cost

The HUB Station concept has been developed through an extensive process of collaboration and engagement including:

- Network Rail Technical Authority Project Team
- Network Rail Stakeholder Working Group
- Nationwide public consultation via 'ExploreStation'
- Network Rail Design Advisory Panel (DAP)
- Built Environment Accessibility Panel (BEAP)

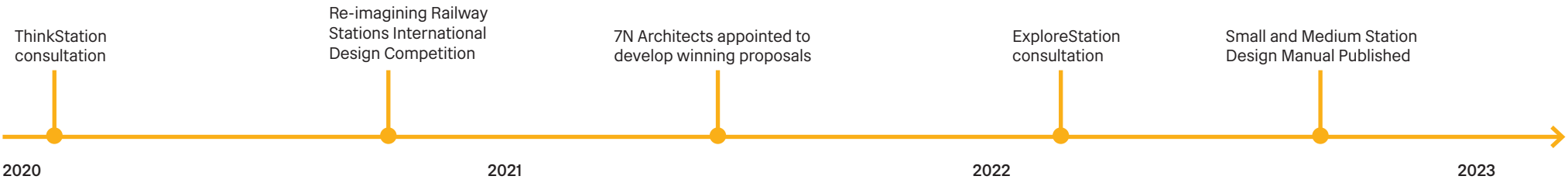


Figure 1.3
Timeline showing the evolution of the Small and Medium Station Design Manual

1.3 Scope

HUB Station focusses on the immediate station approach, entrance and core facilities.

Areas within the scope of this guidance include:

- Station entrance environment
- Core station facilities

Areas out of scope include:

- Platforms
- Footbridges
- Platform-Train Interface
- Car parking

The HUB Station designs have been developed with consideration of key thresholds and relationships with adjoining areas and references to relevant guidance and standards for these surrounding areas are included throughout this document.

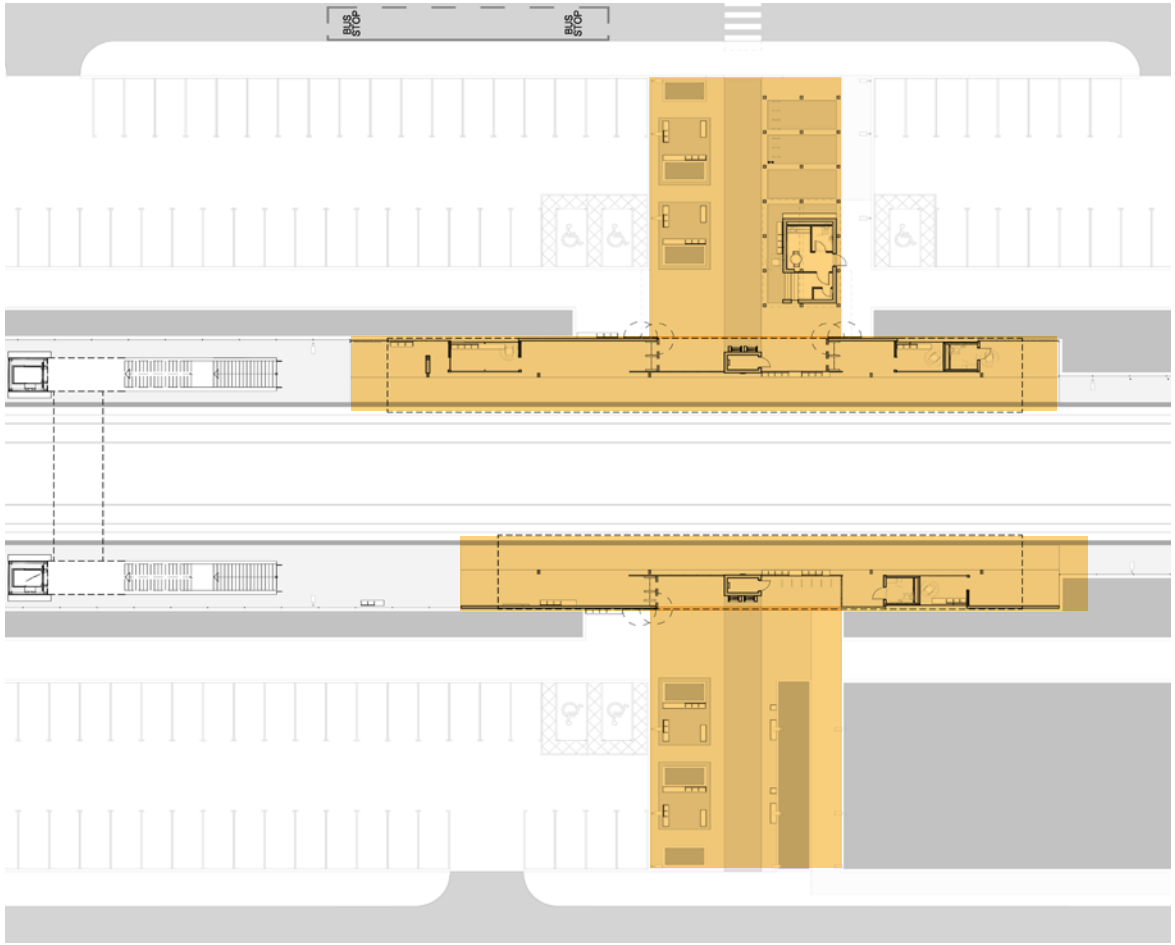


Figure 1.4
Typical station plan highlighting areas in scope

1.4 Design Status

The designs described in this document and the supporting package of drawings and design reports have been developed to a level consistent with PACE milestone ES4.

Form A and Form D were submitted in conjunction with this document to secure Approval in Principle (AiP) for the generic station designs and kit of parts. It is envisaged that forthcoming station projects can use this AiP to streamline the design process for new stations.

Design work to adapt the standard proposals for each site could be undertaken in a streamlined Development and Design phase 'ES4'. The best approach depends on the extent of work required to adapt designs for a specific site and should be agreed on a project by project basis.

The process for using the HUB Station toolkit is explained in further detail in section 4.7.

Phase	Milestone	Description
Strategic Development & Project Selection	ES1	Client requirement defined and baselined.
	ES2	Constraints identified and project feasibility confirmed.
	ES3	Single option identified and endorsed.
Project Development & Design	ES4	Design standards approved and Approval in Principle.
	ES5	Construction ready design approved.
Project Delivery	ES6	Construction complete.
Project Close	ES7	Project demobilised and handed back to Sponsor.
	ES8	Contractual accounts settled, warranties transferred to maintainer, formal closeout.

Figure 1.5
PACE milestones

Figure 2.1
Approach to a HUB Station across the landscape 'Welcome Mat'

Design Manual for Medium to Small Stations

2

Vision and Concept

2.1 Principles of Good Design

HUB Station is underpinned by Network Rail Principles of Good Design and aims to demonstrate how these principles can be applied to create exemplary stations.

The vision for HUB Station is set out on the following pages according to the following core objectives which are described in further detail on the following pages:

- Connecting Communities
- Minimising Environmental Impact
- Improving Passenger Experience
- Deliverable Approach

The proposals described in this document and supporting drawings and design reports show how these objectives can be achieved for small and medium stations.

Network Rail Principles of Good Design

Network Rail Guidance

Principles of Good Design

2.2 Connecting Communities

HUB Station enhances the significance of a station within a local community by making it a focal point for the community, signified by the clock tower, a new local landmark.

The proposed station environment extends beyond the platform to create civic spaces to welcome travellers and provide a placemaking framework to accommodate a diverse mix of permanent and pop-up uses to give local people and visitors a reason to gather and linger.

A 'welcome mat' of landscaped public realm defines these spaces and reflects local character through a tailored design response to each location, based on common design principles, employing local materials, craftsmanship and regional plant species to embed it in the local context.

The scale of the generously proportioned canopy provides shelter, captures solar energy and instils a civic presence.

Figure 2.2
Community HUB

2.3 Minimising Environmental Impact

The aim is to create vibrant sustainable transport hubs to encourage more people to use the railway, an inherently sustainable mode of transport, and harness the potential of stations to be highly visible exemplars in environmentally sustainable design.

HUB Station recognises that the railway should be part of an integrated transport network including convenient connections to active travel routes.

Sustainable design principles are embedded in the HUB Station approach and the development process was informed by whole-life carbon analysis. This approach includes:

- Interrogating new station briefs to avoid under- or over-providing facilities.
- Minimising embodied carbon through low carbon materials like timber.
- Efficient off-site construction methodologies.
- Making stations as self-sufficient as possible by minimising energy usage and maximising on-site renewable generation.
- Promoting active travel access to stations.

Figure 2.3
Sustainable Transport HUB

2.4 Improving Passenger Experience

It is recognised that funding for small and medium stations can be limited so the approach to providing the right facilities is to focus investment on maximising benefits to passengers by:

- Designing people-focused stations to prioritise passenger experience and create places where people want to be.
- Going beyond minimum engineering requirements and focussing investment on aspects that offer greatest benefit to passengers.
- Creating inclusive stations that are accessible for all by providing the right facilities from seating to toilets and considering people in design.
- Establishing a consistent identifiable approach to smaller stations will make stations easier and more enjoyable to use.

Figure 2.4
Existing shelter

Figure 2.5
HUB Station

2.5 Features Comparison

The table on the next page compares the HUB Station base configurations as illustrated here. These configurations are described in further detail in the sections that follow.

Comparison criteria are categorised according to their contribution to achieving core objectives:

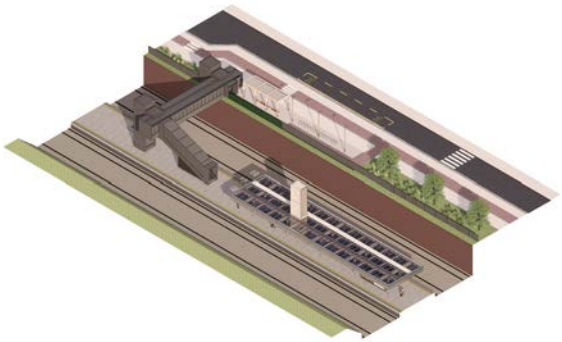
- Passengers and community
- Deliverability
- Environment

The table quantifies the broad range of beneficial features offered by the HUB Station concept and demonstrates tangible improvements for the environment, passengers, funders and operators.

The comparison is based on the following assumptions:

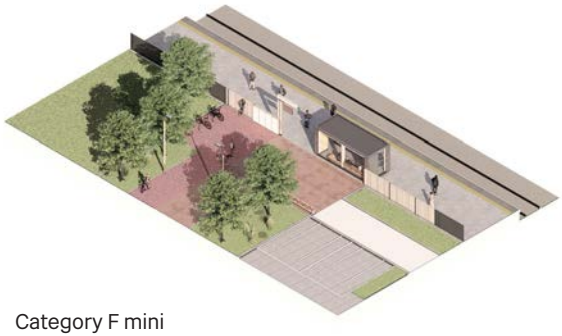
- Capital costs are based on typical layouts and detailed in cost report by Gardiner & Theobald.
- Energy calculations for PVs based on South-East England locartion in North-South orientation with no shading.
- Carbon saving figures calculated based on UK grid Carbon Intensity as of Apr 2022.
- Energy cost saving figures calculated based on projected electricity cost between 2020 and 2050.
- Estimated life span of PV systems to be 30 years.
- Replacement of M&E equipment during 30 year period has not been accounted for.

Category D



Category E (island)

Category F



Category F mini

Figure 2.6
HUB Station base configurations as compared within the features comparison

2.5 Features Comparison

Type	Passengers and Community												Deliverability			Environment			
	Activity frame	Canopy shelter to platform edge	Waiting shelter	Sheltered waiting (seated / standing)	Canopy area	Accessible WC	Baby change	Integrated M&E services	Integrated advertisement	Staff facilities	Ticket machines	'Welcome mat' public realm approach	Revenue generation opportunities	Capital cost	30 year energy cost saving	Operational energy (% self-sufficient)	Biodiversity net gain	Sustainable drainage	30 year carbon saving
D	●	●	●	38 /248	560m2	●	●	●	●	●	●	●	●	£2.5m	£154k	59%	●	●	51t
E	●	●	●	60/ 234	380m2	●	●	●	●	○	●	●	●	£1.3m	£80k	39%	●	●	27t
F	○	●	○	18 / 59	110m2	○	○	●	●	○	●	●	○	£0.5m	£40k	37%	●	●	13t
F mini	○	○	●	8 / -	0m2	○	○	○	○	○	○	○	○	£0.3m	0	0%	○	●	0

● Provided in base configuration ○ Desirable addition to base configuration ○ Optional addition to base configuration

Figure 2.7
Comparison table illustrating features and key data of HUB Station base configurations (configurations as illustrated on previous page)

2.6 Benefits of HUB Station

HUB Station has been developed to create better stations that prioritise people and connect to their place and community. The design approach combines generously proportioned but pared back structures with natural materials and soft landscape to deliver on the core objectives outlined earlier.

Key characteristics and resulting benefits are illustrated on the right and include:

Civic presence: Creating generously proportioned and high quality station environments that re-establish the civic role of the railway.

Community: Making space for people and a framework for community activities. Embedding a process for community input in the creation and operation of stations.

Environment: Combining natural, low-carbon materials with green space to create positive environmental and ecological impacts and maximise enjoyment and wellbeing of users.

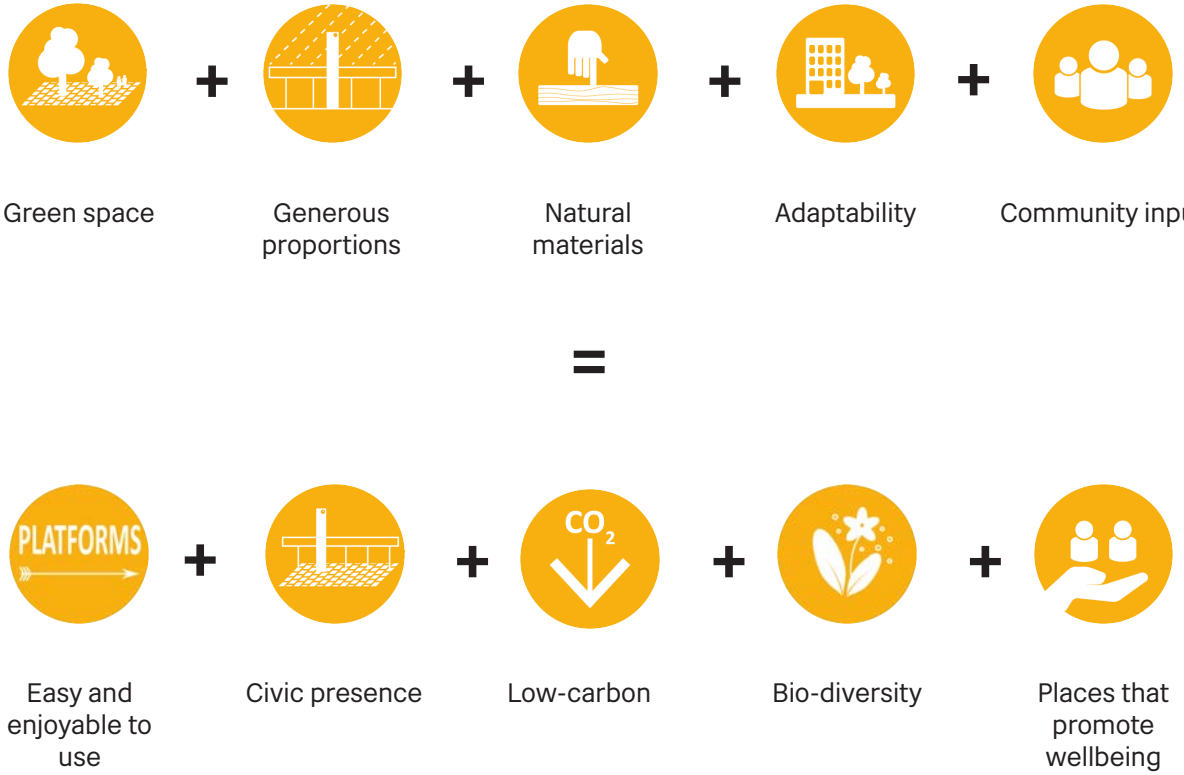


Figure 2.8
HUB Station - summary of benefits

2.7 Deliverability

HUB Station is ambitious and deliverable.

Design development has been informed by input from experienced Network Rail designers and a constructability review with Story Contracting who are experienced constructors of small and medium station projects.

Pragmatic considerations are embedded in the toolkit and need to be followed through on each project. These considerations include:

- Practical and efficient construction methodology
- Safe, convenient and economical maintenance
- Benchmarked lifetime costs balancing upfront capital cost and ongoing operational costs including energy and maintenance.

Strategies to address these considerations are described in detail in section 4.

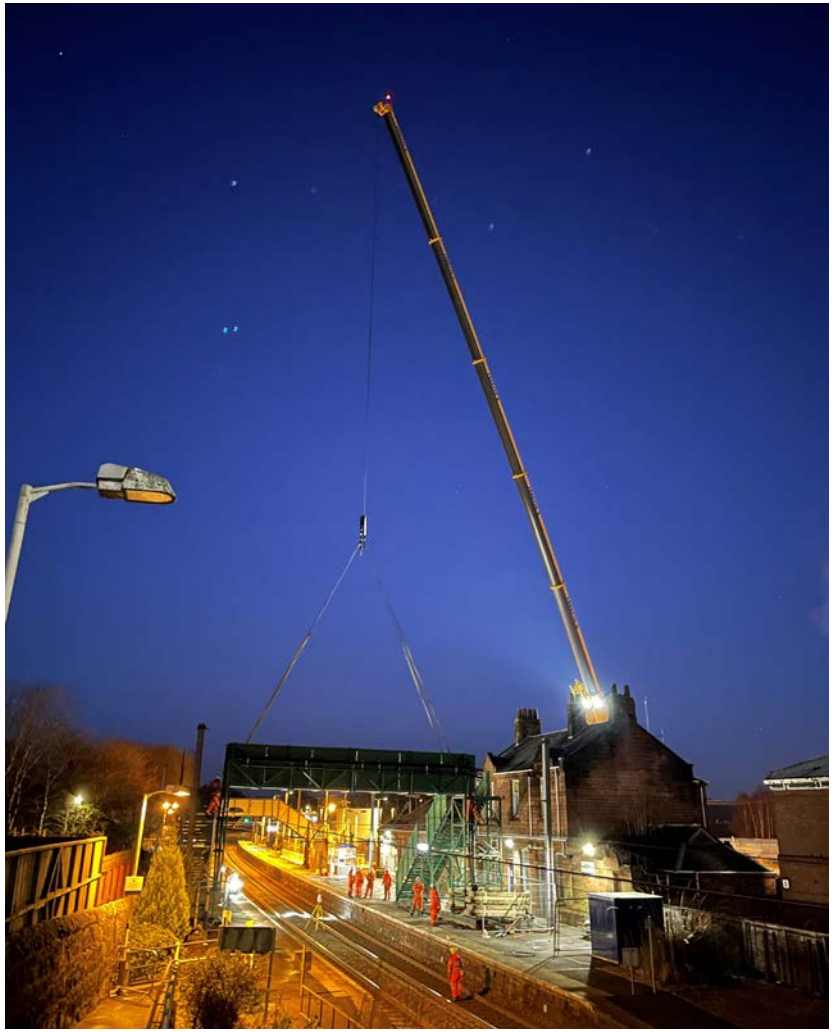


Figure 2.9
Station upgrade works with pre-assembled components

Figure 3.1
Aerial view of an integrated multi-modal transport hub

3

Design Manual for Medium to Small Stations
Community

3.1 Community Input During Design

3.1.1 The civic role of stations

Community involvement in the creation of stations is fundamental to re-establishing their civic role.

Involving the community has the following benefits:

- stations that are tailored to the needs of local people
- sense of ownership increasing usage and reducing vandalism and anti-social behaviour

HUB station has been developed through extensive and varied engagement, as outlined in section 1.2, and appropriate project specific engagement should continue to inform the application of this guidance and the design development of individual projects.
The HUB station kit has been designed so that whilst the rail-side elements of the HUB Station kit are standardised and designed in detail, community focussed elements, specifically the activity frame, is deliberately left more open to allow each station to be adapted to its context and to serve the unique needs of its local community.

Figure 3.2
Stakeholder mindmapping during a ThinkStation event.

Instead of a prescriptive design, HUB Station proposes a process of engagement that should inform decision making around the use, scale and form of these community focussed elements that should be present at every new or refurbished station.

3.1.2 Establishing a framework for engagement

Establishing clear parameters and managing expectations from the outset increases likelihood of focussed and meaningful engagement.

Before embarking on any engagement a clear framework should be established:

- What is the aim of the engagement?
- What is open to change / what is fixed?
- What budget is available?

3.1.3 Utilising existing forums

The preferred approach is to proactively engage with existing community forums, typically community councils. These groups would likely already be statutory consultees as part of the planning process - they should be engaged in advance of any submission so that there is opportunity to input into brief and design development rather than responding reactively to a planning submission.

All projects should seek views of people with protected characteristics.

For higher profile projects, further engagement may be appropriate and this can be tailored to suit the level of involvement that is appropriate for each station project and for higher profile projects could involve establishing a community steering group.

3.1.4 Direct communication

There should be opportunities for locals to interact directly with project teams, particularly sponsors and designers. This approach has the following benefits:

- allow project teams to hear local input first-hand and be accountable for how this is incorporated
- allow local communities to have direct input into proposals and also understand challenges
- encourage sense of ownership by the local community
- streamline engagement process to focus expenditure where it has most direct benefit for communities.

Design teams should present information so it can be readily understood. In order to engage fully with complex projects, community representatives should be afforded sufficient time and training to fully understand challenges and opportunities.

3.2 Community Involvement in Use

3.2 Spaces for community use
The activity frame is to be used and adapted for functions appropriate to each station location. Appropriate functions should be identified through dialogue with the local community. In this way, HUB Station provides a platform for communities to influence the creation of stations and retain an involvement in their day to day use.

Community focused uses could include:

- Food and drink stalls
- Exercise classes
- Craft market
- Farmer's market
- Gardening
- Local library / book swap
- Seed swap
- Bicycle maintenance
- Parcel drop
- Blood donation
- School activity space
- Education spaces
- Local businesses
- Pop-up / drop-in services

Network Rail

NR/GN/CIV/100/09 Medium to Small Station Implementation Manual

Figure 3.3
Tynemouth station market

Figure 4.1
The engineered timber canopy provides shelter whilst boarding

4

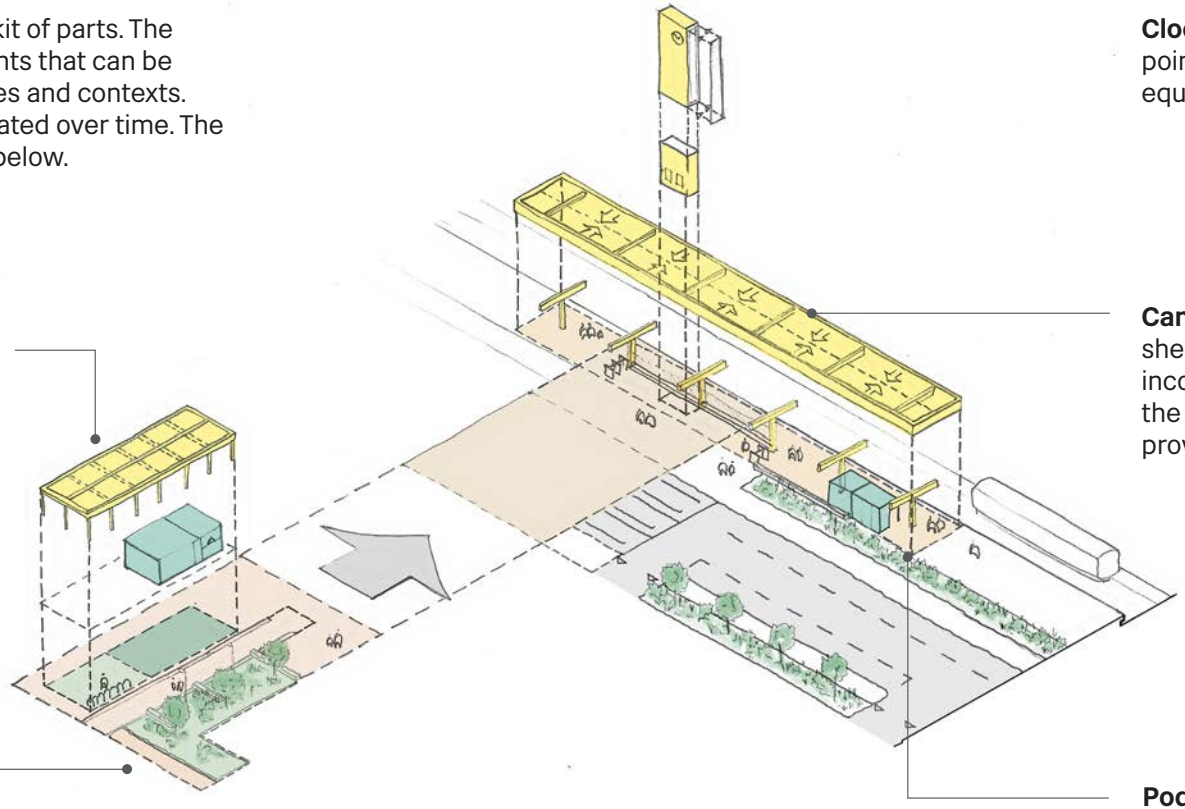
Design Manual for Medium to Small Stations
Toolkit

4.1.1 An adaptable kit of parts

HUB stations are created from a kit of parts. The kit comprises five primary elements that can be assembled to suit a range of scales and contexts. The kit can be expanded and updated over time. The primary elements are described below.

Activity Frame for local uses and station facilities.

Welcome Mat of public realm and rain gardens utilising local materials and plant species.



Clock Tower - a central orientation point and housing core station equipment and services connections.

Canopy - generously proportioned shelter with a civic presence, incorporates energy generation via the translucent glass PV roof and provides shelter.

Pods to provide enclosed spaces such as waiting shelters, toilets and ticket offices.

Figure 4.2
Axonometric sketch showing the core elements of the kit

4.2 Welcome Mat and Activity Frame

4.2.1 Community HUB

The welcome mat and activity frame create spaces for people to gather and accommodate a range of potential activities.

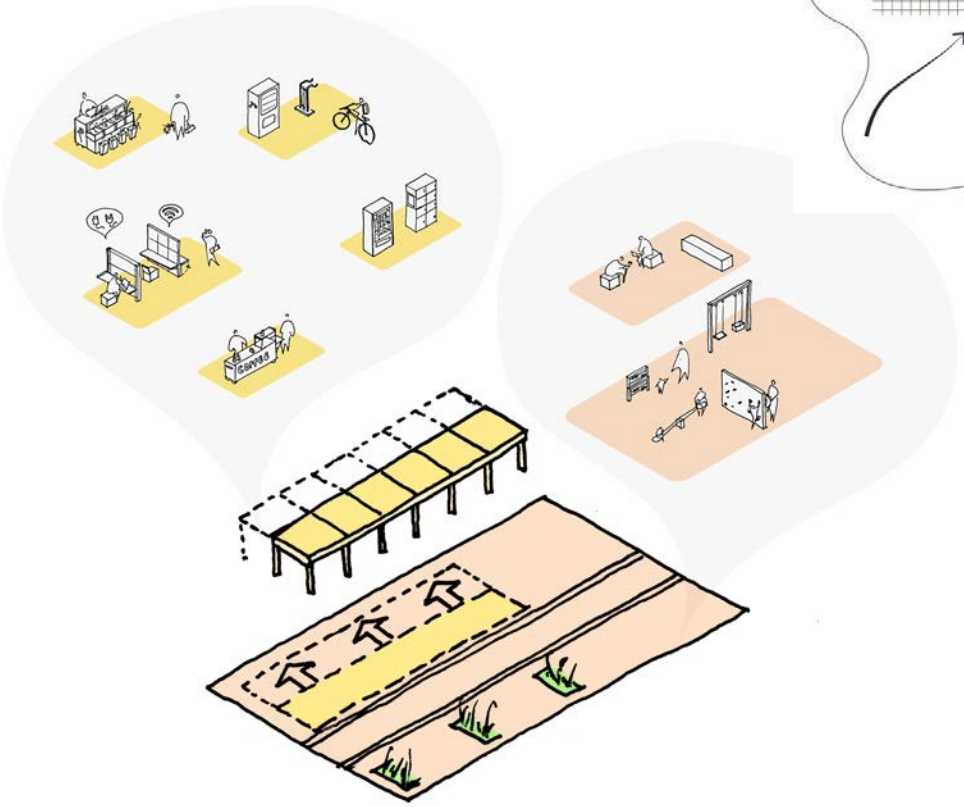


Figure 4.3
Finding new ways to activate open spaces

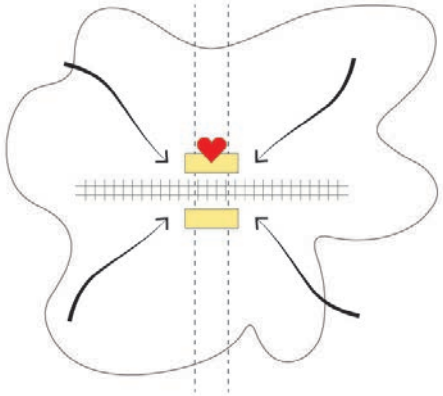


Figure 4.4 (Top)
Deptford Market

Figure 4.5 (Middle)
Huddersfield Station

Figure 4.6 (Bottom)
Viaduct Rail Park Philadelphia

Figure 4.7
Station approach with activity frame and welcome mat

4.2 Welcome Mat and Activity Frame cont.

4.2.2 Welcome Mat

The immediate setting and approach to small and medium stations should welcome passengers and provide space for people to gather.

It should facilitate convenient onward travel connections including for active travel.

The welcome mat is an area of public realm and landscape that creates a high quality environment at the entrance to the station. It includes seating, planted rain gardens and the activity frame.

Creating a high quality environment, even across a relatively small area, creates a stong first impression of the station and local community.

4.2.3 Activity Frame

The activity frame defines space for community activity. The simple timber frame can be scaled and adapted to suit each location. At the smallest stations it could be reduced to 3-4 bays and provide sheltered cycle parking or pop-up refreshment stands. At larger stations facilities can be expanded to provide other facilities including retail, cycle parking, ticket offices and a staff room.

Pods can be incoporated and are sized to suit, or alternatively, bespoke designs can be developed for each location to suit the context and functional requirements.

Power connection points are to be included to service pop-up uses.

Possible uses can vary by location and should be explored through community engagement (see section 3).

Figure 4.8
Model showing Activity Frame and Welcome Mat landscape

Network Rail Guidance

NR/GN/CIV/200/10 Public Realm Design Guidance for Stations

4.3 Clock Tower

4.3.1 Local Landmark

The clock tower is a local landmark that signifies the station within the community and serves as the primary point of orientation for small stations.

The clock, a feature synoymous with rail travel, and louvred sides of the tower are illuminated creating as a beacon as night falls.

Key passenger information and services including station name signage, ticket machines and help points are located at the tower base.

4.3.2 Adaptability - Height

The HUB Station toolkit includes three base heights which can be employed to suit the scale and context of a station.

- Full height tower (preferred option)
- Medium height tower, 4/5 of the full tower
- Short tower for small stations and sensitive locations.

Figure 4.9
Full height corrugated sheet clad tower to a Category D station

Figure 4.10
Part height timber clad tower to a rural Category F station

4.3.3 Adaptability - Cladding Material

The HUB Station Toolkit includes three base material options for the tower cladding:

- Primary Option - Timber
- Alternative 1 - Terracotta
- Alternative 2 - Corrugated sheet

Common characteristics maintain coherency across all options and include:

- Station clock
- Double arrow logo etched or cut out of cladding
- Oversize joints to divide the tower into 1/3 height panels
- Horizontal pattern

Material selection at each site should be informed by local context and the decision should be made in conjunction with selection of paving and planting palettes.

Refer to section 5.6 for Material Specification.

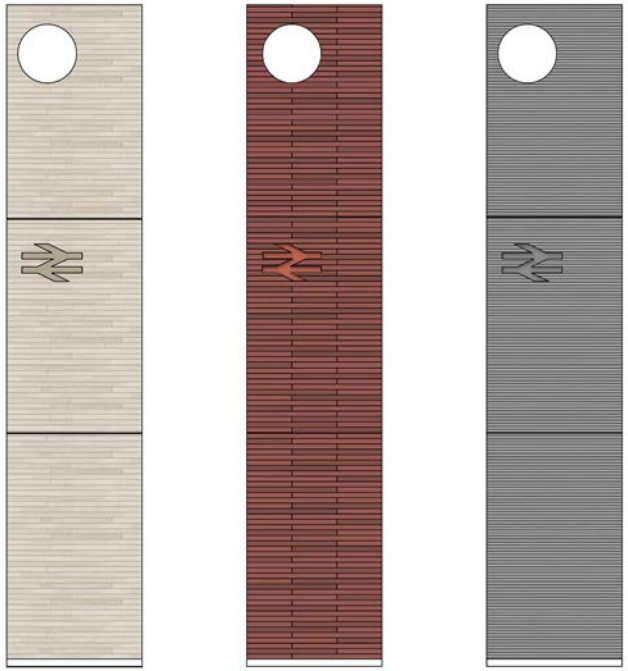


Figure 4.11
Three cladding options - timber, terracotta, corrugation

4.3.4 Services Hub

All tower configurations house station services equipment, vertical services distribution between ground and canopy, and provide a safe access route for maintenance of the canopy roof. Refer to the supporting drawing package for further details.

Figure 4.12
View of canopies at a category D HUB station in an urban location

4.4.1 Canopy Overview

Existing small and medium stations often provide very limited shelter from weather. Providing a large canopy with enclosed shelters beneath offers a better waiting experience for more passengers.

The sweeping horizontal canopy is the primary unifying feature of all but the smallest HUB Station configurations.

The canopy is generously proportioned with a clear height of almost 4 metres and extends to the platform edge to provide shelter whilst boarding and alighting.

The glue laminated timber structure provides material warmth and helps to minimise embodied carbon.

A glazed roof incorporates photovoltaic film transforming the canopy into a renewable energy generator.

An integrated central services spine houses the primary services distribution and provides an easily accessible mounting point for equipment such as speakers, cameras and sensors. Further fixing points are also identified for hanging signage and customer information screens (CIS) and next train indicators (NTI).

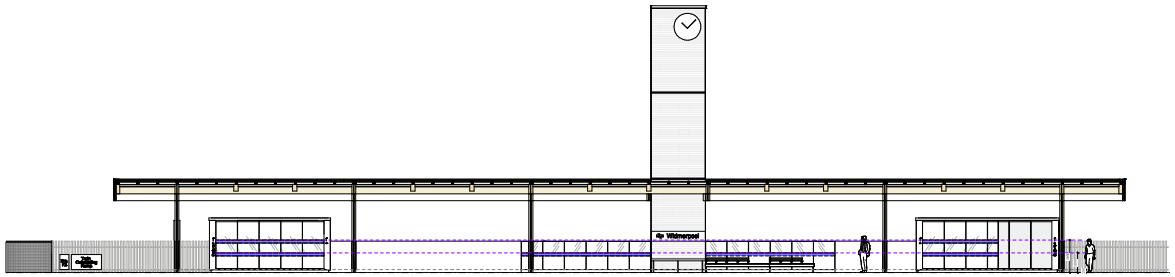


Figure 4.13
Canopy section

Figure 4.14
View of a category E station from across the tracks

Timber louvres

Canopy roof falls away from tracks to gutter on back edge.

Glazed canopy roof with integrated photovoltaic (PV) interlayer

Glue laminated timber structure

Aluminium fascia

Central service spine for services distribution and mounting point for equipment (eg. CCTV cameras, PA)

Glazed windbreak screens with two manifestation and stainless fixings

Figure 4.15
Sectional perspective through canopy

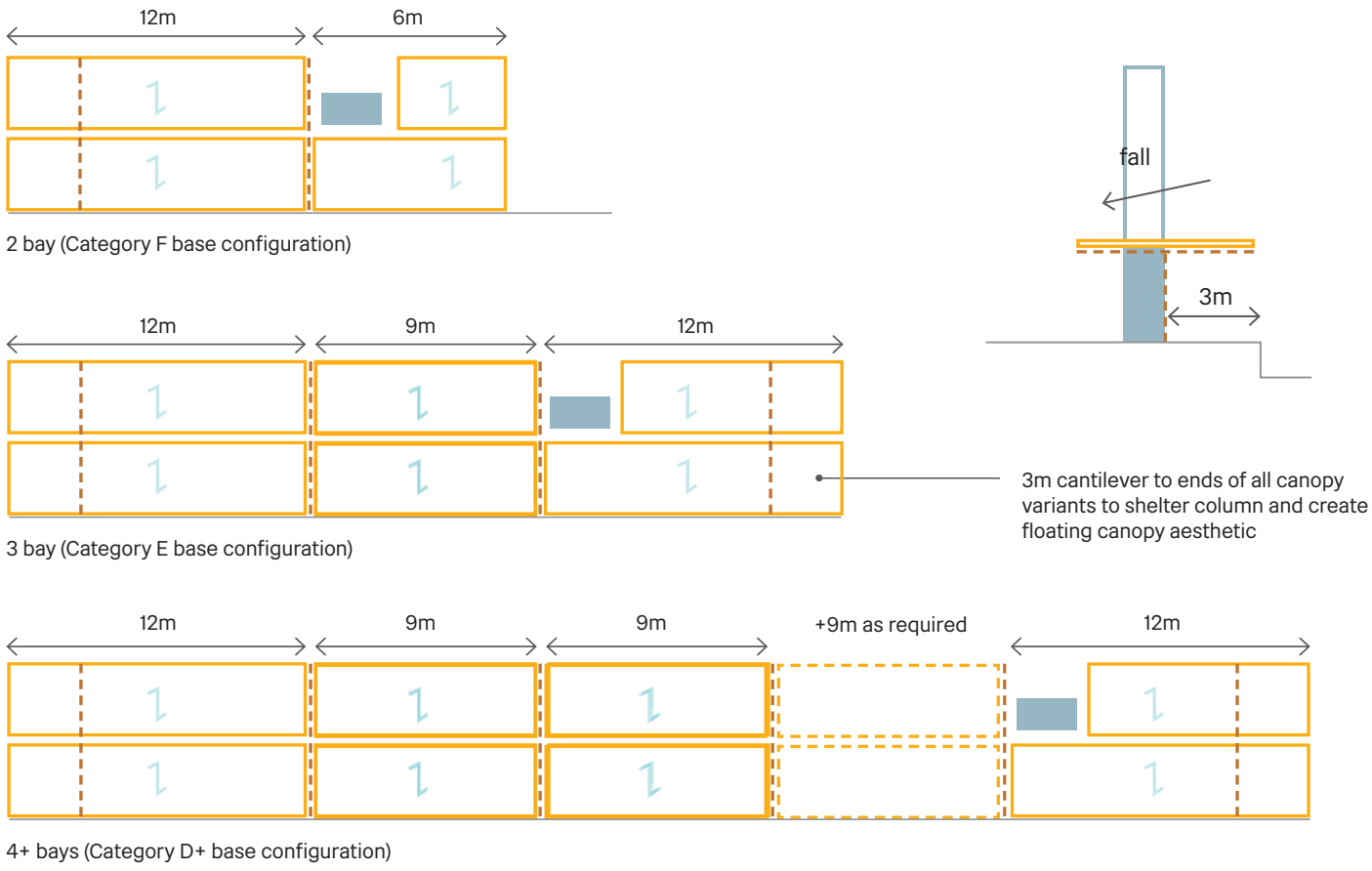


Figure 4.16
Canopy plan diagrams illustrating key components and modularity with (inset) section diagram

4.4.2 Modularity

The canopy has a modular configuration allowing it to scale to suit station size and capacity. Canopy length and width can be scaled to suit station capacity and local requirements.

The structure is comprised of primary T-columns which support rectangular cassettes. Canopies are constructed of 12m end cassettes, allowing a 3m cantilever at the end, with multiples of 9m cassettes in between as required to achieve the desired length.

Canopies are a minimum of 2 bays (18m) long. Standard modules increase as required to accommodate station facilities in multiples of 9m bays.

Canopy length = 6m + (9m x no. bays).

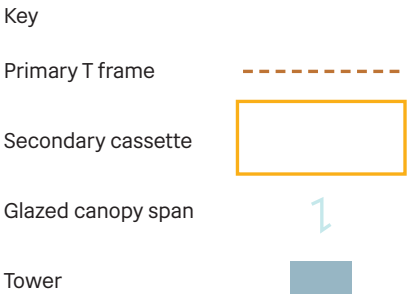


Figure 4.17
Category F Mini - no canopy

Figure 4.19
Category E - 42m canopy

Figure 4.18
Category F - 18m canopy

Figure 4.20
Category D - 51m canopy

Figure 4.21
Waiting pods provide additioal enclosure beneath the canopy

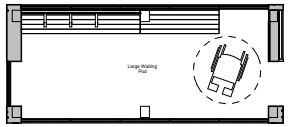
4.5 Pods Overview
Pods provide enclosed accommodation and are scaled and combined together to suit individual station requirements. Facilities include:

- Waiting shelters
- WCs / baby changing
- Ticket office
- Staff welfare

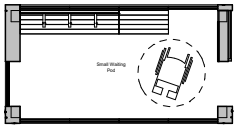
Key features include:

- Consistent planning module allows flexibility and standardisation of components
- Sized to fit within both canopy and activity frame structural grids
- Full height glazing to long sides (parallel to tracks) with two tone manifestation allows clear views to approaching trains and passive surveillance
- Stainless steel upstand and corner details provide robust protection at vulnerable locations
- Internal micro perforated timber linings provide material warmth and acoustic absorption to create a comfortable waiting environment
- Integrated lighting and services within ceiling
- Opaque panels for locally specific graphics
- Integrated customer information and advertising screens, with further option for integral help point

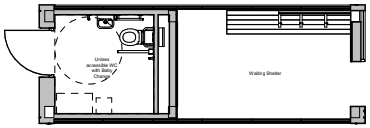
Figure 4.22
Combined waiting and WC pod at dusk



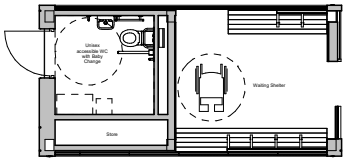
Waiting



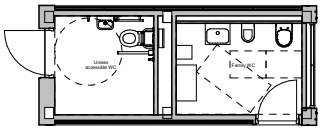
Waiting (short)



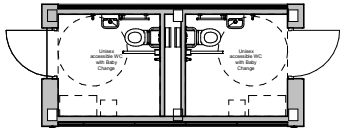
Accessible WC / Waiting shelter



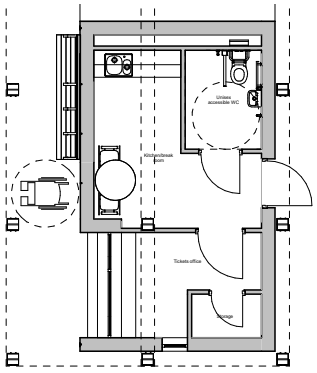
Accessible WC / Double-sided waiting



Accessible WC / Family WC



Accessible WC x 2



Ticket office / Staff room / WC

Figure 4.23
Pod configuration options

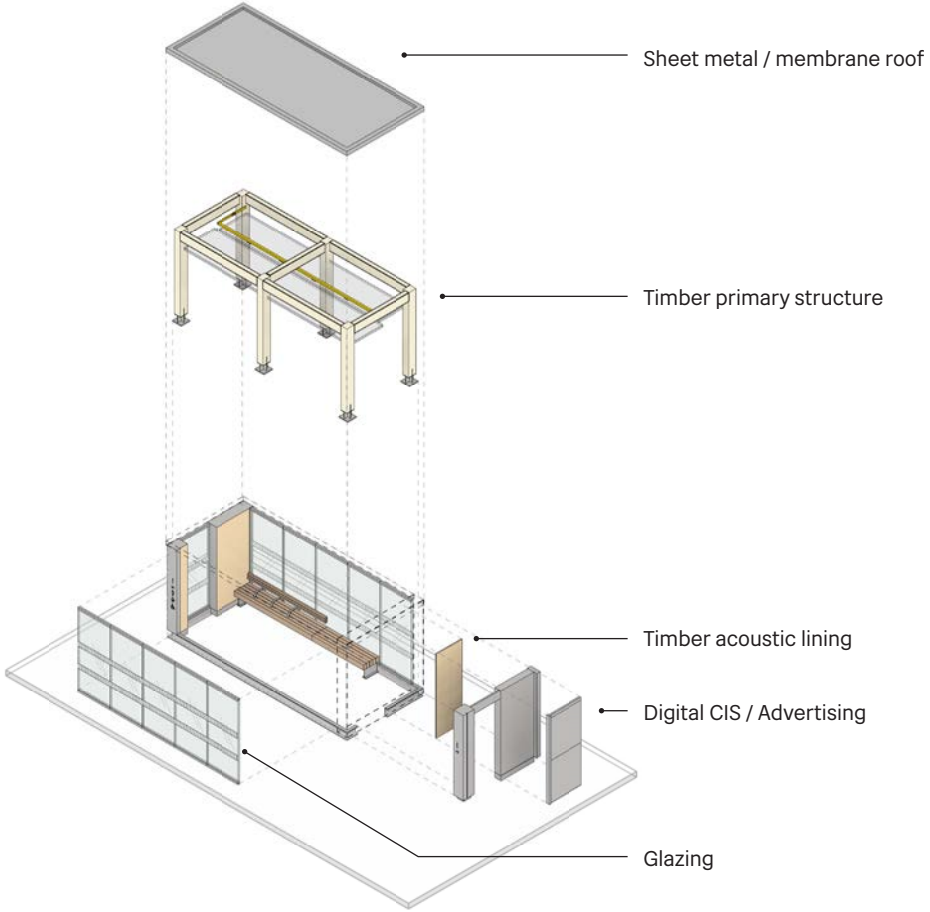


Figure 4.24
Exploded axonometric showing pod construction

4.6.1 Configuration by Station Category

The diagrams below illustrate base configurations for each station category which provide a starting point for station implementation teams. For stations serving multiple tracks or entrances the configurations can be combined to suit. Upgrades can be applied to all options to suit site specific requirements. Further examples are included in the appendix and supporting drawing package.

Figure 4.25
Category F mini

- Welcome mat public realm with rain garden
- Cycle parking
- Entrance sign
- Waiting pod

Figure 4.26
Category F

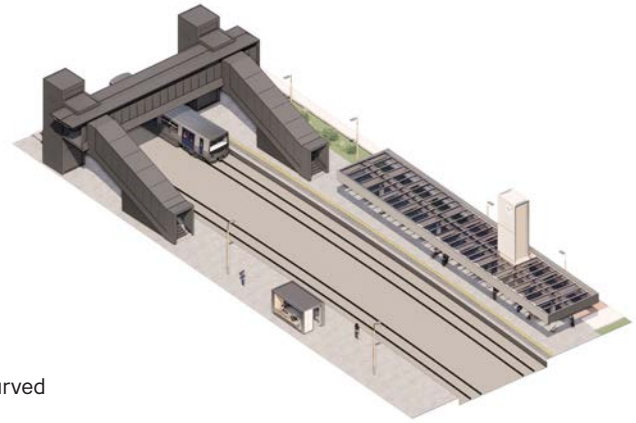
- Welcome mat with rain gardens and seating
- 3-bay activity frame for pop-up activites or cycle parking
- 6-bay canopy and short tower
- Integrated active travel and public transport connections
- Options to upgrade, for example by extending the canopy or adding pods or a full height tower

Figure 4.27
Category E

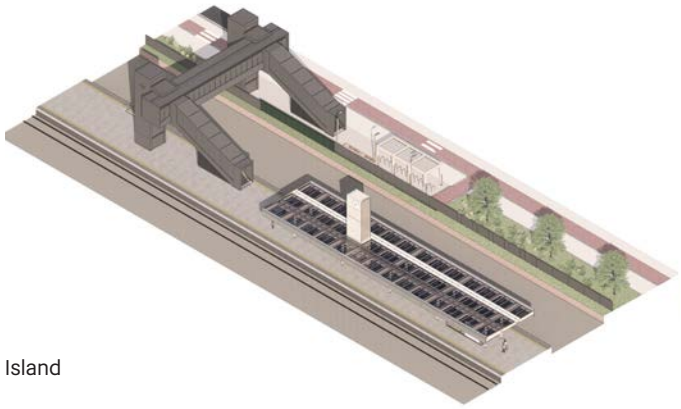
- Welcome mat with rain gardens and seating
- 4-bay activity frame for pop-up activities or cycle parking
- 11-bay canopy with combined waiting-WC pod and medium tower
- Integrated active travel and public transport connections
- Options to upgrade, for example by extending the canopy or adding pods or a full height tower

Figure 4.28
Category D

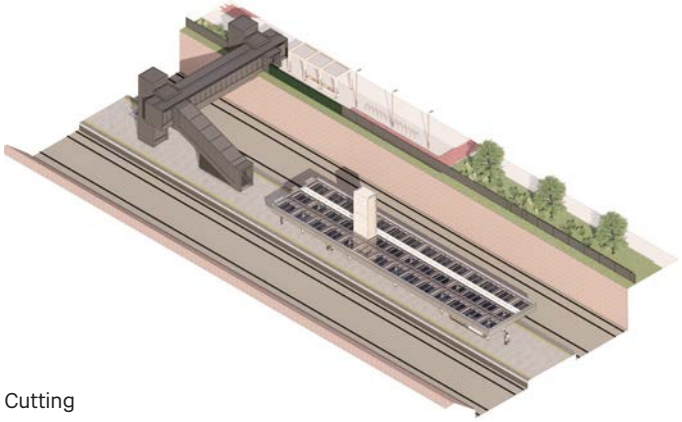
- Enlarged welcome mat with rain gardens and seating
- 6-bay double width activity frame including ticket office, parcel lockers and space for pop-up activites and cycle parking
- 17-bay canopy with waiting pod, combined waiting-WC pod and full tower
- Integrated active travel and public transport connections
- Options to upgrade, for example by extending the welcome mat landscape, customising the activity frame or removing ticket gates



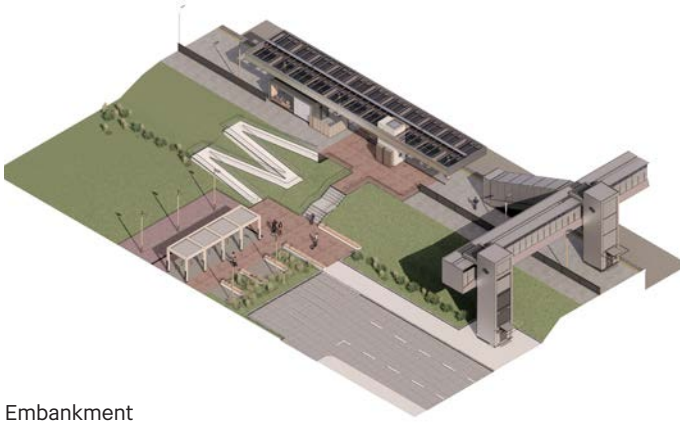
Curved



Island



Cutting



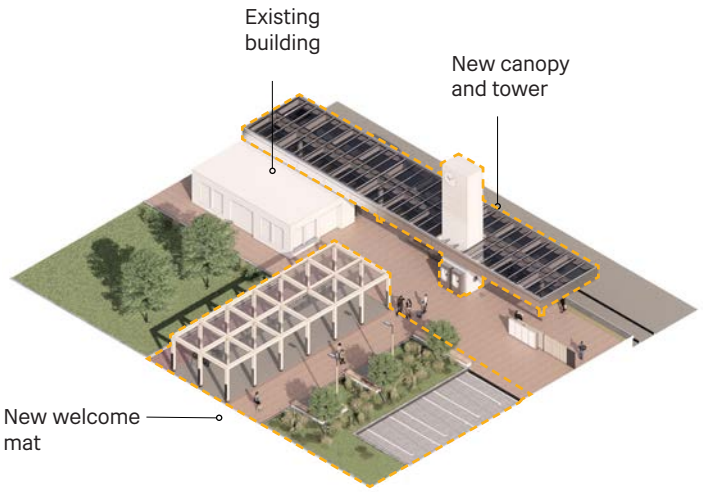
Embankment

4.6.2 Topography and Arrangment
The kit can adapt to various topographical and track arrangements by adjusting the spatial relationship of parts and incorporating other elements such as footbridges.

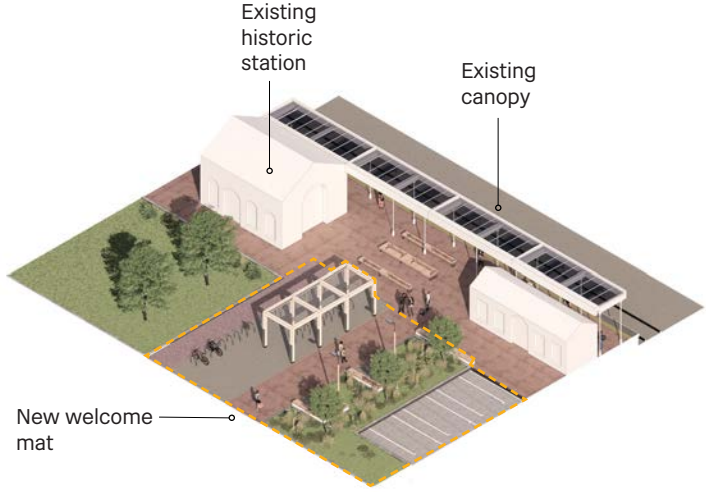
Four illustrative scenarios are show here including:

- **Curved**: canopy lengths less than two carriage lengths generally do not require adaptation. For longer canopies or tighter radius curves, angled infill frames can be inserted between canopy cassettes to create a faceted structure.
- **Island**: Wider 3-bay wide canopy variant with facilities and access routes in central bay.
- **Cutting**: Access via footbridge or underpass. Canopy access via tower due to restricted areas adajcent.
- **Embankment**: Extended welcome mat to address level change. Lifts within footbridge as required.

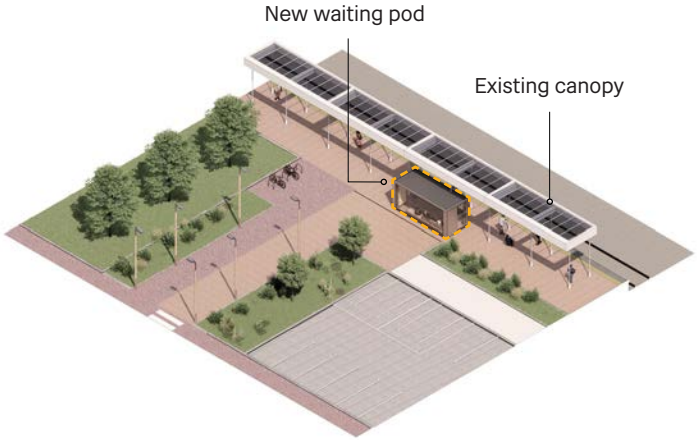
Figure 4.29
Configurations illlustrating adaptability to topography as described above.



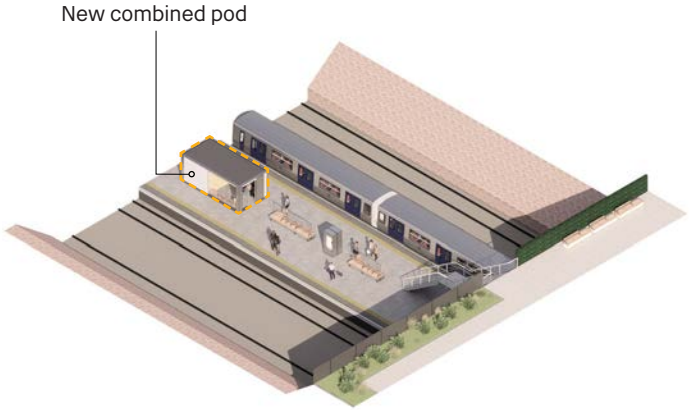
Extensive upgrade



Welcome mat upgrade



Shelter upgrade



Facilities upgrade

4.6.3 Existing structures

Retention of existing elements should always be considered - there can be significant value and carbon benefits in retention. The kit can be used in conjunction with any retained elements.

In existing scenarios elements of the kit can be used independently. Illustrative scenarios shown on the left show how components can be used in different combinations to suit the extent of upgrade required and the configuration of existing elements.

Upgrades could simply include the addition of a welcome mat to improve arrival experience and onward connections or replacement of on platform waiting shelters with new pods.

Integration of new and old should be carefully considered. For example there may be opportunities to oversail existing buildings with a new canopy to upgrade passenger provision whilst minimising demolition.

Figure 4.30
Configurations illlustrating adaptability to existing contexts as described above.

4.7 How to Use the Toolkit

4.7.1 Process Overview

The toolkit described in this section is designed to assist designers and sponsors in developing proposals for new stations and existing station upgrades.

The chart opposite outlines the process and aligns key activities to PACE and GRIP milestones. Key steps include:

Project Brief - at early stages the manual should inform brief development. Project specific requirements should be developed with reference to the functional brief matrix. The kit and base configurations can be used to generate quick initial studies to inform site selection decisions.

Initial activities include context studies to inform selection of base material and planting palettes (refer to Appendix for proforma template). Details of site topography will inform station configuration. Demographic information and local community requirements should be gathered through initial engagement and the Diversity Impact Assessment should be drafted and feedback fed into the brief.

Strategic Masterplan - a strategic masterplan for the site should be created as a framework for development and to coordinate connectivity to community and onward transport connections. This should integrate with any existing Local Development Plans, Local Place Plans or masterplans.

Toolkit Option Selection - selection of options from the toolkit including material and planting palettes and functional requirements.

HUB Station base configuration - select most appropriate base configuration as a starting point for further adaptation.

Site specific adaptations - designers assemble and adapt the kit to suit project specific requirements as applicable. This may not be required on simpler new station projects.

Develop design for construction - designers and/or contractors adopt standard details and refine in discussion with fabricators to develop design for construction.

4.7.2 Functional Brief

This document includes a functional brief that sets requirements for small and medium stations according to category. The importance of establishing a baseline functional brief for each station category is:

- to establish an improved and consistent standard of facilities across all stations
- to streamline delivery of stations, allowing individual design teams to focus on site specific issues rather than debating the minimum functional requirement for every project.

The functional brief is presented as a matrix of strongly advised, desirable and optional requirements. This is a consolidated and updated version of the matrix included in the Station Design Guidance Manual that is specific to Category D to F stations.

The functional brief matrix was developed through extensive consultation with Network Rail capacity planning teams and with reference to passenger surveys data and ExploreStation consultation feedback. Data on provision of facilities at existing small and medium stations was analysed to inform the requirements, either to support upgrading recommendations, for aspects such as Wi-Fi and accessible WCs, or justify a reduced requirement for other aspects, for example ticket barriers and cash machines.

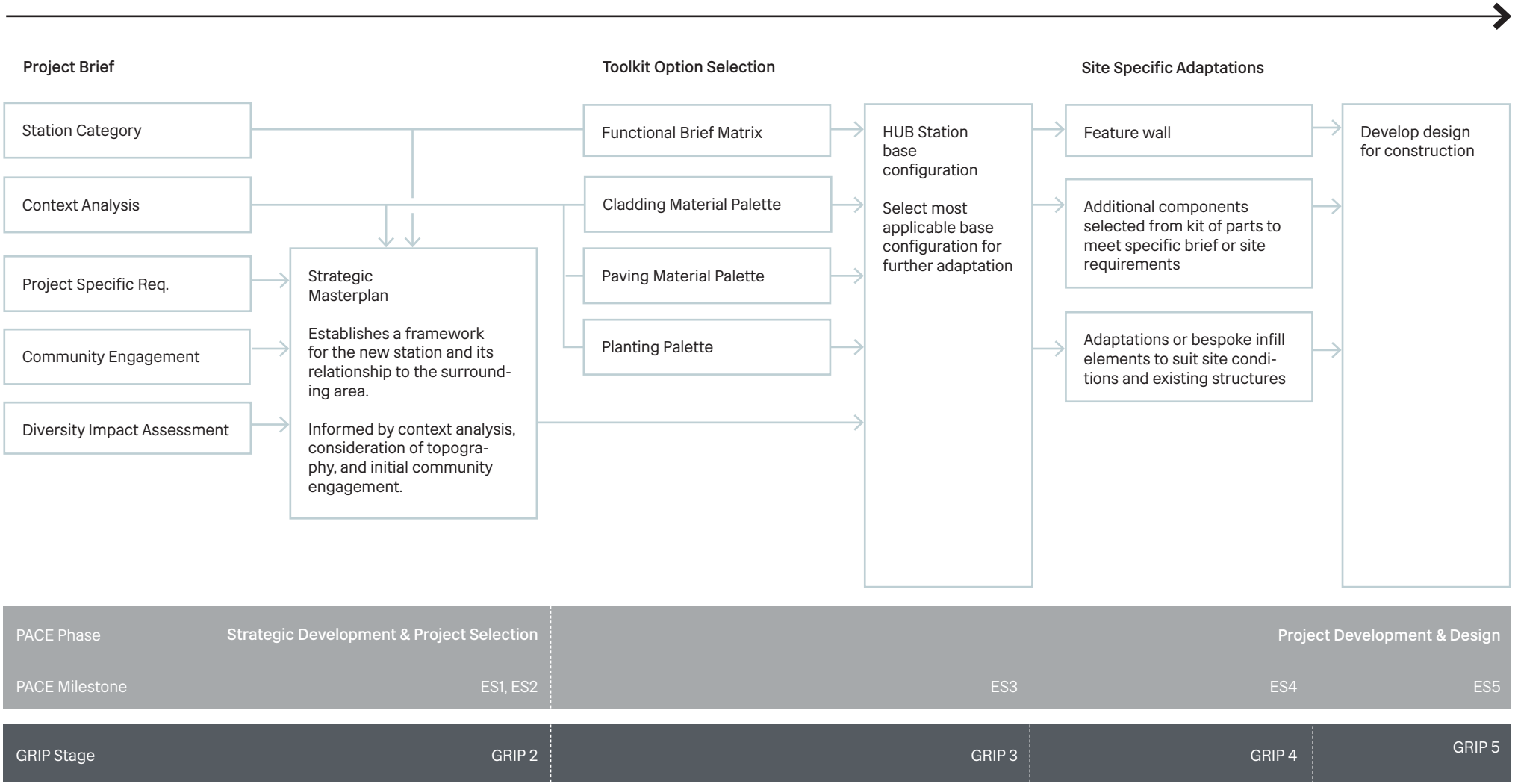
Refer to the Appendix for the functional brief matrix and base configurations.

4.7.3 Applying the Kit

The base configurations included in this document demonstrate how all strongly advised functions can be fulfilled for each category. Additional desirable functions can be added using the kit of parts to expand the base configurations.

Figure 4.31 (next page)
Using the toolkit flow chart

4.7 How to Use the Toolkit



4.7.4 Adaptability
The kit can be adapted to suit a variety of site contexts, scales and topographies. Typical configurations illustrating a variety of scenarios are shown in more detail in the supporting drawing package.

4.7.5 Scale
Base configurations are provided that fulfil the functional brief requirements for station categories D to F as illustrated on the following pages.

It is likely that further adaptation of these base configurations will be necessary. This can be achieved by adding components to extend the canopy or provide additional facilities as appropriate to project brief.

4.7.6 Heirarchy of Approach Routes
Most smaller stations, even those with multiple points of access, should have a primary entrance. This helps to create easy to navigate stations and avoids duplication of facilities which is particularly important for smaller stations.

For new stations the primary entrance should be the approach with best connection to the community and public transport routes.

The primary approach is marked by the full height tower, activity frame and more generous welcome mat.

Typically, canopy length will also be greater on the primary side however this will also be informed by passenger numbers. This scenario is illustrated in the Category D base configuration in the Appendix.

4.7.7 Topography
Site topography is a key consideration. The primary objective is to provide direct easy access to the platform from the surrounding landscape.

Level changes are ideally dealt within the welcome mat and/or footbridge. For sites with more significant level changes lift access may be necessary to provide step-free access for all. Common configurations are illustrated on the following pages and within the landscape toolkit Appendix.

4.7.8 Track Arrangement
The station layout can be adapted to suit different track arrangements. These include single and twin track facing platforms, island platforms and curved tracks. A scenario for an island platform within a cutting is illustrated in the Category E base configuration shown in the Appendix.

4.7.9 Existing Elements
The kit can be used for existing station upgrades. The retention and refurbishment of existing structures should always be considered and options for the incorporation of elements from the kit to provide necessary upgrades. This requires flexibility in application to accommodate the wide variety of scenarios which is achieved by incorporating elements independently or in combination to suit local conditions. Examples are illustrated opposite ranging from the application of the welcome mat and activity frame to an otherwise retained and refurbished station building to more significant expansion of existing facilities.

4.7.10 Heritage
Heritage considerations are particularly relevant in many existing station settings and further reference should be made to the Heritage Care and Development guidance to inform an assessment of which elements of the kit are appropriate.

Network Rail Guidance
NR/GN/CIV/100/05 Heritage Care and Development

4.8 Catalogue

The catalogue includes an array of parts that can be assembled in a multitude of configurations to suit individual site and project requirements. Base configurations are included in this manual and many further arrangements are possible.

1. Tower (full height variant) incorporating ticket machines, canopy access ladder, switchroom, clock and backlit louvres
2. Tower (mid height variant) features as above
3. Tower (base only variant) incorporating ticket machines, canopy access ladder and switchroom
4. Canopy assembly combining cassette modules with T-frames, central service spine and fascia
5. Canopy cassette modules with PV glazing, 12x3m and 9x3m
6. Primary canopy structure - flitched glulam T-frame, Pi-frame and T-frame with stability panel
7. Pods - single-sided combined waiting and accessible WC/baby change pod, single sided waiting pod, double-sided combined pod
8. Timber activity frame with retractable canvas canopies, glass or opaque roof
9. Feature wall - timber slat and green glazed wall options
10. Lighting column
11. Timber bench with back screen
12. Timber bench
13. Standing bench
14. Glass screen
15. Cycle stands
16. Turnstile
17. Entrance gate
18. Station signage
19. Welcome mat public realm with rain gardens

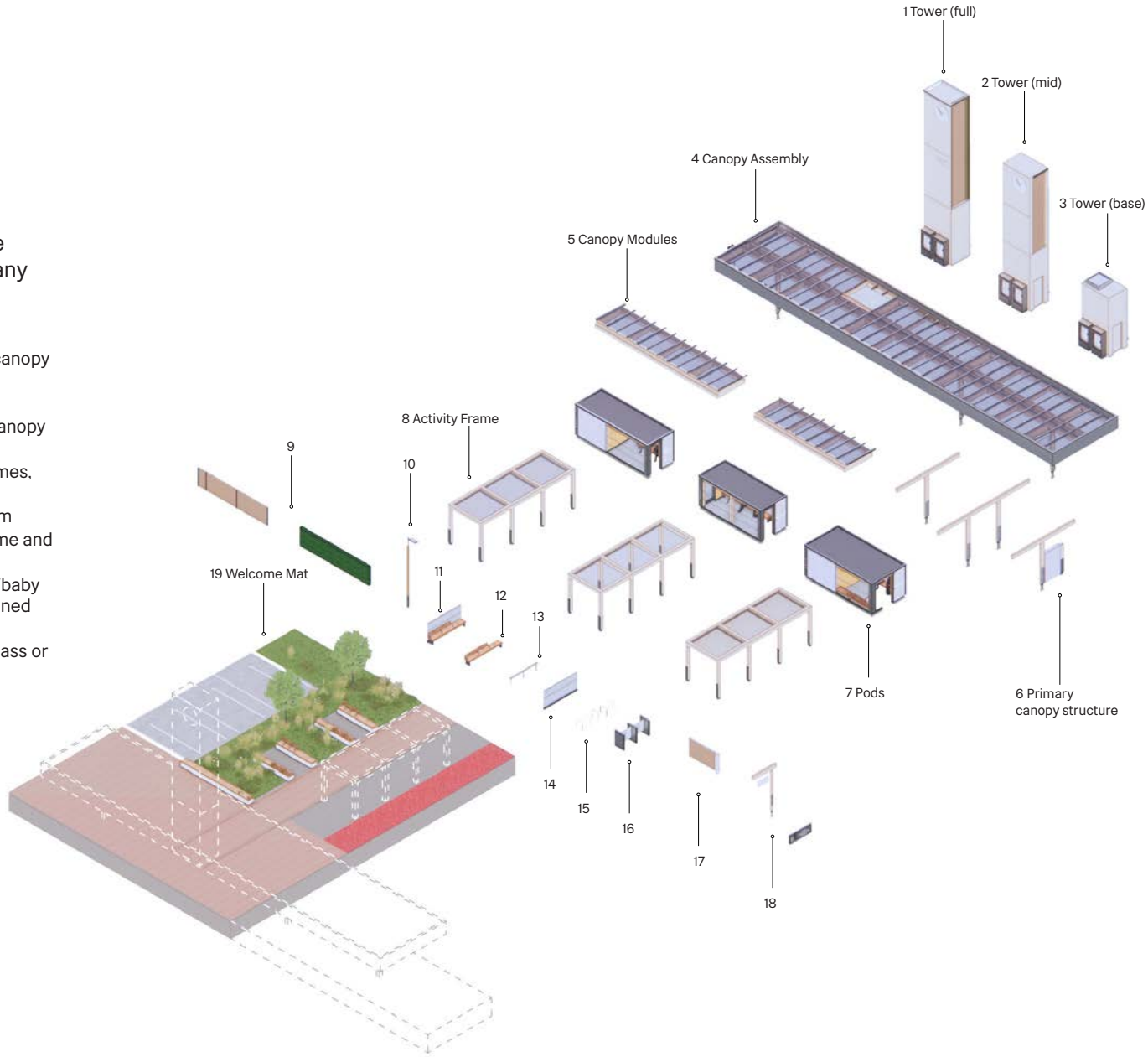


Figure 4.32
Catalogue of Parts Axonometric

Figure 4.33
Example of a Category F HUB station in a rural location

5

Design Manual for Medium to Small Stations

Design Strategy

5.1.1 Designing Inclusive Stations

All stations should be designed in accordance with Network Rail Inclusive Design Guidance. Inclusive design is about making places everyone can use that are convenient and enjoyable.

The HUB Station concept has been developed in consultation with a Design Council Expert with specialism in inclusive design. The Station Competition Working Group worked to best practice standards of accessibility with the aim of creating an inclusive and welcoming environment for all users.

The Network Rail Built Environment Accessibility Panel (BEAP) were engaged at early concept stages. They are supportive of the proposals and excited about the potential for independent, safe and inclusive access.

The BEAP should be consulted for all new station proposals.

The HUB Station concept has placed people at the heart of the design process and recognised that good design is inclusive design.

Network Rail Guidance

Everyone Matters Strategy
NR/GN/CIV/300/04 Inclusive Design

Other Guidance

The Autism ASPECTSS™ Design Index

Figure 5.1 (above right)
Approach to category F station

Figure 5.2 (right)
HUB Station within Urban Realm

5.1.2 Design Features and Inclusive Design Principles
All passengers' needs are considered from the point that they first interact with the station, whether they approach via the Welcome Mat, or alight a train onto the platform.

The HUB Station concept features can therefore be summarised under the two main station environments:

- The public realm and station approach and the transport interchange relative to the platform
- The platform and the passenger facilities

Key features for each are illustrated on the following pages.

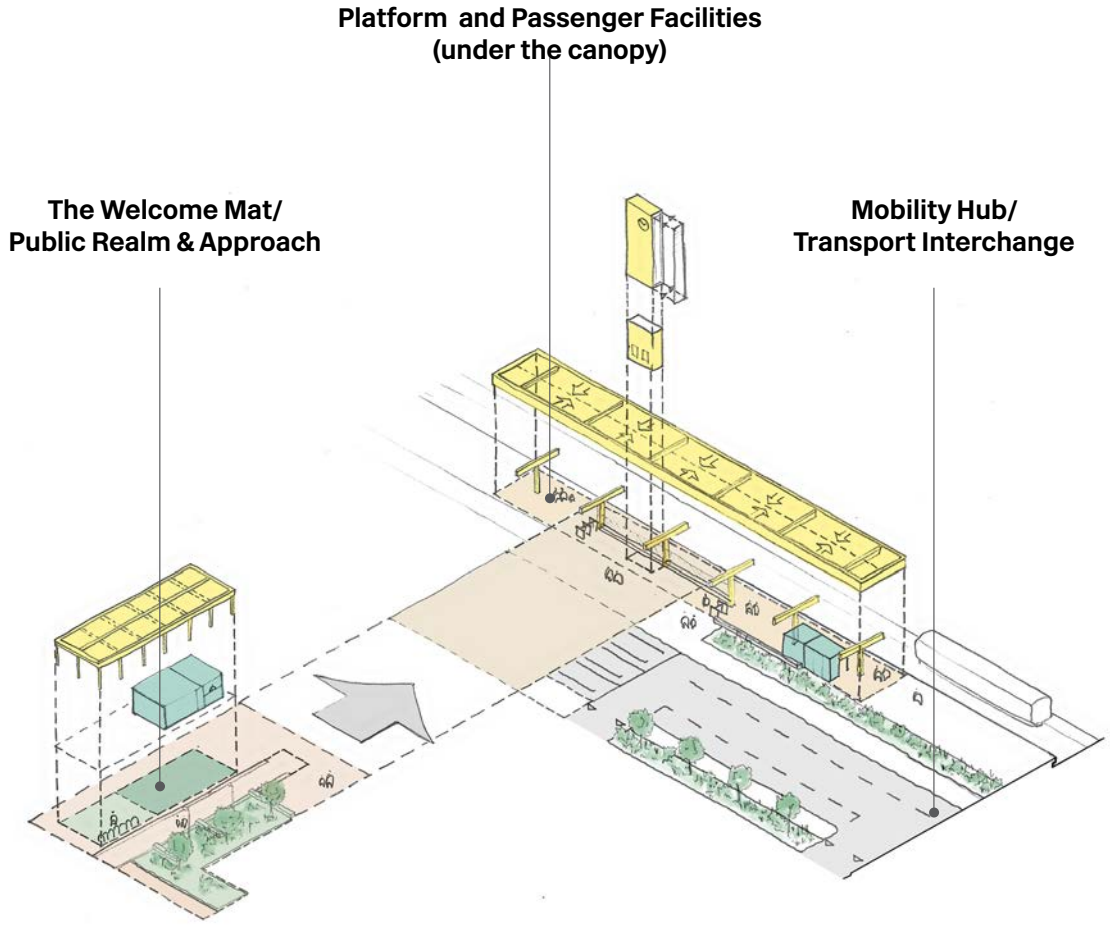


Figure 5.3
HUB Station Overview

National Standards

NTSN Persons with Reduced Mobility (PRM)
DfT Design Standards for Accessible Railway Stations
DfT Inclusive Mobility - A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure

5.1.3 The Welcome Mat

The Welcome Mat acts as a soft buffer between a busy urban environment or sub-urban neighbourhood and the transport interchange.

Features that promote access and inclusivity include:

- Step-free access and circulation with direct intuitive routes and suitable rest points. 1:21+ ramps for small level changes and lifts for level changes greater than 1.5 metres. Lift access is ideally integrated into footbridges to provide direct convenient access across the tracks and reduce the number of lifts required. Long ramps should only be used as secondary access or for emergency egress routes.
- Clear delineation and segregation of main pedestrian, vehicular and cycle circulation routes through paving colour and texture. Landscape finishes are selected to delineate spaces whilst avoid highly contrasting or patterned surfaces which can be perceived as steps or voids.
- The approach route flows seamlessly from one activity to the next and through a one-way circulation where possible.
- Stopping points for public transport, parking or set down points at travel distance less than 50m.
- A range of seating including backrests and arm rests located within clusters at intervals less than 25m, clearly delineated from the main circulation route by different textured pavement and surrounded by natural vegetation.
- Tower is clear signifier of entrance and key orientation point.
- Clear wayfinding at key decision points whilst avoiding overprovision of signage.
- Clutter of unnecessary street furniture minimised to avoid physical obstructions and reduce sensory stimuli.
- Sheltered cycle parking including a variety of spaces for non-standard cycles
- A place for community engagement or accessible customer information counter office
- Use of natural, tactile materials combined with trees and vegetation.
- Trees and other vegetation within the rain gardens can provide spatial sequencing, quiet transition spaces, improved acoustics, a respite space as well as creating a transition between the urban realm and the platform for people with neurocognitive disorders.
- Considered lighting design that enhances materials, and contributes to safety and wayfinding whilst avoiding glare and overspill.

Figure 5.4
Station Approach

5.1.4 The Platform

Features of HUB Station that promote access and inclusivity include:

- The use of wood and wood-derived materials can be perceived through visually, auditory or tactile processing. It promotes better physiological sense of relaxation, decreases stress and blood pressure and improves decision making, mood and orientation on the platform.
- Improved facilities such as provision of at least one accessible WC slightly enlarged to incorporate baby change to all Category D and E stations. In 2021 only 40% of Category E stations had an accessible WC and less than 15% had a baby change.
- Help-points located at the base of the tower and integrated within pod information screens to allow passengers to access assistance even on unstaffed stations.
- Clear legible wayfinding including visual contrast, two tone manifestation and option to incorporate Bluetooth aural wayfinding.
- Consistent lighting levels to allow for ease of wayfinding and identification of key amenities.
- Consistent storage location for train boarding ramp, first aid kit and optional defibrilator.
- Range of seating provided throughout the station environment and on both sides of ticket barriers.
- The waiting pods are spaces that can offer a breakout from the sensory overload experienced on train platforms. Use of foam backed perforated timber panels as the interior finish aims to enhance acoustics and create quiet spaces that offer a refuge from the busy platform environment. The pods also integrate wayfinding and induction loops to guide passengers with reduced sensory orientation.

Figure 5.5
Typical platform elevation

1 - 150mm stainless steel base to all elements
2 - two tone manifestation to all glazing
3 - help point (on perpendicular wall)
4 - boarding ramp storage and first aid kit

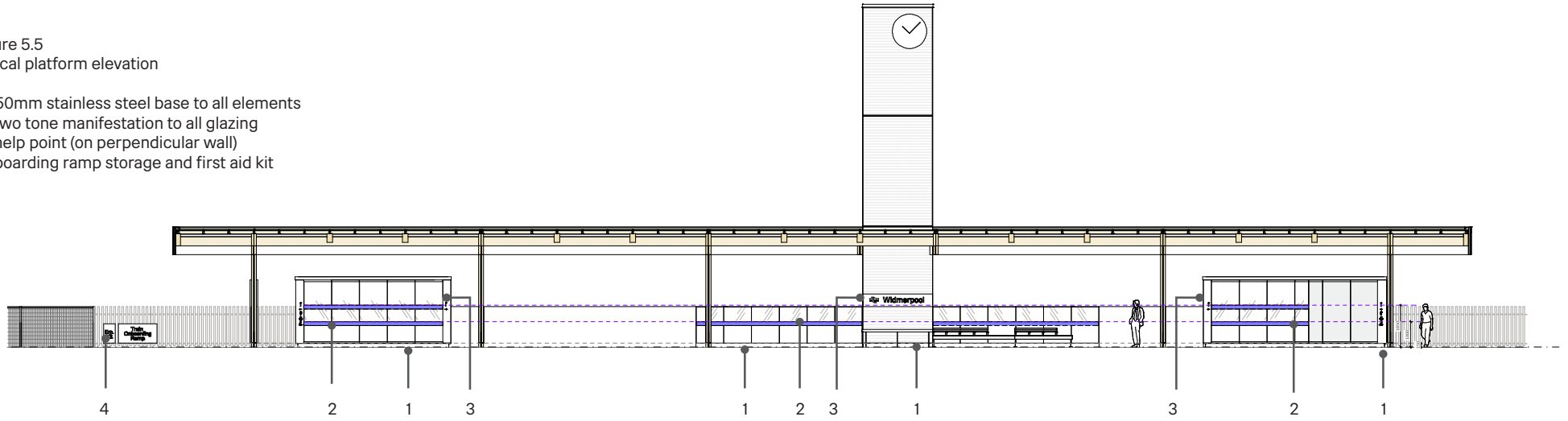


Figure 5.6
View along platform showing hanging signage

5.2.1 Intuitive wayfinding
Open sightlines and transparent elements, combined with clear points of orientation like the tower, contribute to an intuitive wayfinding strategy.

5.2.2 Minimal visual clutter
Signage should be minimised to provide essential wayfinding to avoid unnecessary clutter and maximise benefit of open sightlines.

5.2.3 Signage
Signage is generally suspended from lateral beams of the canopy structure. All signage and customer information screen to be located within typical viewing angles and to suit passengers with reduced mobility. Station name signage is affixed to the face of the tower. All signage design should follow NR Wayfinding Guidance.

5.2.4 Digital Information Displays
Next Train Indicator (NTI) displays within the canopy zone will also be suspended from lateral canopy structure.

Further information is provided via digital customer information screens that appear either as freestanding totems or integrated into the side of pods. Feature walls also include a zone for integrate display screens (see feature walls illustration).

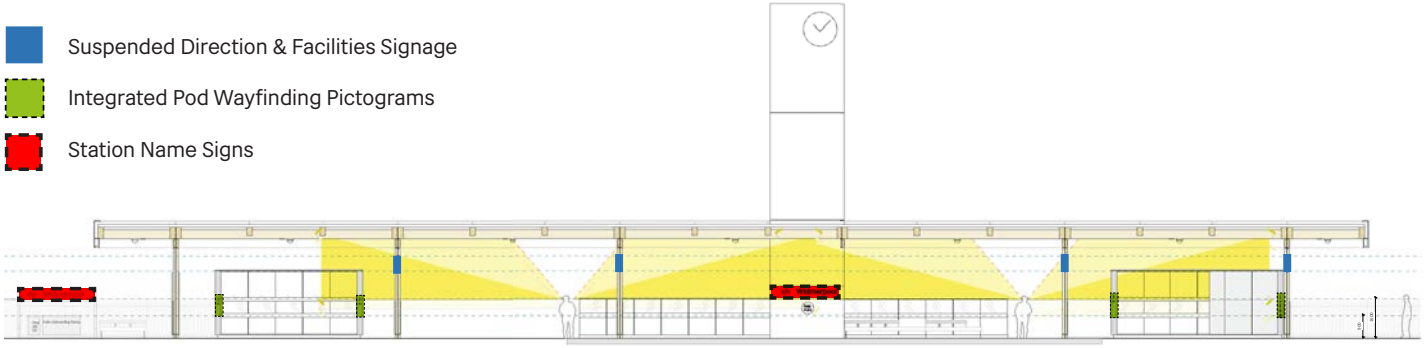


Figure 5.7
Typical platform elevation - vertical sight lines

Network Rail Guidance

NR/GN/CIV/300/01 Wayfinding

5.3.1 Safety Features
Standard features that allow stations to be safely navigated include:

- Platform edge demarcated by yellow tactile blister paving
- 3m wide obstruction free route along the platform
- Glazed screens demarcated by two-tone manifestation, impact resistant steel base plate and contrasting cap and edge profile.

5.3.2 Surveillance
Open sightlines optimise passive surveillance and support effective CCTV coverage. The platform boundary combines see-through and opaque fencing to enhance natural visibility and sightlines and minimise blind spots. The central canopy spine includes zone for mounting of CCTV cameras (refer to supporting drawing pack for generic CCTV layouts).

5.3.3 Reducing Crime
Stations can be targeted by vandalism and other crime and the exact nature will vary by location. In combination with surveillance and other deterrents, the following measures which align to the principles of HUB stations can indirectly contribute to reduced levels of crime including vandalism:

- Cultivating a sense of ownership amongst users by involving communities in the creation and use of stations
- Investing in high quality design to create stations that are 'worth looking after'
- Encouraging more activity around stations to contribute to passive surveillance.

5.3.4 Other Security Requirements
Designers may also need to consider security requirements mandated in the National Railways Security Programme depending on Station Security classification.

5.3.5 Fire Safety
A fire risk assessment including escape strategy should be developed specific to each station and agreed with the local fire authority.

Refer to section 5.6 Materials for detail for fire related aspects of material specification.

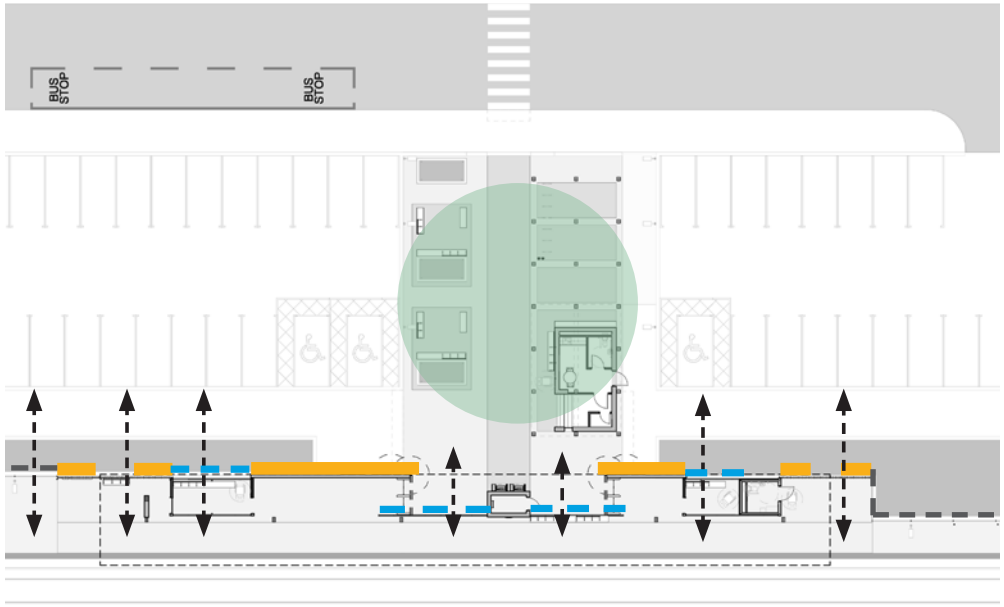


Figure 5.8
Typical platform plan

Code of Practice

Security in the Design of Stations (SIDOS)

Future stations should have a positive impact on the environment. Sustainability, in its broadest sense, should be core to the design brief.

5.4.1 Overview

With more than 2000 across Britain, small and medium stations make up a significant proportion of Network Rail's portfolio. Minimising their environmental impact is fundamental to meeting Network Rail net zero targets, and fulfilling broader sustainability aspirations.

Sustainable features of HUB Station include:

- Lean approach to briefing and design, providing the right facilities in the right place
- Minimising energy use in operation through low energy fittings (eg. LED lighting) and smart operation (eg. off-peak dimming)
- Generating renewable energy on-site through the photo-voltaic canopy
- Reducing embodied carbon by optimising the design to use less material and specifying low carbon materials (eg. timber)
- Embracing off-site construction to reduce waste and minimise construction impacts
- Ecologically sensitive design that mitigates negative impacts (eg. avoiding light pollution)
- Responsible water management by incorporating permeable surfaces and rain gardens
- Sustainable sourcing.

5.4.2 Life Cycle Carbon Analysis

Life cycle carbon analysis (LCA) should be embedded into the design process for all new stations. Lifecycle analysis includes embodied carbon emitted in the manufacture and construction of stations, operational carbon through the life of the station, and end-of-life carbon emitted through the demolition or dismantling of station structures.

Station designers should use the RSSB Rail Carbon Tool. The tool has been successfully implemented through the development of HUB Station and calculations can be used as the basis for future station proposals.

Analysis of the base configurations has been used to set benchmark carbon intensity for each part of the kit. New station proposals should be measured against these benchmarks and will also inform future refinement of the targets. It is important to note that the benchmarks proposed do not include offsetting, which would provide further potential for stations to demonstrate net zero carbon credentials.

5.4.3 Wider Benefits

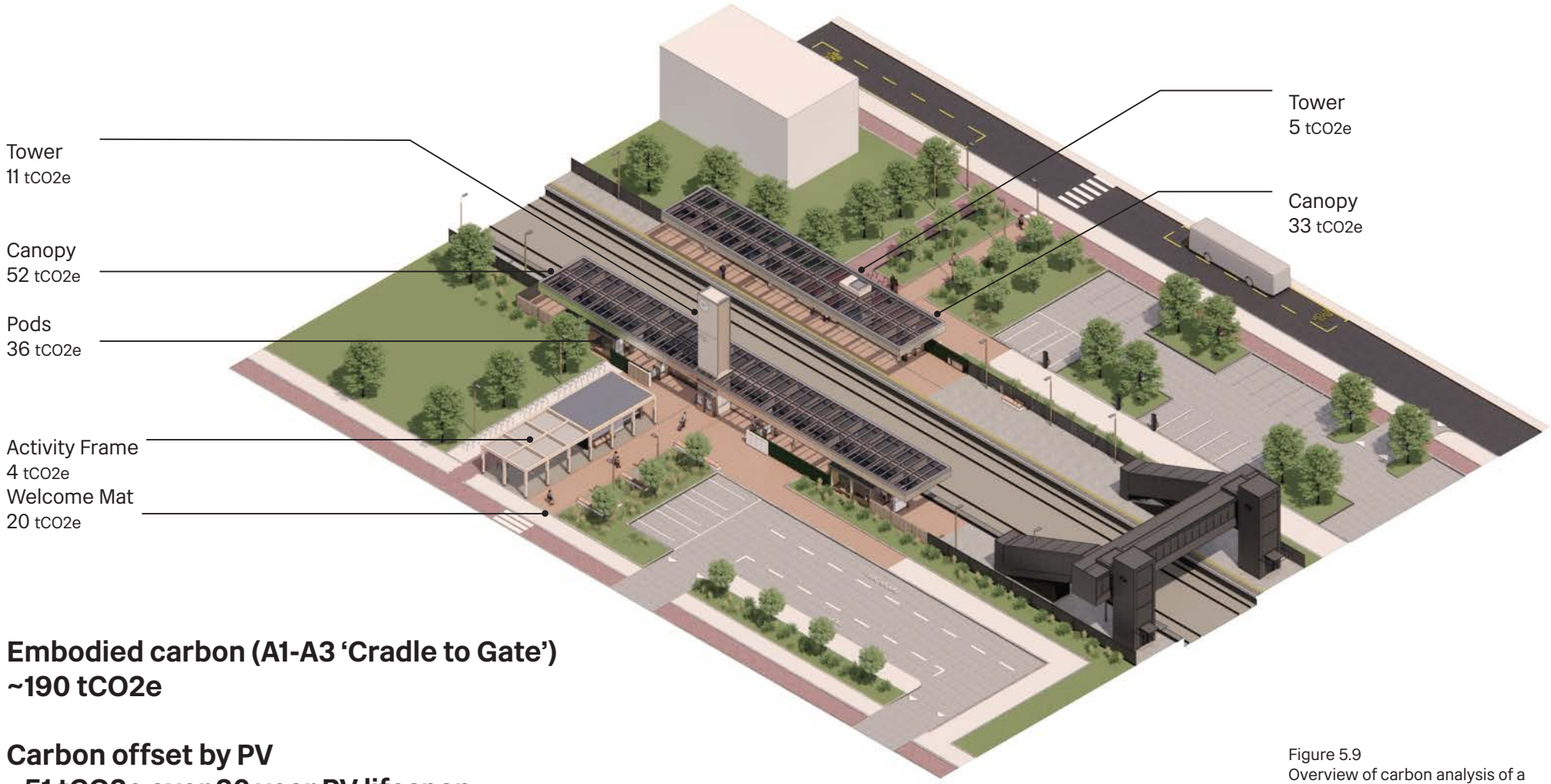
Stations can play a wider role in driving societal behaviour change.

Future stations should make travelling by rail, which is inherently sustainable, accessible and attractive to all.

Stations should also be a visible demonstration of environmentally sustainable design. As community hubs they are local nodes of a national infrastructure network and present an opportunity to show how things can be done better. This is a core aspect of the civic role that stations should play in their local communities.

Network Rail Guidance

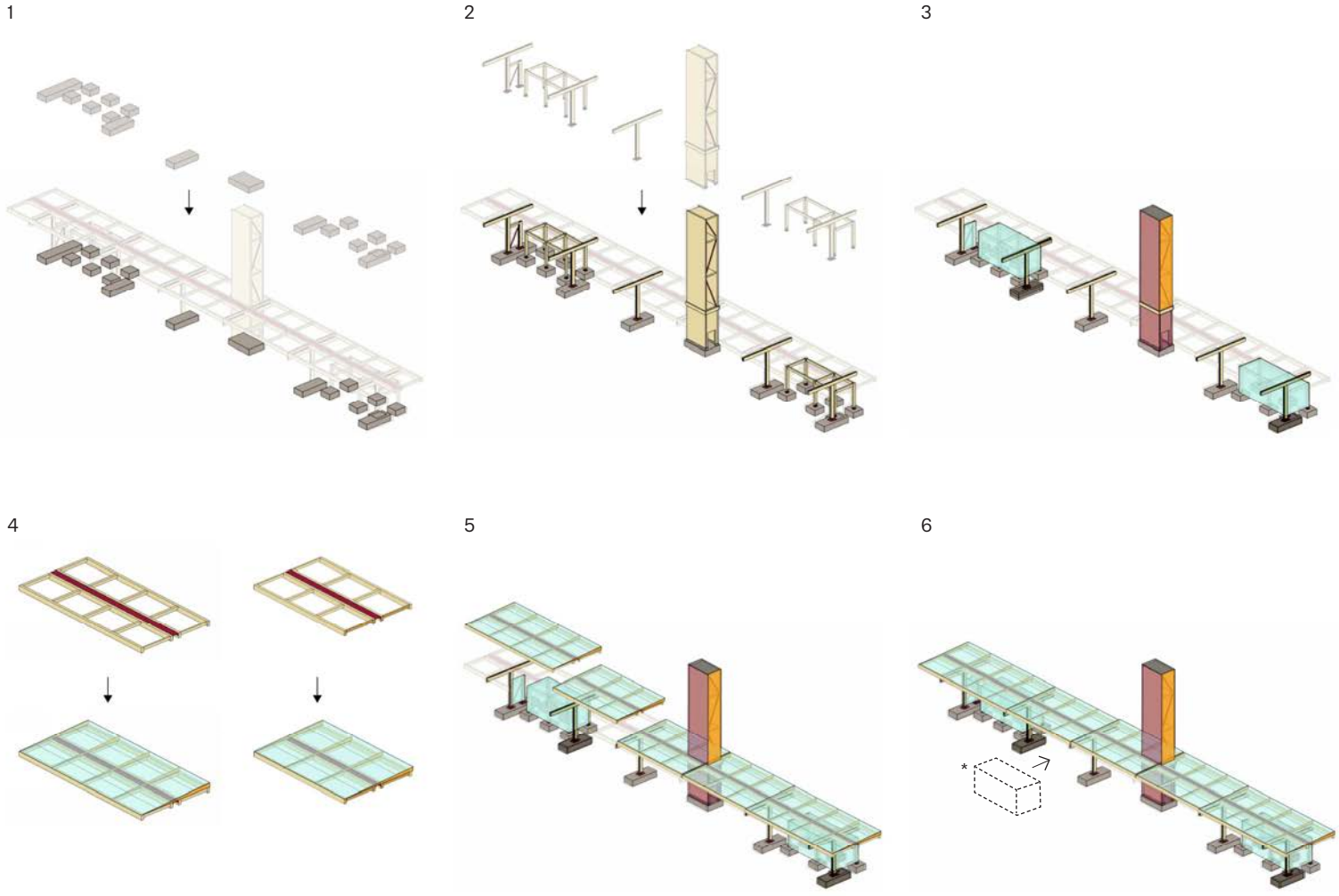
NR/GN/CIV/100/04 Climate Action Design for Buildings & Architecture



Embodied carbon (A1-A3 'Cradle to Gate')
~190 tCO2e

Carbon offset by PV
~51 tCO2e over 30 year PV lifespan

Figure 5.9
Overview of carbon analysis of a typical category D station



5.5.1 Outline Methodology

Construction methodology is to be optimised to maximise the benefits of off-site construction and minimise time on site which requires costly and disruptive possessions.

Outline methodology:

1. Excavate and construct foundations. Their typology varies from site to site. For new stations foundations should be coordinated with platform structural design prior to platform construction.
2. Install tower, T-frames and pods.
3. Add cladding to tower and pods (explore options to clad prior to lifting in place).
4. Join canopy cassettes in groups of two to form a 6m wide assembly. Install tertiary framing, fascia modules and glazing before lifting.
5. Lift canopy cassette assemblies into position and fix to T-frames and tower. Add roof infill behind tower.
6. Connect services modules.

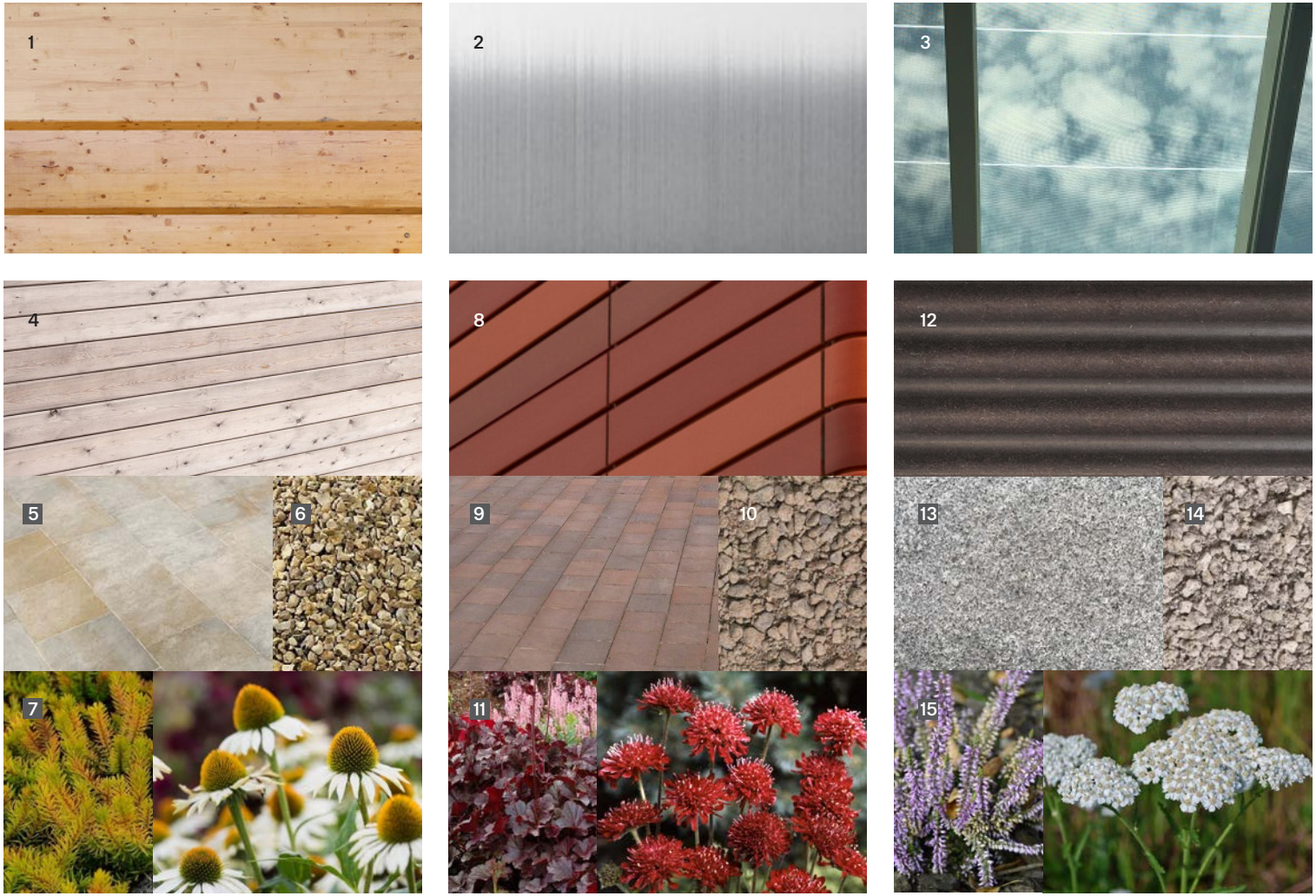
*Further pods can also be added (or removed) at a later date.

Figure 5.10
Construction methodology

5.5.2 Benefits

The benefits of a standardised kit of parts and streamlined off-site focused construction methodology are summarised below:

Figure 5.11
Standardised off-site focused approach - summary of benefits



5.6.1 Material Palette

The core material palette of engineered timber, stainless steel, and glazing creates a consistent station brand with a focus on simple, durable materials. A series of coordinated architectural and landscape material palettes allow each station to be tailored to its context.

Refer to appendix 7.4 for further detail.

Figure 5.12
Material palette overivew (see Appendix for full material and planting palettes)
Core materials:
1 Glue-laminated timber
2 Stainless steel / clear anodised aluminium
3 Glazing with integral PVs (80-90% opacity)
Buff palette:
4 Treated timber cladding
5 Sandstone primary paving
6 Buff self binding gravel
7 Complementary planting
Red palette:
8 Terracotta cladding
9 Clay primary paving
10 Red self binding gravel
11 Complementary planting
Grey palette:
12 Corrugated sheet cladding
13 Granite primary paving
14 Grey self binding gravel
15 Complementary planting

Strength to weight

Timber has a relatively high strength-to-weight ratio compared with other materials, resulting in lighter structures with lighter foundations.

Low embodied carbon

The carbon rate for glue-laminated timber can be about 4 times lower than for steel. Structural timber is to be FSC certified sourced from sustainable plantations, thus resulting in potentially negative carbon rates.

Carbon capture

The CO2 absorbed or sequestered by trees as they grow is captured within timber. When sustainably sourced, this contributes to further offsetting the overall project carbon at an average rate of 1.64 $kgCO^2e$ sequestered per kilogram of timber.

Non-conductive

Lifespan

Structures are designed for a 50-year design life. Timber materials such as glulam and accoya are manufactured to comply with this minimum lifecycle. eg. Accoya includes 50 year warranty for above ground application.

Tactile

Timber brings a natural warmth to spaces. Environments rich in natural materials, especially wood, can decrease blood pressure and stress levels.

Contextual

Timber is equally applicable in urban and rural contexts and there is a long history of timber structures in railway stations.

Re-usable

Figure 5.13
Benefits of engineered timber

Figure 5.14 (right)
Glulam timber column with recessed stainless steel fixings

5.6.2 Outline Material Specification

Engineered timber structure

Locations: structure throughout.

Species: softwood glulam to cassettes and T-frame columns, Accoya acetylated timber to activity frame due to exposure.

Size: to structural design and to include appropriate allowance for charring to provide structural integrity in event of fire.

Finish: coating to non-acetylated elements.

Fixings: Stainless steel preferred including flitch plates to SE details. Hidden fixings may be off the shelf galvanised steel components.

Fire rating: Fire retardant treatment to provide Euroclass B / BS476 Class 0 rating for surface spread of flame.

Structural fire integrity to be achieved by charring.

Pre-weathered timber cladding

Locations: tower cladding.

Size: 95x20mm boards, random lengths, trapezoidal open rainscreen profile (see overlay)

Layout: horizontal boards.

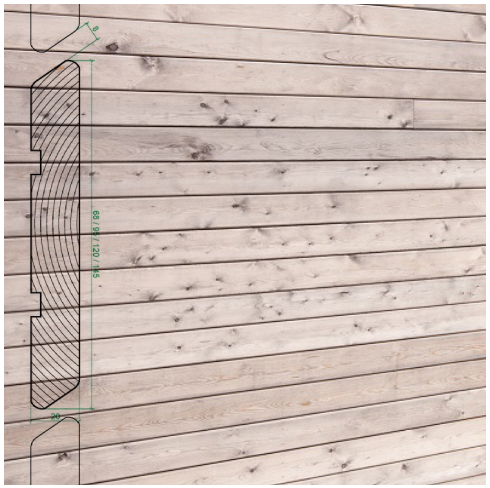
Species: Treated durable timber, eg. Thermopine or Accoya (acetylated timber).

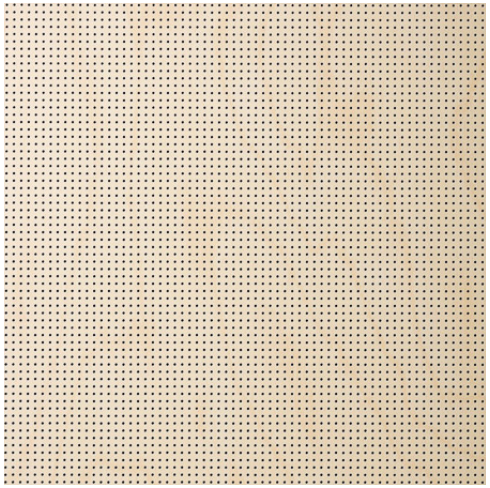
Finish: pre-weathered by factory coating (eg. SiOO:X Light Grey).

Fixings: stainless steel, vertically aligned and equally spaced.

Fire rating: Fire retardant treatment to provide Euroclass B / BS476 Class 0 rating for surface spread of flame.

Other: black insect mesh backing.





Perforated acoustic timber wall lining

Locations: pod interior.

Type: Timber facing with micro perforations and foam backing.

Fire rating: Fire retardant treatment to provide Euroclass B / BS476 Class 0 rating for surface spread of flame.

Terracotta cladding

Locations: Tower cladding alternative 1.

Type: Rainscreen tile with closed joints (eg. Argelite).

Size: 95x900mm tiles, horizontally hung.

Colour: Random mix of three similar tones.

Fire rating: Euroclass B / BS476 Class 0 rating for surface spread of flame.

Corrugated sheet cladding

Locations: Tower cladding alternative 2.

Material: Coated metal or hemp fibre.

Profile: Sinusoidal corruguation.

Fire rating: Euroclass B / BS476 Class 0 rating for surface spread of flame.

Stainless steel pressings

Locations: skirting detail to base of pods and tower, pod cladding.

Material: Duplex Stainless steel to BS EN 10088-4.

Finish: A non-directional, light and smooth uniform Matt surface finish with low reflectivity by use of bead blasting. Finish to be uniform throughout all panels.

Appearance: to match structural stainless steel elements such as column bases.

Canopy glazing with PV film interlayer

Locations: canopy roof.

Type: laminated toughened self-cleaning double glazing (eg. SGG Bioclean or Pilkington Activ)

Interlayer: photovoltaic film, typically cadmium telluride PV (see energy strategy).

Frame: Tertiary canopy frame of extruded anodised aluminium supported on secondary glulam cassettes.

Aluminium pressings / extrusions

Locations: Canopy fascia and flashing, tower reveal lining, tertiary glazing frame.

Finish: Natural anodised satin (clear anodic coating to appear like mill-finish aluminium).

Size: Generally 2mm thick pressings, sizes as per detail drawings cut from standard maximum sheet sizes.

Fixing: generally bonded to ply backing - see details.

Fire rating: Fire retardant treatment to plywood backing to provide Euroclass B / BS476 Class 0 rating for surface spread of flame.

Glass

Locations: pods, windbreak screens.

Type: laminated toughened and self-cleaning (eg. SGG Bioclean or Pilkington Activ)

Coating: Optional vandal resistant ETFE film to high risk locations eg. SG Norfilm

Fixings/trims: Aluminium base and head profiles. Aluminium channel to all exposed edges. See drawings.

Manifestation: two tone vinyl, see drawings for design.

5.6.3 Feature Walls

The Feature Wall is one of the first things passengers arriving at a station will see and offers opportunity for local character to be embedded into stations.

Examples of decorative wall finishes can be seen throughout railway buildings, from decorative glazed finishes to many Victorian and London Underground stations, to modern interpretations with the possibility of customisation and specific commissions. The feature wall is an opportunity to commission local craftspeople to make something that is of its place.

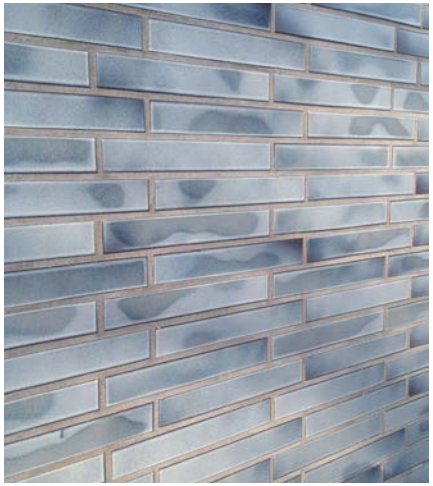
The feature wall also includes space for integrated information screens to display information such as onward travel, penalty fares, change to service etc.

Figure 5.15 (right)
Feature wall at West Hampstead Station

Figure 5.16 (below)
Visual showing a feature wall along the back edge of the platform.

Figure 5.17 (next page)
Reference images of feature wall precedents.

5.6 Materials continued



5.7.1 Landscape Approach

There are opportunities throughout Britiain to signficantly improve the landscape surrounding small and medium stations and addressing this forms a fundamental part of the HUB Station proposals. The landscape design responds to the three core objectives described in section 2.0 and expanded in relation to landscape as follows:

Connecting communities:
- Place for activity - flexible use activity frame
- Personalised - opportunities for bespoke elements that reflect community
- Integrated with the landscape beyond the station

Minimise environmental impact:
- Green/blue infrastructure - rain gardens and permeable paving contribute to sustainable urban drainage strategy (SUDs)
- Active travel - cycle parking, intermodal links, electric vehicle charging
- Provenance - locally sourced, locally appropriate

Improve passenger experience:
- Legibility of the space - clear routes from arrival to platform
- Dwell time - places to gather, not just wait
- Distinctiveness - interesting unique locations

The following pages include details of the landscape toolkit.

Figure 5.18
Landscape public realm references

5.7.2 Spatial Relationships

Establishing clear spatial relationships between station elements creates consistent easy to navigate environments. A typical arrangement is illustrated below and further examples are included in the appendix.

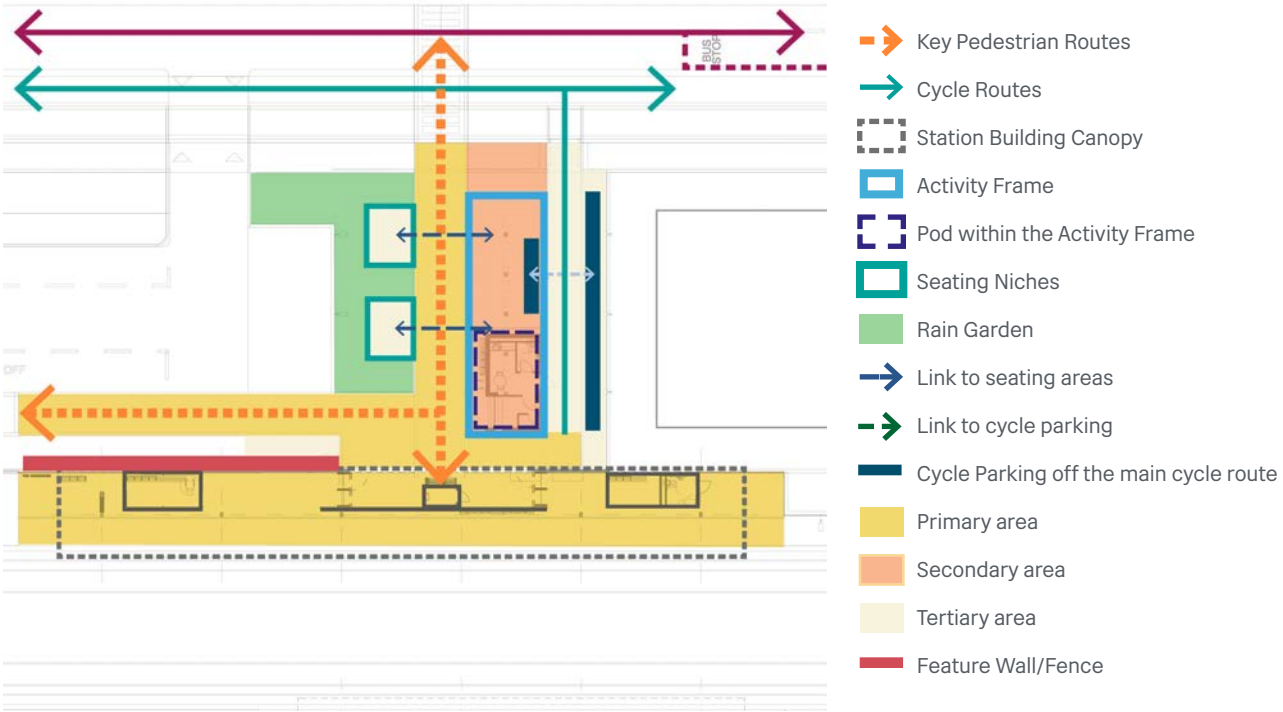


Figure 5.19
Spatial Relationships

5.7.3 Key Features

The Welcome Mat includes the following key features:

- **Rain Gardens to c. 30% Welcome Mat area:** Inlet kerbs and paving gradient should direct rainfall from hard surfacing into planted areas. Plant species should be tolerant of both wet and dry conditions. The Rain Gardens provide additional amenity value, providing a green frontage to the station and surrounding seating areas.
- **Biodiversity Net Gain**: A mixture of herbaceous perennials (native and non native where appropriate to conditions) in the Rain Gardens, wildflower verges and tree planting should be used to provide a range of habitats and increased species richness. Planting should be tailored to the locality (upland/coastal/lowland) to encourage habitat connectivity.
- **Permeable Paving:** Permeable construction of paving should be considered wherever possible, and combined with dropped kerbs, rain gardens and pocket attenuation.

5.7.4 Paving

- Creating a hierarchy of spaces, aiding orientation and legibility of space for the user.
- Promoting local identity through the use of local materials.

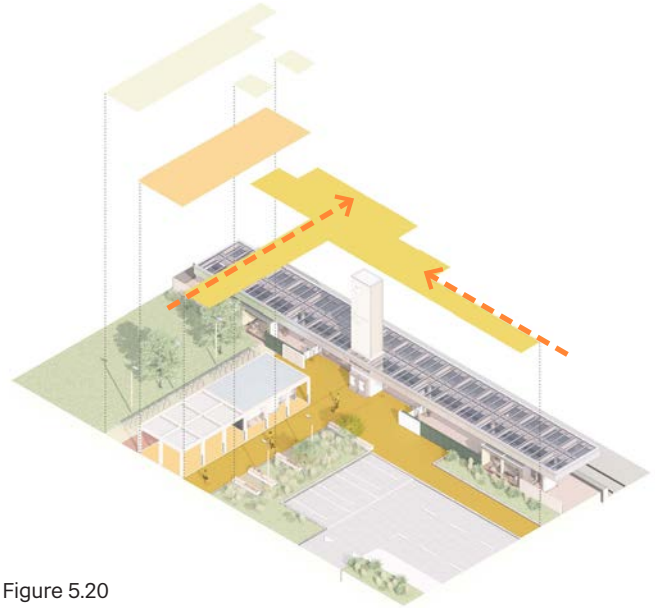


Figure 5.20
Paving Types

- Key Pedestrian Routes
- Primary area
- Secondary area
- Tertiary area

5.7.5 Soft Landsacpe

- Creating structure to the spaces, whilst encouraging dwell time.
- Promoting biodiversity and green-blue infrastructure.

Figure 5.21
Soft Landscape

- Rain garden planting
- Wild flower planting

5.7.6 Street Furniture

- Providing a suite of street furniture to animate the public realm and to enhance the user's experience.
- Introduce the use of local materials within the street furniture, to promote local identity.

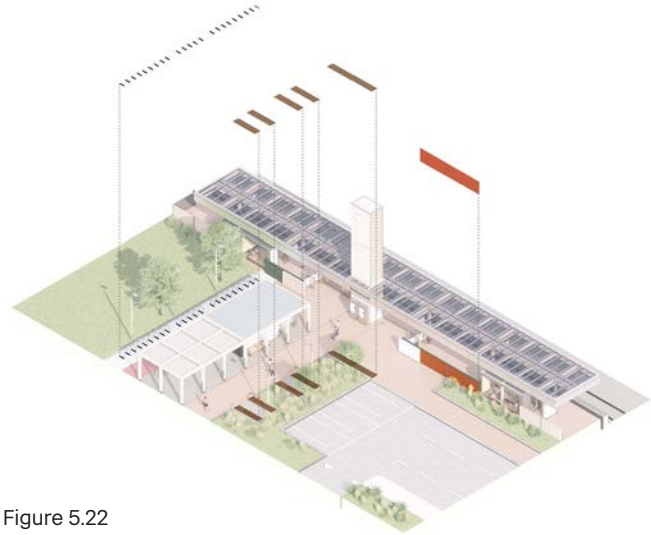


Figure 5.22
Street Furniture

- Bench with back
- Bench
- Cycle stands
- Feature wall

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Figure 5.23
Suggested palettes informed by local geological characteristics

Figure 5.24
Brunel Collection of stone samples from Great Western Railway station sites at the National Railway Museum, York

5.7.7 Material and Planting Palettes

The station design includes material and planting palette options to allow stations to be tailored to their context and rooted in their context.

Local geological and climatic characteristics should inform the selection of a suggested combination of paving and planting palettes.

This selection should be made through a process of contextual analysis:

- Paving colour theme with recommended specification for primary, secondary and tertiary paving areas
- Base rain garden planting colour theme coordinated to paving
- Further rain garden planting, meadow planting and trees informed by location - upland, lowland or coastal

The process for material and planting palette selection is illustrated on the next page. A detailed overview of the palettes and proforma for context analysis is included in the Appendix.

5.7.8 Scenario Testing

A range of hypothetical landscape scenarios were selected and tested to develop and refine the landscape approach and design process. Nine scenarios were tested as illustrated in the Appendix.

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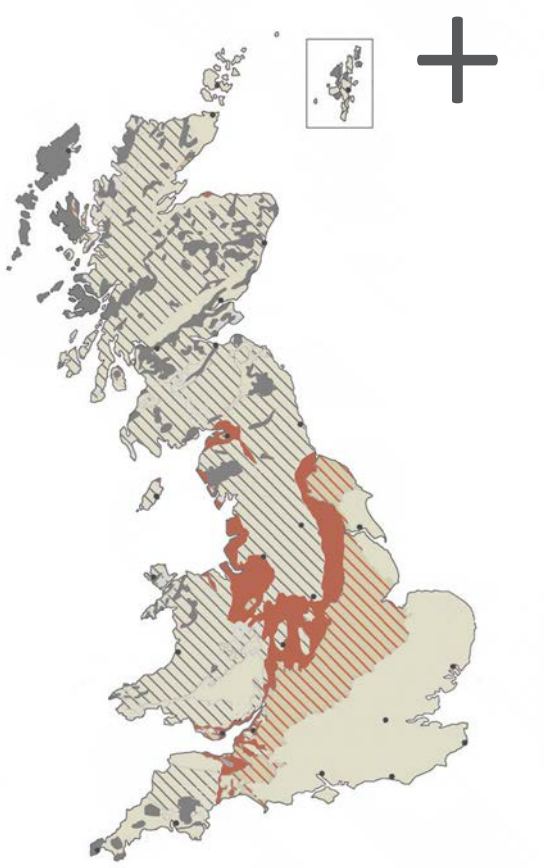
5.7.9 Pallette Selection Process - Worked Example



GEOLOGY : Sandstone and conlomerates
LOCATION :
Upland / Lowland / Coastal

LOCAL VERNACULAR

War Memorial

Church

Walling

Consider materiality of nearby landmarks e.g. town hall, monuments etc.

SURROUNDING MATERIALS

Consider building and paving materials in immediate surroundings - views from station

PAVING PALETTE

RED Or **BUFF** Or GREY

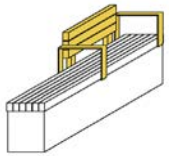
PLANTING PALETTE

RAIN GARDEN BASE PLANTS

+

RED PLANTING PALETTE	Or	**BUFF PLANTING PALETTE**	Or	GREY PLANTING PALETTE
UPLAND		UPLAND		UPLAND
Or		Or		Or
LOWLAND		**LOWLAND**		LOWLAND
Or		Or		Or
COASTAL		COASTAL		COASTAL

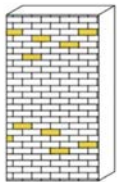
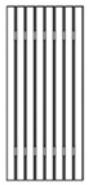
5.7.10 Landscape Toolkit

Element		Quality Objectives	Key Design Considerations	Performance Requirements
Bench with back and armrests		· To provide seating to provide a place to rest and wait - enhancing passenger experience.	· Consider the use of local materials for the base. · Minimum 1 no. seat with back and armrests as illustrated to be incorporated within seating niches.	· Material choice to reflect paving palette.
Seating		· To provide seating to provide a place to rest and wait - enhancing passenger experience.	· Consider the use of local materials for the base. · Locate bench within seating niches and at the entrance to station. · Consider the use of the seat where a bench with back may obstruct sightlines.	· Material choice to reflect paving palette.
Waste Facilities		· To reduce waste by providing sufficient provision. · Provision of bins should cover waste from trade, retail and public waste.	· Waste facilities should always be located away from entrances and main pedestrian routes. · The location of bins should be coordinated with other street furniture and not create an obstruction.	· The design of the waste facilities is to be part of the street furniture suite - reflecting local identity.
Cycle Stand		· To provide sufficient number of cycle stands to meet demand.	· Cycle parking should be fit for purpose, inclusive and secure. · Cycle stands are to be located off the main cycle route or within the activity frame, where appropriate.	· The design of the cycle stands are to be part of the street furniture suite - reflecting local identity.

5.7.10 Landscape Toolkit continued

Element		Quality Objectives	Key Design Considerations	Performance Requirements
Tree Planting		· Provide a structure and framework to the Welcome Mat. · Promote biodiversity.	· Trees to form structure and complement the layout of the Welcome Mat. · Trees should not obstruct sight lines, views, signage and building entrance ways. · Trees to be located so as not to obstruct lighting columns and CCTV. · Tree planting should be coordinated with services and utilities layouts.	· Planting choice to reflect planting palette.
Planter		· Provide a structure and framework to the Welcome Mat. · Promote biodiversity. · Consider community involvement with planters.	· The location of any planters should be coordinated with other street furniture and not create an obstruction.	· Planter material choice to reflect paving palette. · Planting choice to reflect planting palette.
Rain Garden		· To provide a nature based drainage solution to the station entrance. · Provide a structure and framework to the Welcome Mat. · Promote biodiversity.	· Consider the proportion of rain garden to hard standing - c30% of Welcome Mat to be rain garden. · Consider the edge of the rain gardens to allow rainfall to be collected and directed into planted areas.	· Planting choice to reflect planting palette.
Meadow Planting		· Provide structure and setting to the station through the use of meadow flower planting areas. · Promote biodiversity within the station setting.	· Areas of planting to consider desire lines. · Areas of planting to form part of the overall station structure. · Provide boundary edge planting to paths or adjacent hard standing (routes from car parking to station entrance).	· Planting choice to reflect planting palette.

5.7.10 Landscape Toolkit continued

Element		Quality Objectives	Key Design Considerations	Performance Requirements
Feature Wall		· To promote local identity to station frontage. · To define boundaries.	· Location of the Feature Wall should be considered within the context of the Welcome Mat, creating a sense of arrival and defining the space. · Consider local craftsperson involvement.	· Material choice to reflect paving palette colours.
Fence		· To promote local identity to station frontage. · To define boundaries.	· Consider visually permeable fencing, mainitaining visual connections between station areas. · Consider local craftsperson involvement.	· Material choice to reflect paving palette colours.
Screen		· To promote local identity to station frontage. · To define boundaries.	· Consider visually permeable screens, mainitaining visual connections between station areas. · Consider local craftsperson involvement.	· Material choice to reflect paving palette colours.
Hedge		· To define boundaries. · To screen areas. · To provide linear habitat connectivity. · Promote habitat biodiversity.	· Position to form structure and an edge to spaces - defining boundaries. · Use when a feature wall/ fence or screen are not applicable.	· Planting choice to reflect planting palette.

5.8.1 An Adaptable Approach

The mechanical and electrical (M&E) services proposal has been developed to allow flexibility allowing the design principles to be applied and implemented on various sites across Britain. The design information provided is readily scalable to allow the design to be implemented across station categories D, E and F.

5.8.2 Integrated Design

The M&E design has been developed to integrate the service distribution within the architectural design whilst minimising visual clutter and maximising efficiency.

Within the canopy a central service spine has been detailed to allow all electrical containment and electrical fixtures to be located within this central zone. The containment is concealed to minimise their visual impact, however, can be easily accessed via the removable panels for maintenance. Electrical fixtures such as CCTV cameras and PA speakers will also be mounted within this central zone so they can be easily and safely accessed when needed.

5.8.3 Utilities

Once a suitable site has been identified for a HUB Station project, the design team will need to liaise with local utility providers to obtain information relating to the provision of electricity, water, drainage and telecommunications from local networks to serve the station.

Electrical Load Assessments have been undertaken for category D, E and F stations. It has been determined that a 3-phase LV supply derived from the local distribution network will be sufficient to serve category D, E and F station sizes. A maximum demand assessment will be required from the station design team for each new station to confirm the supply is sufficient to support all of the services and facilities envisaged.

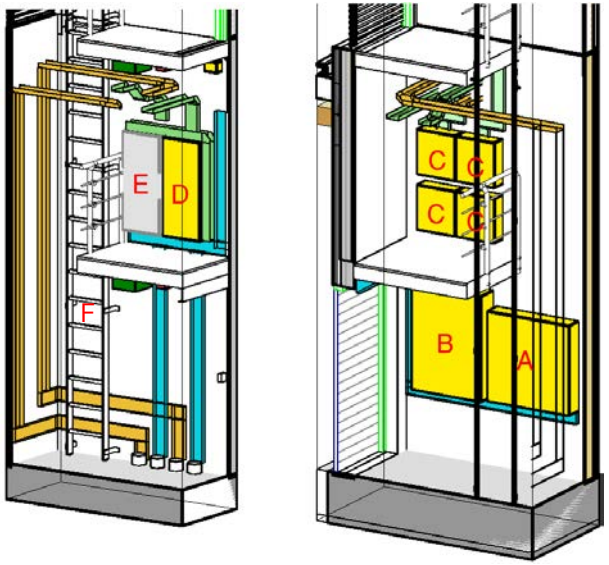


Figure 5.25
Tower interior layout
The tower should house the DNO incomer, electrical switchgear and PV inverters to serve the station.

A: Distribution network operator (DNO) incomer
B: Moulded case circuit breaker (MCCB) panel board
C: Photovoltaic (PV) inverters
D: Small power & lighting distribution board
E: PV Gateway (Optional - only if batteries installed)
F: Ladder access to upper levels

5.8.4 Towards Net Zero

Sustainability has been a key driver in the development of the M&E strategies to align with Network Rail's Net-Zero Carbon ambitions and to provide a future-proof solution which can be maintained easily and safely. The M&E strategy allows HUB Stations to be serviced in an energy efficient manner, with minimal carbon emissions.

The future success and widespread roll out of the Hub Station design will be largely governed by its ability to respond and adapt to the net zero carbon agenda. This should continue to drive the development of the design and delivery of the station from both a construction and operational perspective. The Network Rail "Environmental Sustainability Strategy 2020 – 2050" outlines the following milestones:

- "Achieve agreed science-based targets for scope 1 and 2 by 2050 at the latest (Scotland 2045)"
- "We will purchase 100% renewable non-traction electricity by 2020, and will aim to feed in 100% of our non-traction electricity from renewable sources by 2030"

There are no Scope 1 emissions envisaged on the HUB Stations. It is assumed that Network Rail will achieve their targets of purchasing 100% renewable non-traction electricity to serve their non-traction estate by 2030. This will allow Network Rail to achieve the Scope 2 operational Net Zero targets at the HUB Stations. Therefore an appraisal was completed of various options to meet Scope 3 targets. To help achieve this, the option of installing sustainable technologies within canopy roof has been extensively explored.

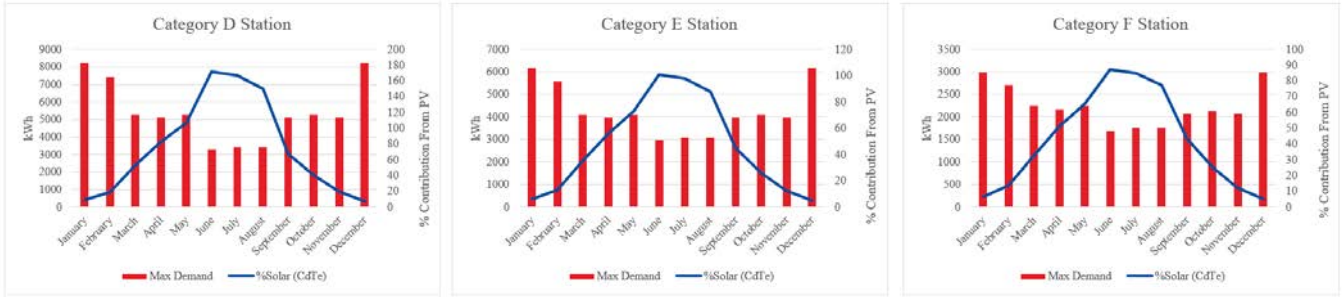


Figure 5.26
Electrical load profile and CdTe PV contribution by station category

5.8.5 Photovoltaic Canopies

Following a desktop study that compared the advantages and disadvantages of various available options (e.g. rainwater harvesting, green roof) it was established that the optimal use of the canopy roof would be the installation of Photovoltaic (PV) panels. This was primarily due to the benefit that a PV installation offers with regards to Scope 1 and Scope 2 carbon savings as well as reducing exposure to variable and uncontrollable energy costs.

The chosen panels were required to have a certain degree of transparency to allow sunlight to pass through the canopy onto the platform, in line with the architectural aspirations. With this in mind two PV panel technologies were identified as potentially viable options:

- Monocrystalline Silicon (sc-Si)
- Cadmium Telluride (CdTe)

Electrical load profiles were generated for category D, E and F stations and compared against the PV yield which could be generated using panels incorporated within the Canopy Roofs. A comparison of the monthly electrical demand for each station against the monthly PV yield can be seen in the graphs above.

5.8.5 PV Canopies continued

Assuming the station was located in the South-East of England with a North-South orientation it was estimated 35% to 60% of the annual electricity demand could be fulfilled using the PV panels. The effect of geographical location on energy generation was also tested and adjustment factors determined. The study confirmed an approximate variation of 15% in annual PV yield across the country. There is also a 3-4% variation depending on the orientation of the canopy.

The comparison considered panel output, embodied carbon, and potential payback period for both PV panel technologies (sc-Si PV and CdTe). It was found that the origin of manufacture of the PV panels and the inclusion of battery storage has a significant impact on results for both the Scope 2 (Operational Carbon) and Scope 3 (Embodied Carbon) analysis – see figures 4.21, 4.22 and 4.23.

It was found that whilst the incorporation of battery technology into the PV Installation improves the energy yield for both of the installed systems, it resulted in failure to achieve a suitable payback of the Scope 3 embodied carbon. As it is proposed that the primary objective of the PV installation should be offsetting the Scope 3 embodied carbon emissions, the Cadmium Teluride panel (with no Battery Storage) achieves the greatest carbon payback (within 6 years of installation). This will result in a greater offset of embodied carbon across all aspects of HUB Station.

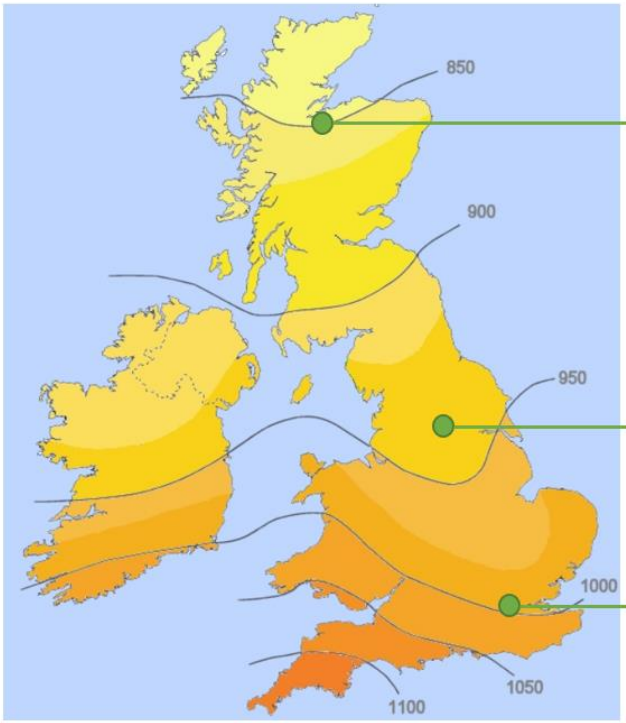


Figure 5.27
PV yield performance for various orientations at three locations across Britain.

Station Category	sc-Si PV Panels (incl. Batteries)				CdTe Panels (no Batteries)			
	Scope 1: Direct Emissions	Scope 2: Operational Carbon Reduction	Scope 3: Embodied Carbon Payback	Financial Payback	Scope 1: Direct Emissions	Scope 2: Operational Carbon Reduction	Scope 3: Embodied Carbon Payback	Financial Payback
Category D	Not Applicable For This Project	106%	Not achieved with sc-Si panels	10 years	Not Applicable For This Project	59%	6 years	14 years
Category E		71%		11 years		39%	6 years	15 years
Category F		67%		11 years		37%	6 years	14 years

Figure 5.28
Comparison of PV technologies carbon and financial payback periods.

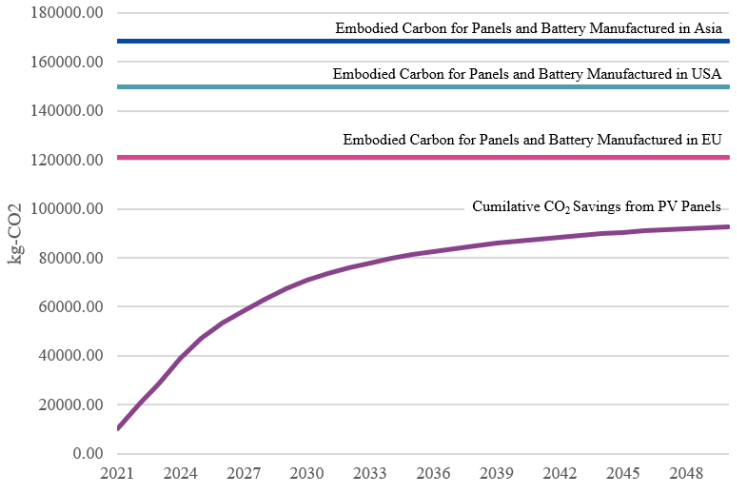


Figure 5.29 (right top)
Embodied carbon payback for Sc-si PV panels showing that embodied carbon is never paid back resulting in increased net carbon.

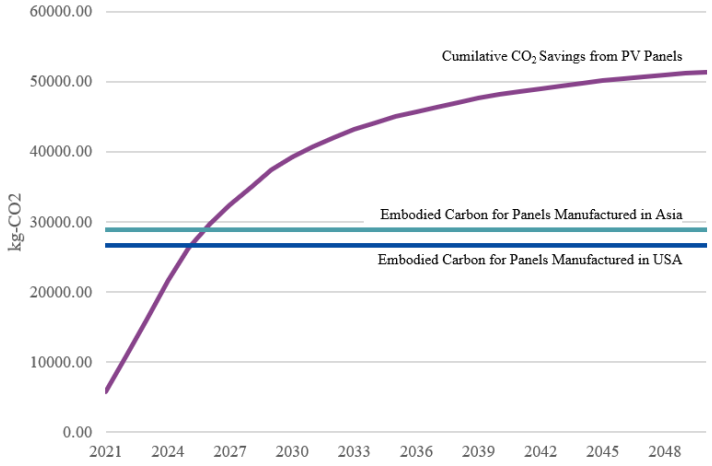


Figure 5.30 (right bottom)
Embodied carbon payback for CdTe PV panels showing embodied carbon payback in approximately 6 years resulting in net carbon offset.

5.9.1 Design Objectives

Lighting has a key role to play in the HUB Station concept. The lighting has been developed to enhance user experience of the various station types, so that passengers and staff feel safe and are provided with a quality lit environment that considers the surrounding environmental context.

The lighting provides a sense of shelter for users, through the use of warm light to illuminate the structural timber construction. Integrated lighting to the clock tower provides a civic beacon.

The lighting scheme sets out to achieve the following design objectives:

- Facilitate safe movement for passengers.
- Assist with orientation through the station journey.
- Provide a unique identity to each station by illuminating and coordinating with the tower finishes.
- Consider the environmental location of the station.
- Achieve the safety and security requirements by providing sufficient illumination for facial recognition and CCTV camera detection.
- Provide a welcoming and inviting environment.
- Provide a visually comfortable space with no glare.
- Use minimum materials in the delivery of the lighting scheme.
- Incorporate a reliable, user-friendly lighting control system.
- Energy efficient through the use of daylight from PV roof panels and low energy efficient LED sources.
- Use colour temperature to enhance material selection and provide an inviting space at night that considers the surrounding context.
- Provide future flexibility within the framework of the design principles.
- Practical to maintain and procure.
- Specify high quality LED light sources that will provide consistent colour and a reduced maintenance cycle.

Overall the design looks to re-define how lighting is considered for small and medium size stations to make them more accessible, sustainable and attractive to encourage use.

Figure 5.31
View towards platform from Welcome Mat (Type D Station)

5.9.2 Technical Standards

Lighting technical standards have been applied in a considered and tailored way to avoid over-illumination and a blanket approach to the lighting of the platforms.

The diagram below provides an application diagram of the standards and how these have been applied to the station plan.

The design intends to review aspects of the current lighting standards, that are currently under review, and looks at additional metrics to provide the correct character and quality and thereby enhance the user experience of the station.

While recent Network Rail accessibility guidance recommend open platform stations are lit to 100lux this is not always appropriate for certain station settings and the levels on platforms have been designed, in consultation with Network Rail, to go up to 80lux maximum with good uniformity and illumination to vertical surfaces as set out in this guide.

Location		Lighting Requirement	Design Standard
Ticket Barriers		Eh_{av} 200 lux	RIS-7702-INS
Ticket Machines		Eh_{av} 300 lux (U0: 0.5)	RIS-7702-INS (non-illuminated)
Waiting Areas		Eh_{av} 300 lux (U0: 0.5)	BS 12464-1
Cycle Stores		Eh_{av} 5 lux (U0: 0.25)	BS 12464-2
Open Platforms: Passengers	Small number	Eh_{av} 5 lux (U0: 0.2)	RIS-7016-INS
	Medium number	Eh_{av} 20 lux (U0: 0.3)	RIS-7016-INS
	Large number	Eh_{av} 50 lux (U0: 0.4)	RIS-7016-INS
Platform Edge		Ev_{min} 10 lux	RIS-7016-INS, 1m above platform surface

Figure 5.32
Current (2022) Standards referred to for each area

Figure 5.33 (right)
Application of light levels to station plan (Type D)

5.9.3 Lighting Quality Metrics

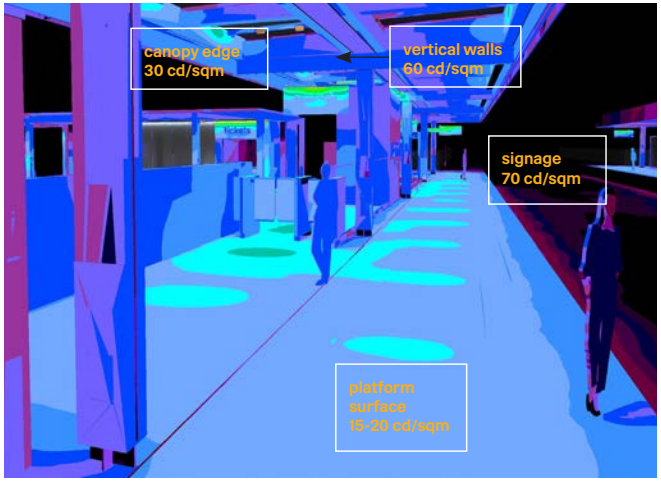


Figure 5.34
Luminance levels of proposed scheme

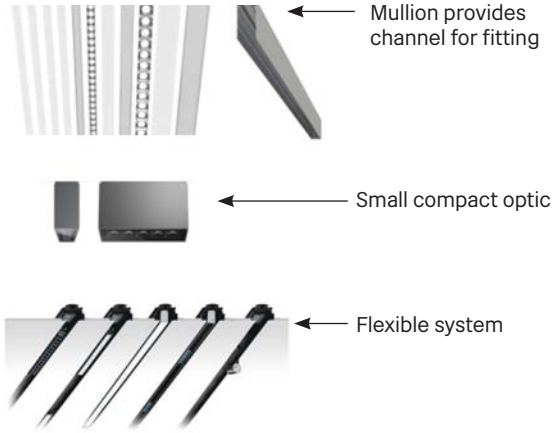


Figure 5.35
Proposed optical control for platform lighting

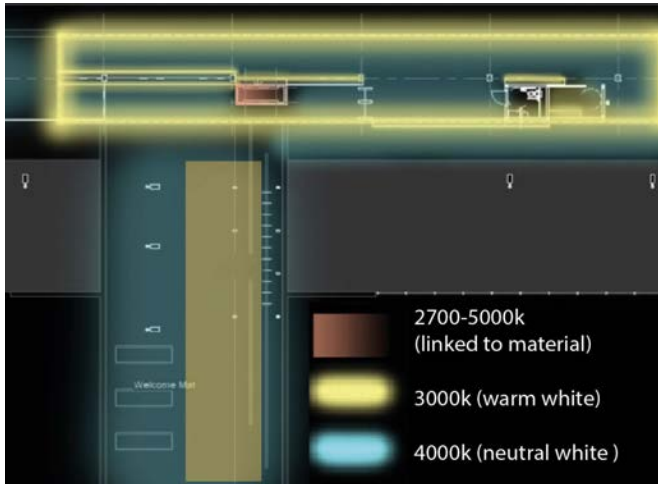


Figure 5.36
Colour temperature plan for platform

The level of visual comfort of and sense of safety that people feel in a space depends on the lit environment, characterised by the apparent brightness of surfaces in their field of view and the degree of visual contrast they experience. Luminance is an objective metric of the brightness of a lit surface, and this has been carefully considered in the design. The illumination of the canopy edge greatly assists with visual comfort for users by creating a lit surface in relative proximity to downlights. The luminance diagram in figure 5.34 indicates the contrast ratios the design provides in combination with the agreed material palette, which should be adhered to with future lighting proposals.

Also using an lensed optical system with darklight optics greatly reduces potential glare from the light source. Standards define maximum allowable glare ratings (GR), but in practise we would recommend that glare should only be accepted at the noticeable rating (GR 30-35) and not the admissable level of (GR 45) which is often used.

Colour appearance and consistency is also critical for visual acuity. All fittings should have a colour rendering index (CRI) of above 85 and the colour temperature plan in figure 5.36 should be followed.

It is recommended that new metrics are assessed with a simplified mock-up using proposed luminaires for the station.

5.9.4 Design Proposal

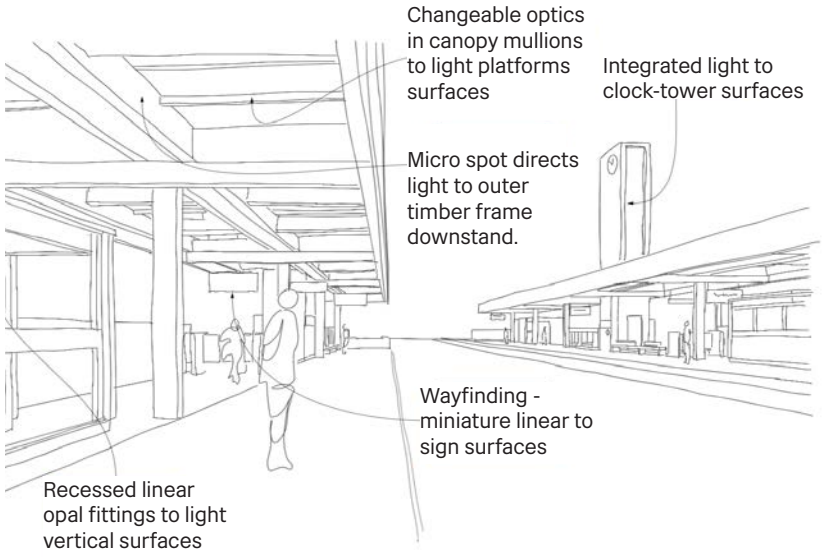


Figure 5.37
Platform lighting concept sketch

Figure 5.38
Dialux Evo calculation generated to check performance of proposal

The platform is illuminated from two main sources: a downlight with low glare optics integrated into the roof mullions and a small surface mounted floodlight fixed to the side of the main central spine of the structure, to illuminate the edge frame of the timber platform canopy. This layered approach provides a background level of light from the canopy keeping the brightness and energy use to a minimum when the space is not in use. The downlights will be programmed to come on when the station is in use. Key walls are lit with a recessed opal luminaire.

Base walls of the clock tower are illuminated to highlight ticket machines and help points and to aid orientation. This is mirrored in the upper area of the tower where focused uplights illuminate the base of the tower and floodlights illuminate the louvres. Network Rail logos will have integrated lighting to render the signage information legible.

It is proposed that all luminaires will be dimmed through a Bluetooth mesh system to reduce cabling requirements.

5.9.4 Design Proposal continued

Figure 5.39
User journey

Figure 5.40
Activity frame

Figure 5.41
Waiting Shelter on platform

The lighting has been considered from a user journey perspective and therefore a lighting proposal for the Welcome Mat area and Community Hub is included in the proposal. It is important that the lighting guides passengers along their journey and assists with wayfinding, orientation and perceived safety at night.

Timber lighting columns provide general light to the 'Welcome Mat' landscaped area which is supplemented with low level lighting integrated into benches to provide a welcome appearance to the space, encouraging use throughout the day and night.

The Community Hub has lighting provided from the main frame of the canopy which will come into use during darker days and evening uses. The canopy glazing with integrated photovoltaic panels will allow natural light to enter these spaces during daylight hours.

Once through the turnstiles, passengers have the opportunity to wait under the warmly-lit timber canopy, or wait for their train in one of the waiting shelters provided in the larger station types. The light for these spaces is provided from central downlights and interior walls are lit in the space to provide a sense of enclosure and safety at night.

5.9.5 Environmental Considerations

Figure 5.42
Environmental Considerations embedded in lighting concept

5.10.1 Outline
Sustainability and modern methods of construction (MMC) govern the structural design. In line with this, the structure has been designed as low and potentially negative carbon, modular timber assemblies.

5.10.2 Low/negative embodied carbon
Primary materials includes glue-laminated timber, acetylated timber and cross-laminated timber (CLT), all of which can result in negative carbon construction to help offset the overall project carbon. For example the CLT tower structure reduces embodied carbon by up to 65% in comparison to steel. The high strength-to-weight ratio of timber also reduced the need for concrete foundations. High utilisation ratios have been achieved in the design to further optimise material use and mechanical fixings have been outlined to increase recyclability at the end of the lifecycle. Steel is to come from recycled sources and cement replacement materials are to also be employed in the foundations to reduce their embodied carbon.

5.10.3 Durability
All structures have been designed for a minimum 50-year design life, in line with the Eurocodes. The configuration of fixings has also been developed following industry best practice for timber and to facilitate inspection and maintenance where required.

5.10.4 MMC
The primary canopy structure comprises three standard assemblies: 2D canopy cassettes, 2D T-frames and 3D towers. Their topology has been developed to facilitate nationwide applicability, standardisation for easy manufacturability, transport by road or rail, and on-site constructability. See section 5.5 for a diagrammatic representation of the construction sequence.

Figure 5.43
The Ivy Pavilion with Accoya timber frame

Figure 5.44
Sectional perspective through canopy illustrating ease of access

Maintenance considerations are embedded within the HUB Station approach as summarised below.

Ladder within tower allows safe maintenance access to lighting and clock face.

Canopy roof falls away from tracks to gutter on back edge. PVs to be cleaned annually. Preferred roof and gutter cleaning via mobile access platform or MEWP positioned at the back edge of the canopy. Option for fall prevention line to central walkable gutter is included for island platform scenarios with access via the ladder within the tower - refer to drawing package for details. Fall prevention systems require regular maintenance so should only be used where other options are not available.

All equipment including lighting setback from platform edge to avoid requirement for maintenance possessions or isolations

Service spine with removable cover for easy maintenance access.

Platform drainage and in-ground service conduits coordinated with finishes to allow non-disruptive ongoing access and setback from platform edge

Figure 6.1
Community engagement model of a Category E HUB Station

6

Design Manual for Medium to Small Stations

Cost and Procurement

6.1.1 Investing in Passengers and Communities

Cost benchmarking for small and medium stations show the proportion of new station budgets allocated to passenger facing elements is extremely limited (see figure 6.2), particularly smaller category E and F stations.

The functional brief requirements included in this manual aim to improve the way stations serve passengers and communities and minimise their impact on the environment. Where this requires additional investment this can be justified against the wider benefits and value generated.

Additional funding options should be explored and the HUB Station cost estimate includes an illustrative split of 'Rail' and 'Community' elements that could be apportioned to funding partners.

6.1.2 Cost Benchmarking

The HUB Station cost estimate has been benchmarked against the 'Minor Station Cost Benchmarking' report provided by Network Rail. Please note benchmark costs are only included for '1.06 Buildings and Property' as this is the section that relates to the current project scope.

A comparison of base configuration costs to these benchmarks is illustrated on the right.

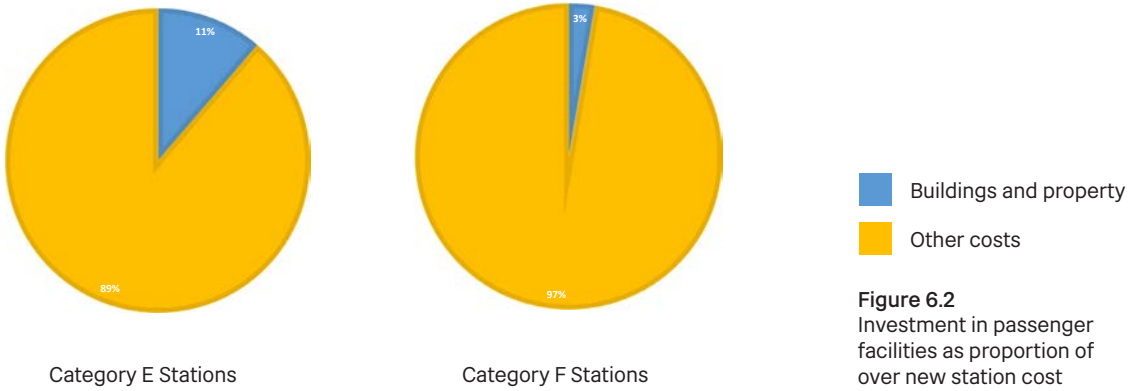


Figure 6.2
Investment in passenger facilities as proportion of over new station cost

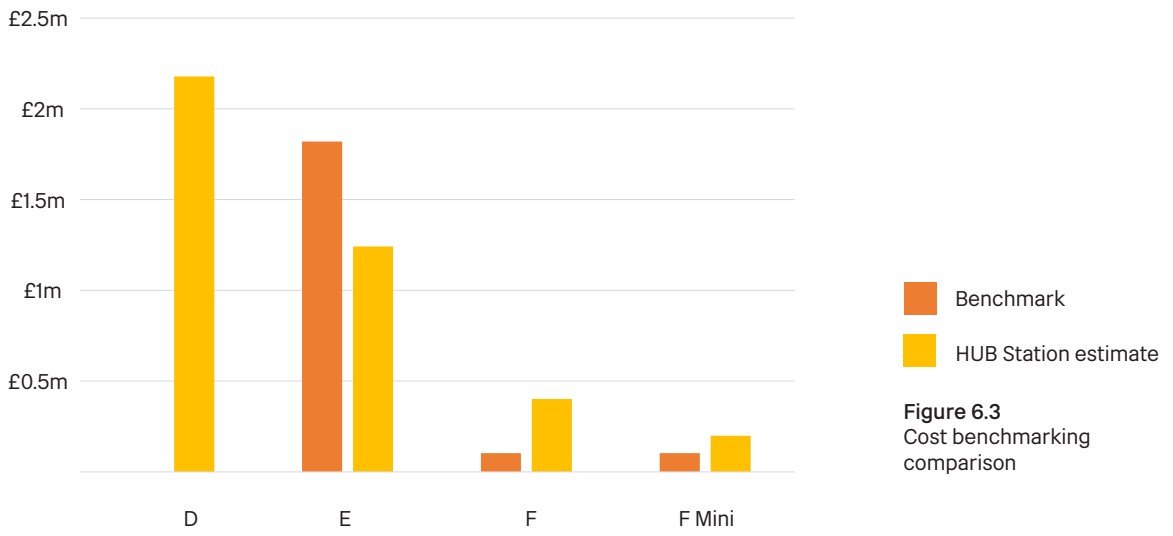


Figure 6.3
Cost benchmarking comparison

6.2 Opportunities

6.2.1 Opportunities - Generate Revenue

Opportunities for revenue generation include:

- Energy cost savings through on-site PV generation. Based on current modelling the financial payback period for capital cost of PVs is between 10-15 years, after which savings offset other costs.
- Leasing income from activity frame occupiers
- Better stations result in increased footfall with wider economic benefits.

6.2.2 Opportunities - Bulk Procurement

Bulk procurement of components or elements offers significant opportunities for cost reduction. For example:

Pods – procuring 100s of units would realise a significant discount / economies of scale.

PVs – the supplier consulted in the development of HUB Station anticipated a 50% cost reduction of the solar PV panels if manufactured at scale – ie. 1000s of units (3m x 1m).

6.2.3 Opportunities - Reduce Prelims

Contractor preliminary costs associated with the construction phase will vary from site to site and are therefore excluded from the current cost estimates.

Construction methodology and knock-on budget and programme impacts should be assessed as early as possible as cost impacts can be significant.

For example based on the illustrative example shown on the right an 8 week programme reduction equates to a saving of over £200,000.

It is therefore possible that upgrading materials or component sizes to allow larger component sizes would be offset by the savings achieved as a result of reducing the number of crane lifts.

Principles to reduce prelim costs:

- Minimise crane lifts - larger components
- Avoid requirement for isolations and possessions

Figure 6.4 (top right)
Lifting elements into place during an overnight possession.

Item	Cost	Per
Basic Prelims	£10,000	week
Crane (250t)	£13,000	night
OLE Isolation	£3,000	night (c. 4 hours working time)

Illustrative prelim cost rates advised by Story Contracting during constructability review of HUB Station concept. Based on construction projects in Central Belt Scotland 2021.

Example cost saving for 8 week programme reduction:

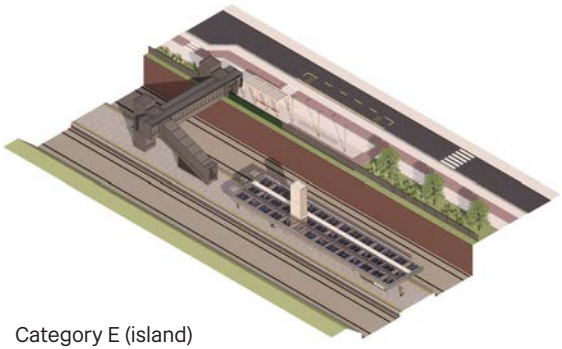
24 week programme with crane lifts and isolation every weekend	= £624,000
16 week programme with crane lifts and isolation every weekend	= £416,000
saving for 8 week programme reduction	= £208,000

6.3 Cost Overview

Cost estimates have been prepared for each of the four base configurations and a full elemental cost plan prepared by Gardiner and Theobald is included in the supporting design pack, available on request from Network Rail Buildings and Architecture, Technical Authority.

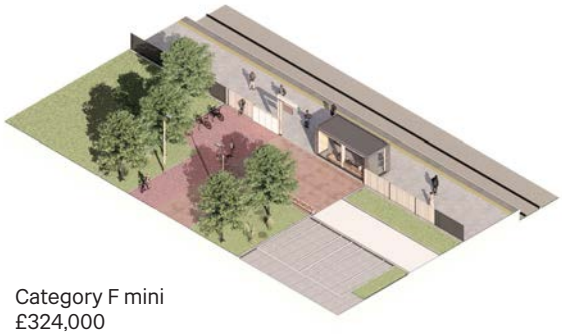
Total costs for the base configurations are illustrated on the right. Costs illustrated are construction costs excluding fees and prelims. Refer to the supporting cost plan mentioned above for full details of assumptions and exclusions.

Category D
£2,456,000



Category E (island)
£1,301,000

Category F
£542,000



Category F mini
£324,000

Figure 6.5
HUB Station base configurations as compared within the features comparison

6.4 Cost Breakdown

Approximate costs per part are noted on the right. This catalogue of parts is intended to allow quick estimates of different configurations to be compiled and does not replace the requirement for professional cost advice for all projects.

Indicative cost breakdown by element:

Tower (Full) £200,500 per tower
Tower (Mid) £197,100 per tower
Tower (Base) £86,700 per tower
Canopy Bay (9x6m) £98,000
Waiting Pod £103,000 per pod
Combined Pod £143,400 per pod
Staff Pod (Not including activity frame) £208,400 per pod
Welcome Mat (excluding platform) £210 per m²
Activity Frame £550 per m²
Security Fence £500 per m
Bench (3.3m long) £4,250 per item
Bench (4.4m long) £5,500 per item
Bench (6m long) £8,000 per item
Leaning Bar/Bench (2.8m long) £2,800 per item
Glazed Screens to Platform (1.6m high) £800 per m
Cycle Stands £350 per item

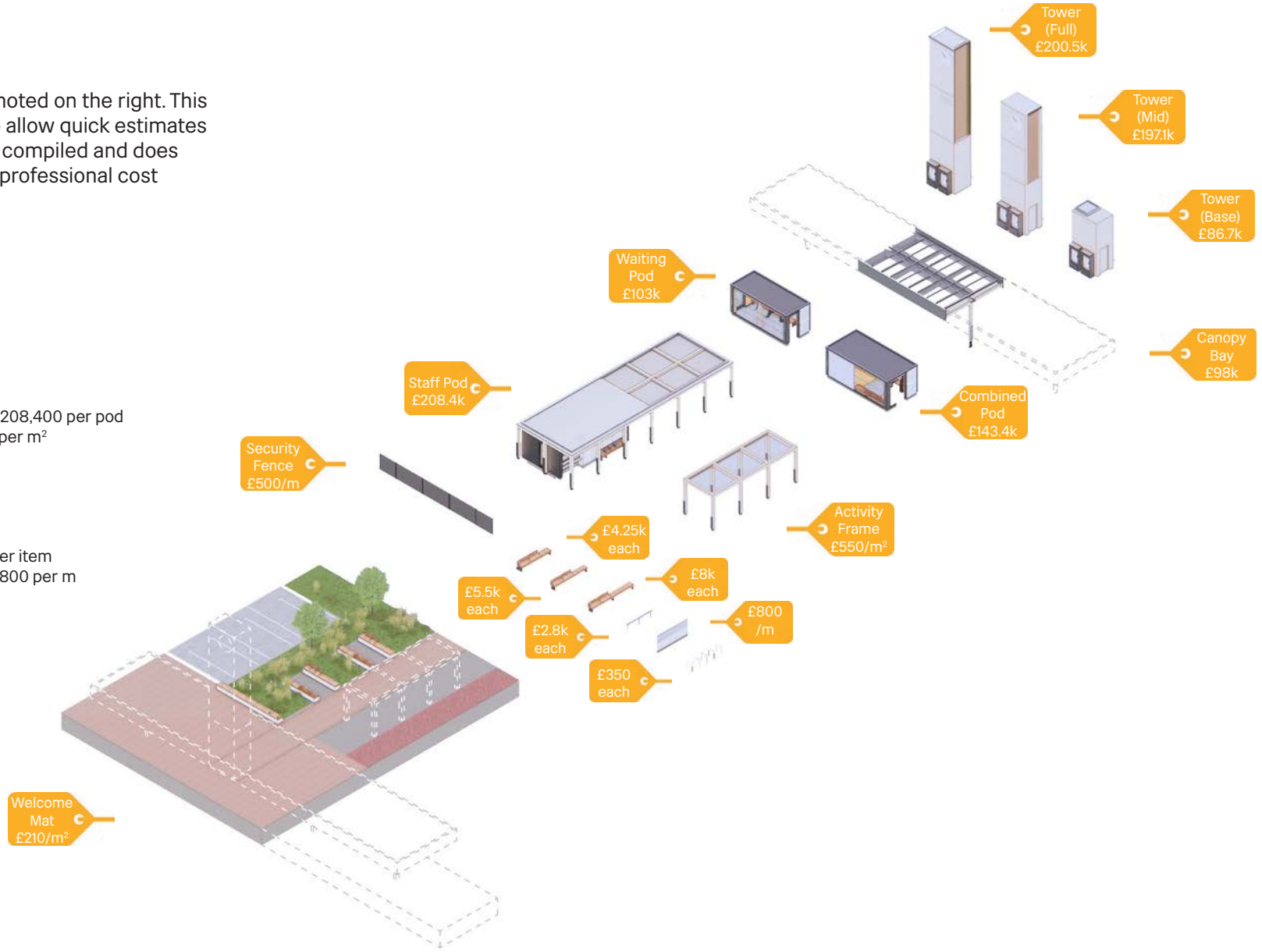


Figure 6.6
Catalogue overview with costs

Figure 7.1
View across the track to a Category E HUB station at dusk

7

Design Manual for Medium to Small Stations
Appendix

Appendix
7.1 Functional Requirements Matrix (1 of 3)

Element Category	Element	Station Category		
		D	E	F
Signage / Wayfinding	Station identification signage			
	Statutory signage			
	Static station wayfinding signage			
	Evacuation point refuge			
Information	Locality information			
	Induction loops			
	Interchange information			
	Customer information screen			
	Train timetables and leaflets			
	Train service information			
	Arrival/departure screens			
	Train timetable			
	Public address system			
	Help points			
	WiFi	51%	26%	11%
Advertising	Advertising displays (specified locations only)			
Lighting	Lighting			
Security	CCTV			
Waste	Waste management			
Energy	On-site renewable energy generation (eg. PV canopy)			

This matrix of requirements applies to category D, E and F stations and should be referred to in the creation of project briefs.

Key

- Strongly Advised - as per current guidance
- Strongly Advised - proposed upgrade*
- Desirable - as per current guidance
- Desirable - proposed upgrade*
- Optional - as per current guidance
- Optional - lesser requirement*

x% - percentage existing provision based on April 2021 extract from knowledgebase, a database of station facilities maintained by TOCs.

*Proposed upgrades or omissions are relative to current Network Rail Station Design Guidance

Figure 7.2
Functional Requirements Matrix

Appendix
7.1 Functional Requirements Matrix (2 of 3)

Element Category	Element	Station Category		
		D	E	F
Access / Egress	Vehicle pick-up / set-down areas			
	Blue-badge parking area			
	Rail replacement bus location			
	Electric vehicle charging points			
	Demarcated accessible route			
	Level / step-free access			
	Cycle access lane			
	Secure cycle parking			
	Electric scooter parking			
	Station clock			
Shelter / Waiting	Canopy			
	Enclosed waiting shelter			
	Range of seating	92%	84%	54%
Tickets / Services	Ticket machines			
	Ticket office / excess fares office			
	Cash machine	11%	4%	1%
	Parcel lockers with digital interface			
	Automatic ticket gates	21%	4%	1%

Key

- Strongly Advised - as per current guidance
- Strongly Advised - proposed upgrade*
- Desirable - as per current guidance
- Desirable - proposed upgrade*
- Optional - as per current guidance
- Optional - lesser requirement*

x% - percentage existing provision based on April 2021 extract from knowledgebase, a database of station facilities maintained by TOCs.

*Proposed upgrades or omissions are relative to current Network Rail Station Design Guidance

Figure 7.2 (cont.)
Functional Requirements Matrix

7.1 Functional Requirements Matrix (3 of 3)

Element Category	Element	Station Category		
		D	E	F
Staff / Welfare	Changing room			
	Teapoint and break room			
	Staff WCs			
	Back of house storage			
	Cleaners Store			
Technical	Electrical equipment storage			
	Mobile device charging points			
WCs	Gender neutral accessible WC	75%	40%	5%
	Parent room / baby change	34%	14%	2%
	Additional WCs			
Community/ Landscape	Activity frame with pop-up power (or equivalent)			
	Seating niches with benches			
	Primary paving and banding to main entrance / tower			
	Secondary paving to activity frame			
	Tertiary paving to seating niches, below cycle stands			
	Rain garden			
	Wildflower planting			
	Trees to rain garden (minimum 3 trees)			
	Feature wall			
	Feature bench with stone base to match paving palette			

Key

- Strongly Advised - as per current guidance
- Strongly Advised - proposed upgrade*
- Desirable - as per current guidance
- Desirable - proposed upgrade*
- Optional - as per current guidance
- Optional - lesser requirement*

x% - percentage existing provision based on April 2021 extract from knowledgebase, a database of station facilities maintained by TOCs.

*Proposed upgrades or omissions are relative to current Network Rail Station Design Guidance

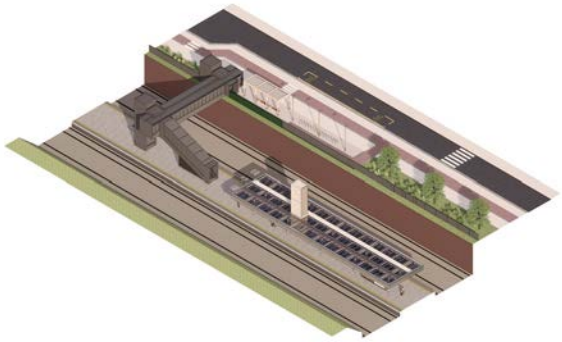
Figure 7.2 (cont.)
Functional Requirements Matrix

7.2 Base Configurations - Overview

Base configurations illustrated here are described at larger scale over the following pages.

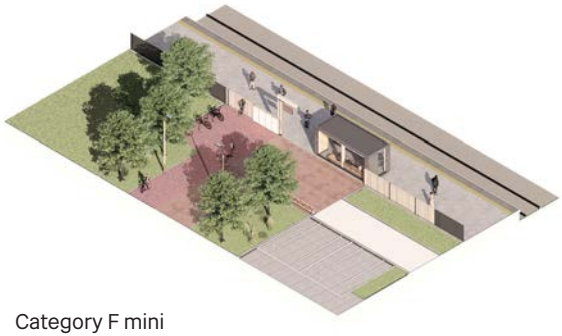
Category D

Category E



Category E (island)

Category F



Category F mini

Figure 7.3
Base configurations summary

7.2 Base Configurations - Category D

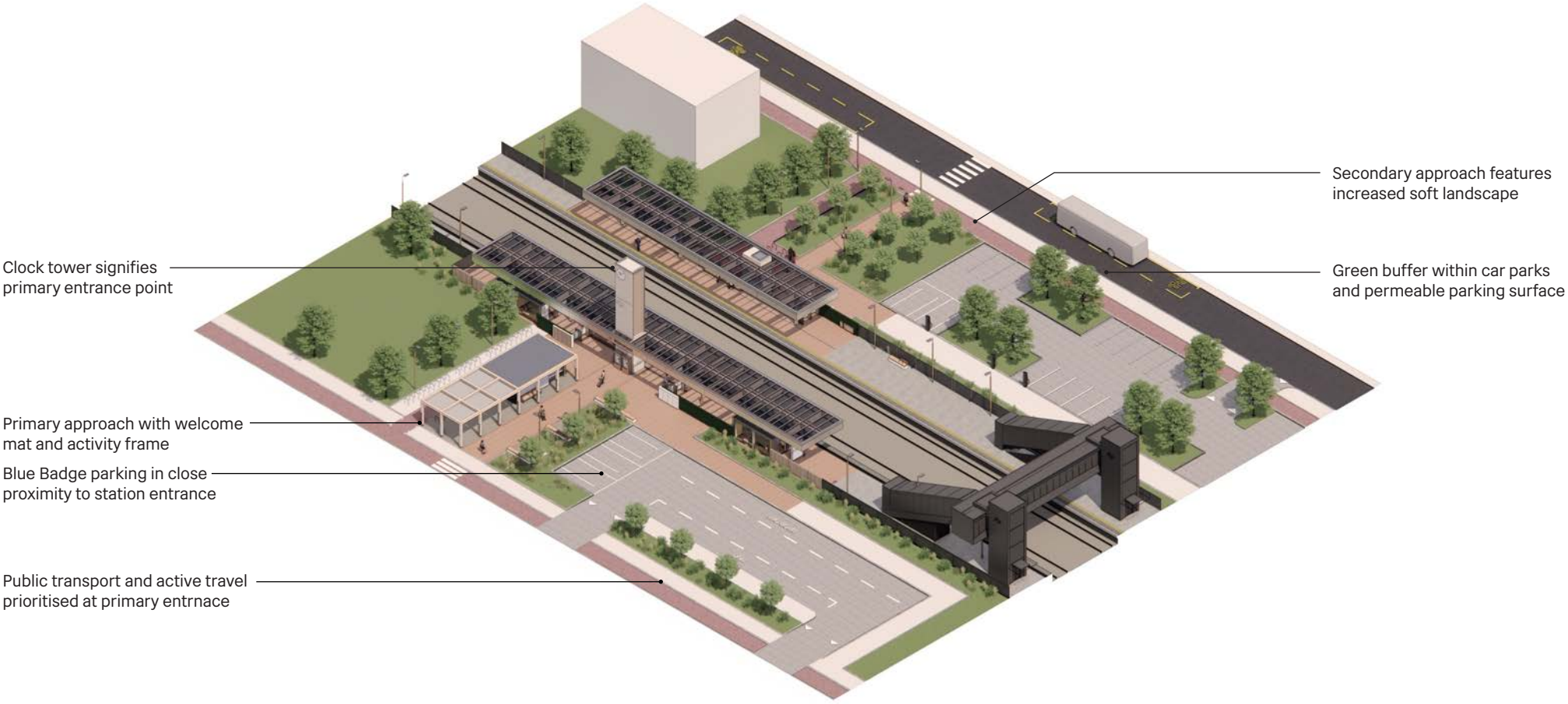


Figure 7.4
Axonometric overview of a Category D base configuration

7.2 Base Configurations - Category E

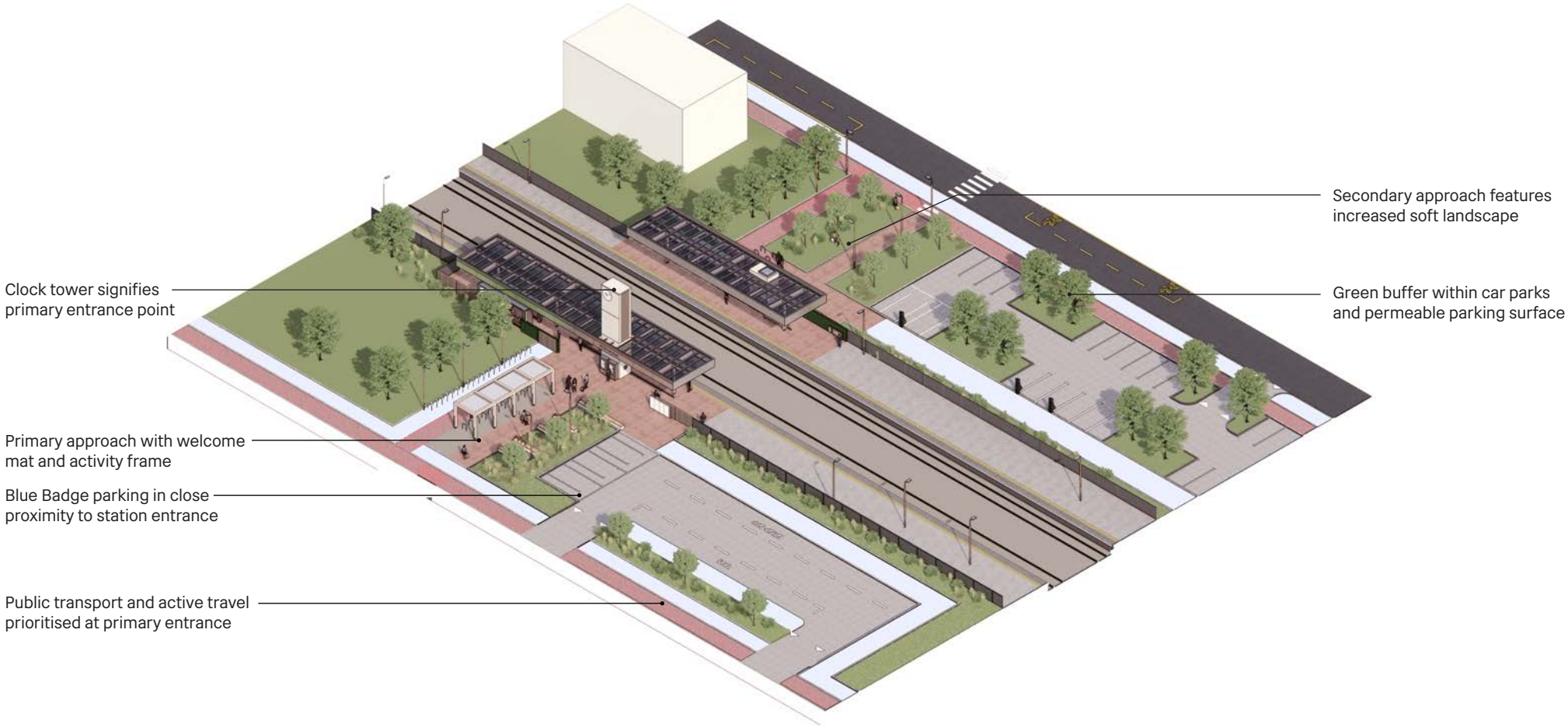


Figure 7.5
Axonometric overview of a Category E base configuration

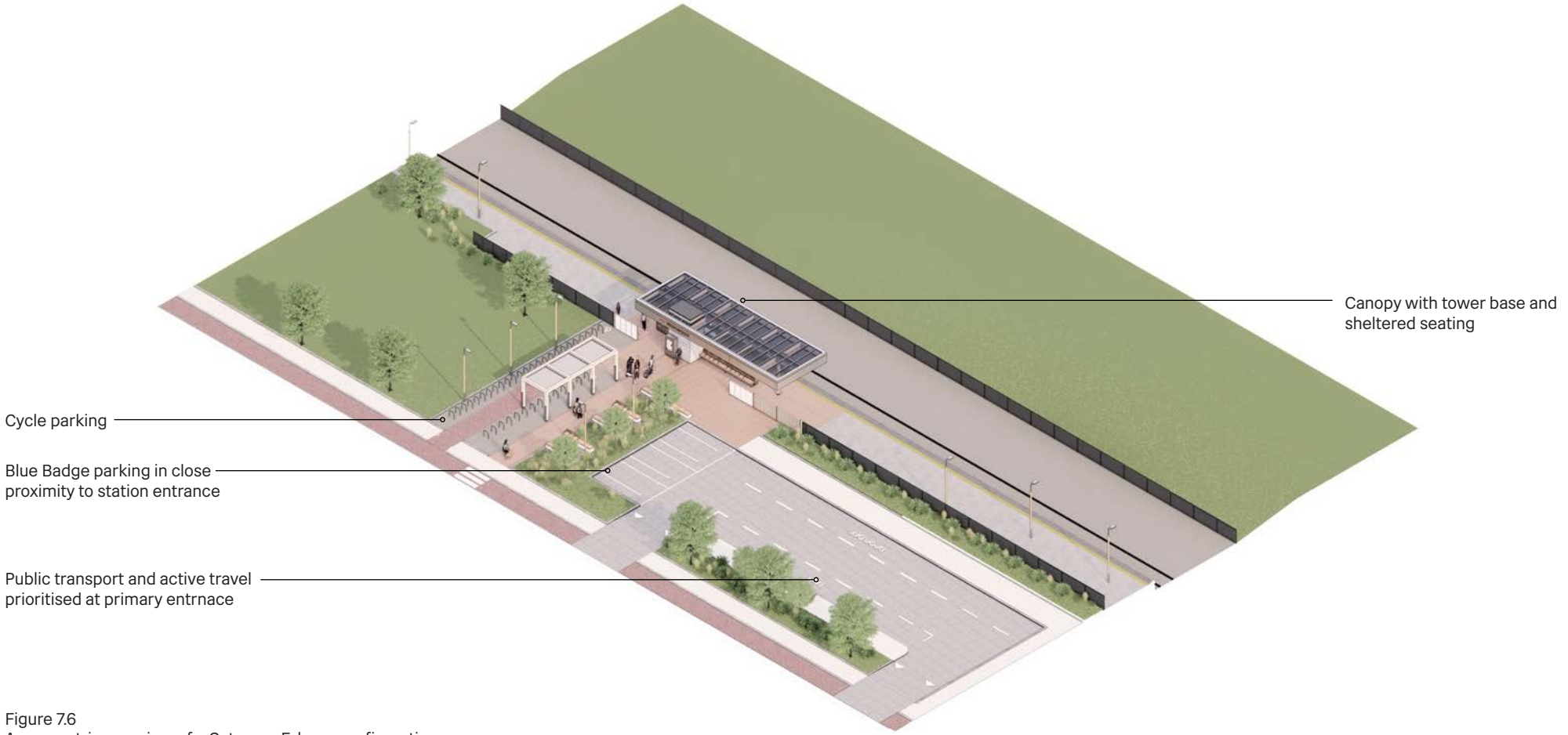


Figure 7.6
Axonometric overview of a Category F base configuration

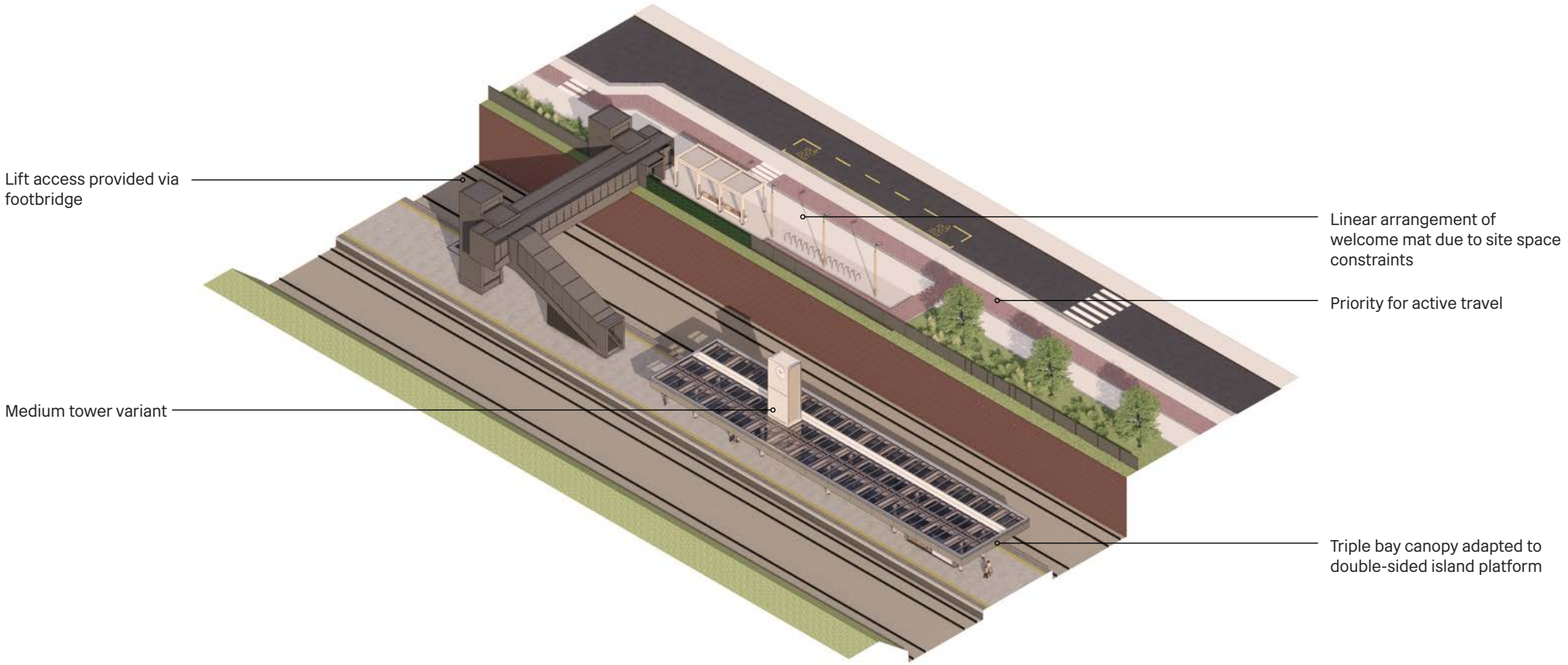
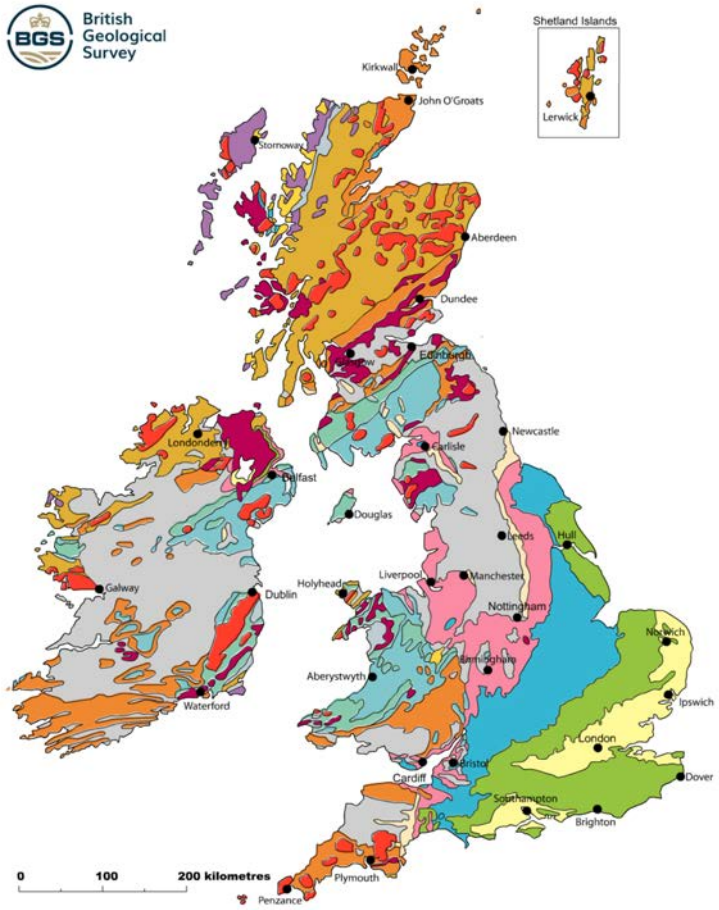
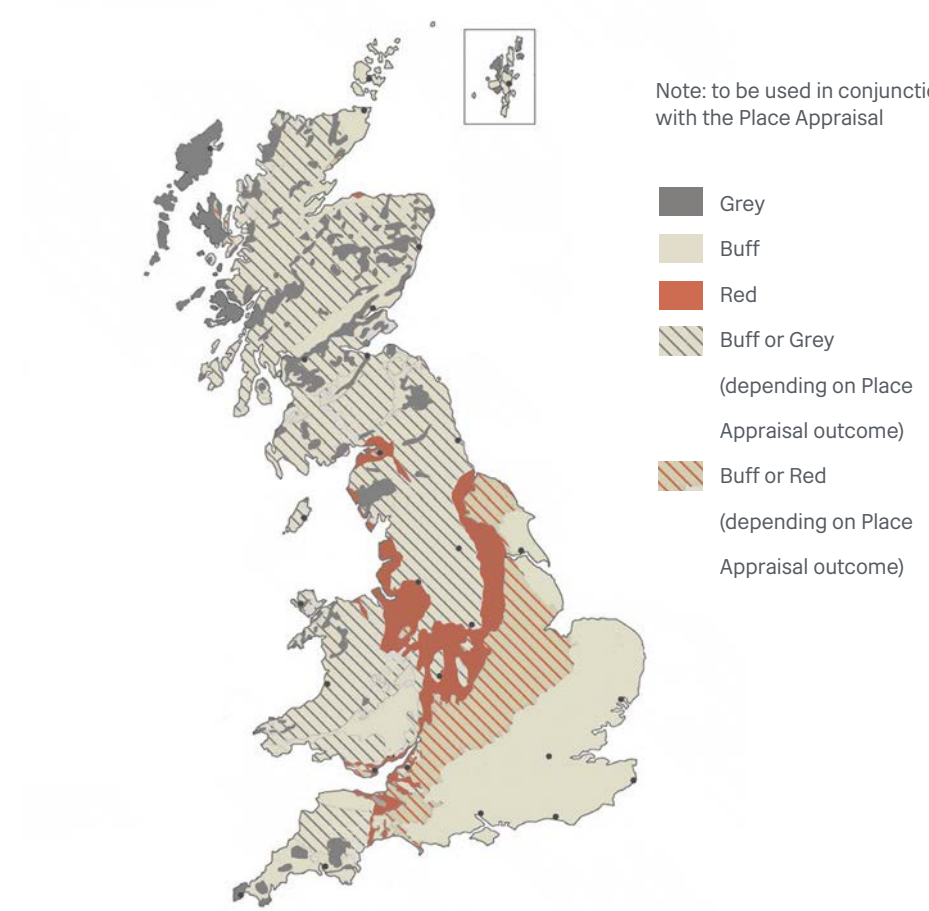


Figure 7.7
Axonometric overview of a Category E Island base configuration

Creating Local Identity through Geology / Soils



Geological Map of the UK and Ireland

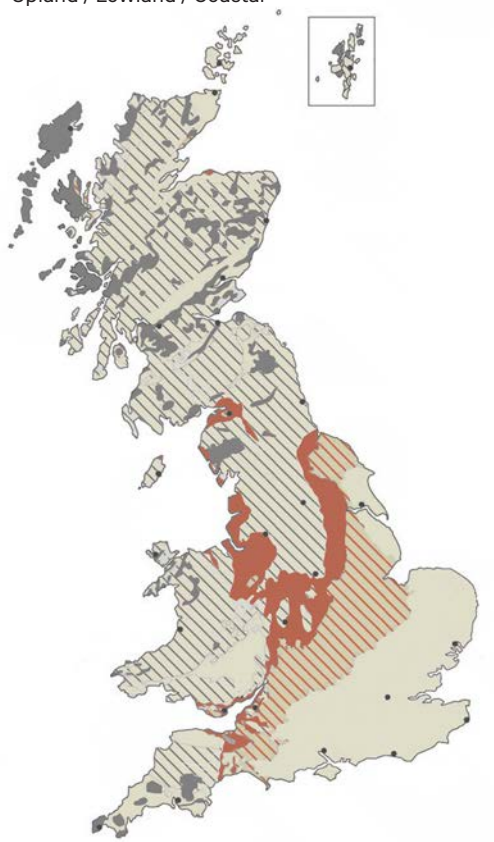


Application of the colour palettes according to the local geology

Figure 7.8
Geological map informing colour palettes

GEOLOGY :

LOCATION :
Upland / Lowland / Coastal



LOCAL VERNACULAR

Consider materiality of nearby landmarks e.g. town hall, monuments etc.

SURROUNDING MATERIALS

Consider building and paving materials in immediate surroundings - views from station

CLADDING AND PAVING PALETTE

RED Or BUFF Or GREY

PLANTING PALETTE

RAIN GARDEN BASE PLANTS

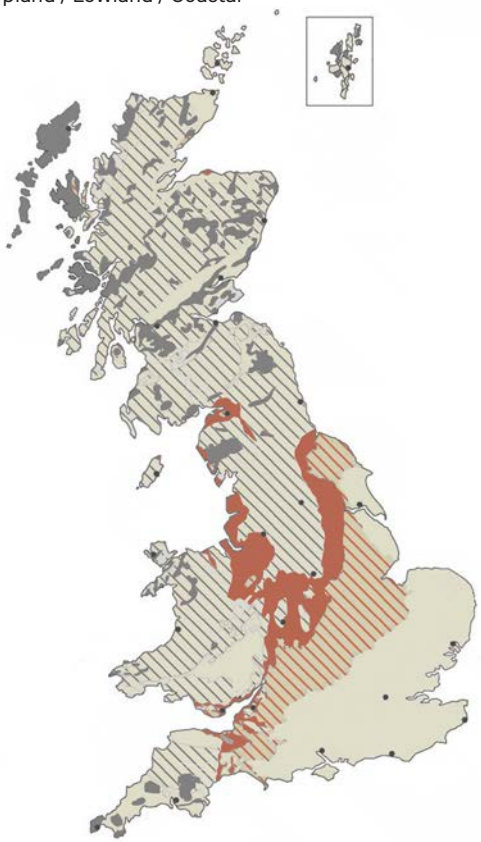
RED PLANTING PALETTE	BUFF PLANTING PALETTE	GREY PLANTING PALETTE
UPLAND	UPLAND	UPLAND
Or	Or	Or
LOWLAND	LOWLAND	LOWLAND
Or	Or	Or
COASTAL	COASTAL	COASTAL

Figure 7.9
Material palette selection flow chart

Worked Example e.g. Cullompton, Devon

GEOLOGY : Sandstone and conlomerates

LOCATION :
Upland / Lowland / Coastal



LOCAL VERNACULAR

War Memorial

Church

Walling

Consider materiality of nearby landmarks e.g. town hall, monuments etc.

SURROUNDING MATERIALS

Consider building and paving materials in immediate surroundings - views from station

PAVING PALETTE

RED Or BUFF Or GREY

PLANTING PALETTE

RAIN GARDEN BASE PLANTS

RED PLANTING PALETTE	Or	BUFF PLANTING PALETTE	Or	GREY PLANTING PALETTE
UPLAND		UPLAND		UPLAND
Or		Or		Or
LOWLAND		LOWLAND		LOWLAND
Or		Or		Or
COASTAL		COASTAL		COASTAL

Figure 7.10
Material palette selection flow chart - worked example

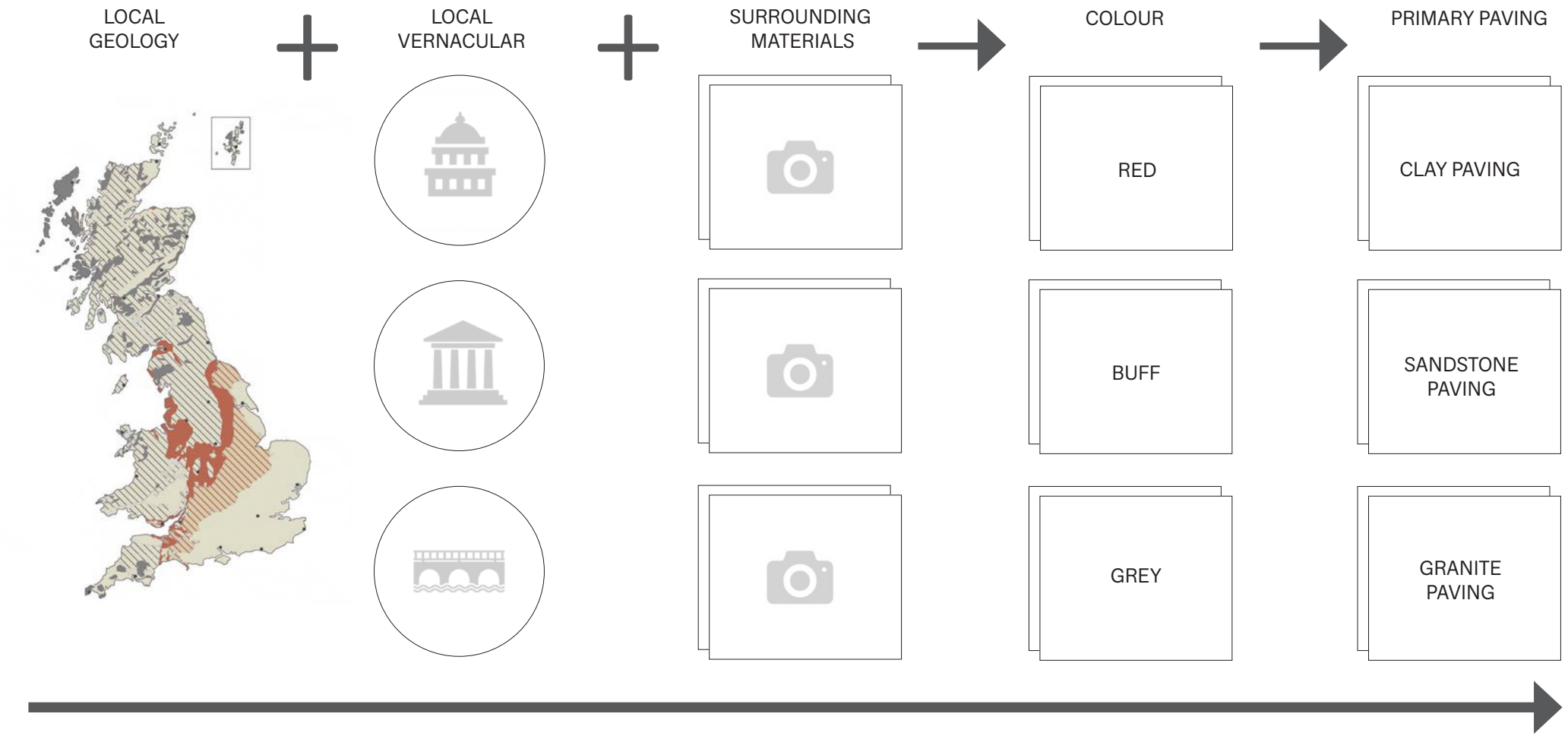


Figure 7.11
Paving selection flow chart

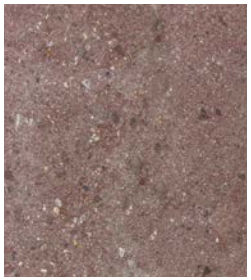
7.4 Paving - Red Theme

Primary Paving - Clay

Clay paving units direct the heaviest pedestrian traffic through the station's main route to the platforms. These could be various sizes, with a minimum width of 450mm. If service vehicles are to use this route, a minimum paving unit thickness and appropriate build-up will be required.

Permeable paving should be used wherever possible/ appropriate.

Secondary Paving



Smooth faced red-toned concrete paving units of smaller proportions than the primary paving indicate slower moving areas. Variation can also be achieved through paving pattern.

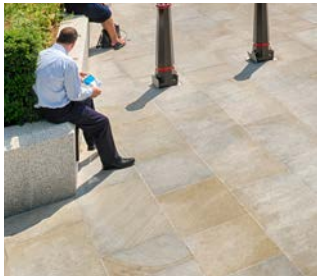
Tertiary Paving

Self-binding aggregate, colour-matched to the primary paving.

7.4 Paving - Buff Theme

Primary Paving - Sandstone



Buff Sandstone flags with natural colour banding come in a range of finishes. These could be various sizes, with a minimum width of 450mm. If service vehicles are to use these areas, a minimum paving unit thickness and appropriate build-up will be required.

Permeable paving should be used wherever possible/ appropriate.

Secondary Paving




Smaller buff-coloured smooth-faced, riven or textured concrete paving units of smaller proportions than the primary paving indicate slow-moving areas. Variation can also be achieved through paving pattern.

Tertiary Paving



Self-binding aggregate, colour-matched to the primary paving.

Appendix

7.4 Paving - Grey Theme

Primary Paving - Granite




Grey-toned granite paving units are avaiable in various sizes, with a minimum width of 450mm. If service vehicles are to use these areas, a minimum paving unit thickness and appropriate build up will be required.

Permeable paving should be used wherever possible/ appropriate.

Secondary Paving



Smaller grey smooth-faced or textured concrete units, or concrete units with a granite aggregate finish, concrete paving units of smaller proportions than the primary paving to indicate slow-moving areas. Variation can also be achieved through paving pattern.

Tertiary Paving



Self-binding aggregate, colour-matched to the primary paving.

7.4 Paving - Materials Comparison Table

Palette		Material	Product Example Finish	Size (mm)	Install cost per sq/ metre	Buildability e.g. what construction 'make-up', screed or other adhesive specifications are required	Load Capacity (5owt maintenance vehicles)	Aesthetic Acceptance	Design Factors													Score
									Safety Slip Resistance Value (PTV) to BS8300:9.1.3 (Min 40 Wet / 50 in open)	Design Life Durability	Cleanability	Reflectance - min 30%	Remedial repair timescale for traffic GAP	BRE Green Guide Estimate Min B where applicable	Embodied carbon kg C02/kg	ISO 14001 Accredited Supplier	Use of a sealant required	Compatibility with access covers and floor trunking	Ability for future procurement of material.	Manufacturers waste take back scheme	
RED	Primary	Clay Pavers	**Wienerberger Kassei Astra KTF Sanded**	150x150x65 45 per m2		Rigid or Flexible	Mean Traverse Breaking Load T4 (BS EN 1344:2013)	appearance of natural stone but with the performance qualities of clay	U3	FP100				B/A with recycled sub-base		Y					
	Secondary	Concrete block	**Hardscape Kellen Breccia Rosso**	300x150x80		Rigid or Flexible	>3.6 Mpa	4grain sizes	NPD (textured surface)	Satisfactory				B/A with recycled sub-base	28kg CO2/m2	Y					
	Secondary (Permeable)	Concrete block	**Hardscape Kellen Breccia Permeable Rosso**	210x105x80		Rigid or Flexible	>2.9 Mpa	4grain sizes	NPD (textured surface)	Satisfactory	https://hardscape.co.uk/wp-content/uploads/2021/06/Kellen_Maintenance_2021a.pdf			B/A with recycled sub-base	28kg CO2/m2	Y					
	Tertiary	Self binding gravel	**CEDEC Red**	10m2 per tonne @ 50mm thick		150mm sub-base	pedestrian and light vehicle use	softer' appearance hard material						C/A with recycled sub-base		Y					
BUFF	Primary	Sandstone flags	**Marhsalls Brackendale Sandstone Paving Blasted**	450x450x63		mortar bed	37.5 Mpa	fine grained warm buff sawn sandstone with blasted finish, subdued banding	83 (wet) 91 (dry)	18.4/30.9 MPa		40.43		B	FROM 101.5 kg CO2 per m²	Y		Good			
	Secondary	Concrete block	**Marshalls Myriad Sunlight**	300x200x80 16.2 no per m²		mortar bed	Category 6 - 10 large goods vehicles per week (0.15 msa)	buff coloured textured aggregate surface	Mean polished skid resistance value (PSRV) : > 45	≤ 1.0 kg/m²	Cleaning & maintenance details are available on request			B/A with recycled sub-base	34 kg CO2 m²	Y					
	Secondary (Permeable)	Concrete block	**Tobermore Hydropave Fusion Sandstone**	200x100x80		jointing grit	pedestrian and light vehicle use	Textured Granite Aggregate surface	Extremely Low Risk	Class 3	https://www.tobermore.co.uk/professional/wp-content/uploads/tobermore-hydropave-permeable-paving-maintenance-guidelines.pdf			B/A with recycled sub-base	34kgCo2e/m2	Y					
	Tertiary	Self binding gravel	**Breedon Golden Amber gravel**	8m2 per tonne @ 50mm thick		150mm sub-base	pedestrian and light vehicle use	softer' appearance hard material						C/A with recycled sub-base							
GREY	Primary	Granite flags	**Marhshalls Oberon Portuguese Granite, Flamed**	450x450x60			pedestrian and vehicle use	Light to medium grey, medium grained Granite	75 (wet) 92 (dry)					?							
	Secondary	Concrete block	**Hardscape Kellen Lavaro Grijs 010**	300x150x80		Rigid or Flexible	>3.6 Mpa		NPD (textured surface)	Satisfactory	https://hardscape.co.uk/wp-content/uploads/2021/06/Kellen_Maintenance_2021a.pdf			B/A with recycled sub-base		Y					
	Secondary (Permeable)	Concrete block	**Hardscape Kellen Lavaro Permeable Grijs 010**	210x105x80		Rigid or Flexible	>2.9 Mpa		NPD (textured surface)	Satisfactory	https://hardscape.co.uk/wp-content/uploads/2021/06/Kellen_Maintenance_2021a.pdf			B/A with recycled sub-base		Y					
	Tertiary	Self binding gravel	**CEDEC Silver**	10m2 per tonne @ 50mm thick		150mm sub-base	pedestrian and light vehicle use	softer' appearance hard material						C/A with recycled sub-base		Y					

Figure 7.12
Paving material comparison table

Figure 7.13
Planting palette selection process

A base mix of species will be used across all rain garden planting palettes, made up of hardy, low-maintenance species suitable for rain gardens. These will then be supplemented by species suitable for coastal, lowland and upland micro climates in a rich, warm colour-way to complement the red paving.

Figure 7.14 - Rain Garden Base Palette (All Themes)


Geranium macrorrhizum


Carex pendula


Osmunda regalis 'Cristata'


Calamagrostis brachytricha


Dryopteris filix-mas


Penstemon digitalis

Figure 7.15 - Rain Garden Micro Climate Specific Planting (Red Theme)

COASTAL

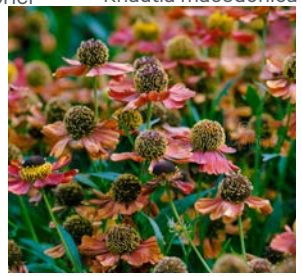

Aster amellus 'Jacqueline Genebrier'


Knautia macedonica


Achillea millefolium mix

LOWLAND


Heuchera 'Obsidian'


Echinacea purpurea


Eupatorium cannabinum

UPLAND


Geranium 'Purple Ghost'


Calluna vulgaris 'Dark Beauty'


Saxifraga x geum

A base mix of species will be used across all rain garden planting palettes, made up of hardy, low-maintenance species suitable for rain gardens. These will then be supplemented by species suitable for coastal, lowland and upland micro climates in a bright, sunny colour-way to complement the buff paving.

Figure 7.16 - Rain Garden Base Palette (All Themes)


Geranium macrorrhizum


Carex pendula


Osmunda regalis 'Cristata'


Calamagrostis brachytricha


Dryopteris filix-mas


Penstemon digitalis

Figure 7.17 - Rain Garden Micro Climate Specific Planting (Red Theme)

COASTAL


Iris germanica


Echinacea purpurea 'Purity'


Achillea millefolium 'Terracota'

LOWLAND


Aquilegia vulgaris 'Gold Finch'


Kniphofia 'Royal Standard'


Iris sibirica 'White Amber'

UPLAND


Calluna vulgaris 'Firefly'


Geum rivale 'Cream Drop'


Erica carnea' Foxhollow'

A base mix of species will be used across all rain garden planting palettes, made up of hardy, low-maintenance species suitable for rain gardens. These will then be supplemented by species suitable for coastal, lowland and upland micro climates in cool, blue tones to complement the grey paving.

Figure 7.18 - Rain Garden Base Palette (All Themes)


Geranium macrorrhizum


Carex pendula


Osmunda regalis 'Cristata'


Calamagrostis brachytricha


Dryopteris filix-mas


Penstemon digitalis

Figure 7.19 - Rain Garden Micro Climate Specific Planting (Red Theme)

COASTAL


Aster × frikartii 'Wunder von Stäfa'


Achillea millefolium


Cimicifuga simplex 'Elstead Variety'

LOWLAND


Iris sibirica 'Rauchblau'


Ajuga reptans


Campanula glomerata 'Caroline'

UPLAND


Geranium 'Orion'


Erica carnea f. alba 'Springwood White'


Calluna vulgaris 'Hilda'

A Coastal meadow seed mix should be used with coastal rain garden planting options across the three colour palettes, tailored to suit the local soil profile and conditions.


Silene uniflora


Molinia caerulea subsp arundinace


Papaver rhoeas


Echium vulgare


Agrostis capillaris


Armeria maritima


Deschampsia cespitosa


Rhinanthus minor

Figure 7.20 - Meadow planting (Coastal)

A Lowland meadow seed mix should be used with lowland rain garden planting options across the three colour palettes, tailored to suit the local soil profile and conditions.


Achillea millefolium terracotta


Plantago lanceolata


Pimpinella saxifraga


Prunella vulgaris


Poa trivialis


Agrostis capillaris


Festuca rubra subsp commutata


Gallium verum

Figure 7.21 - Meadow planting (Lowland)

An Upland meadow seed mix should be used in with upland rain garden planting options across the three colour palettes, tailored to suit the local soil profile and conditions.


Calluna vulgaris


Molinia caerulea subsp arundinace


Ranunculus acris


Agrostis capillaris


Armeria maritima


Trifolium repens


Festuca rubra subsp commutata


Achillea millefolium terracotta

Figure 7.22 - Meadow planting (Coastal)

Tree species should also be selected based on their suitability to the local soils and micro-climate.
There are three recommended categories of tree, for different locations in and around the Welcome Mat:

Rain Garden Trees

2-3m multi-stem, vase shaped, open crown, mature height <10m
Tolerant to drought and waterlogging

Example Species:

Acer campestre 'Lousia redshine'

Malus 'Evereste'

Street Trees

3-5m, 2m clear stem, upright oval, dense crown, mature height 10-15m
Robust urban tree, attracts pollinators

Example Species:

Tilia cordata 'Greenspire'

Prunus avium 'Plena'

Habitat Trees

5-7m, broadly round, moderate/open crown, mature height 15-25m
Links to nearby habitat, ideally native or cultivar of native species

Example species:

Betula nigra

Sorbus torminalis

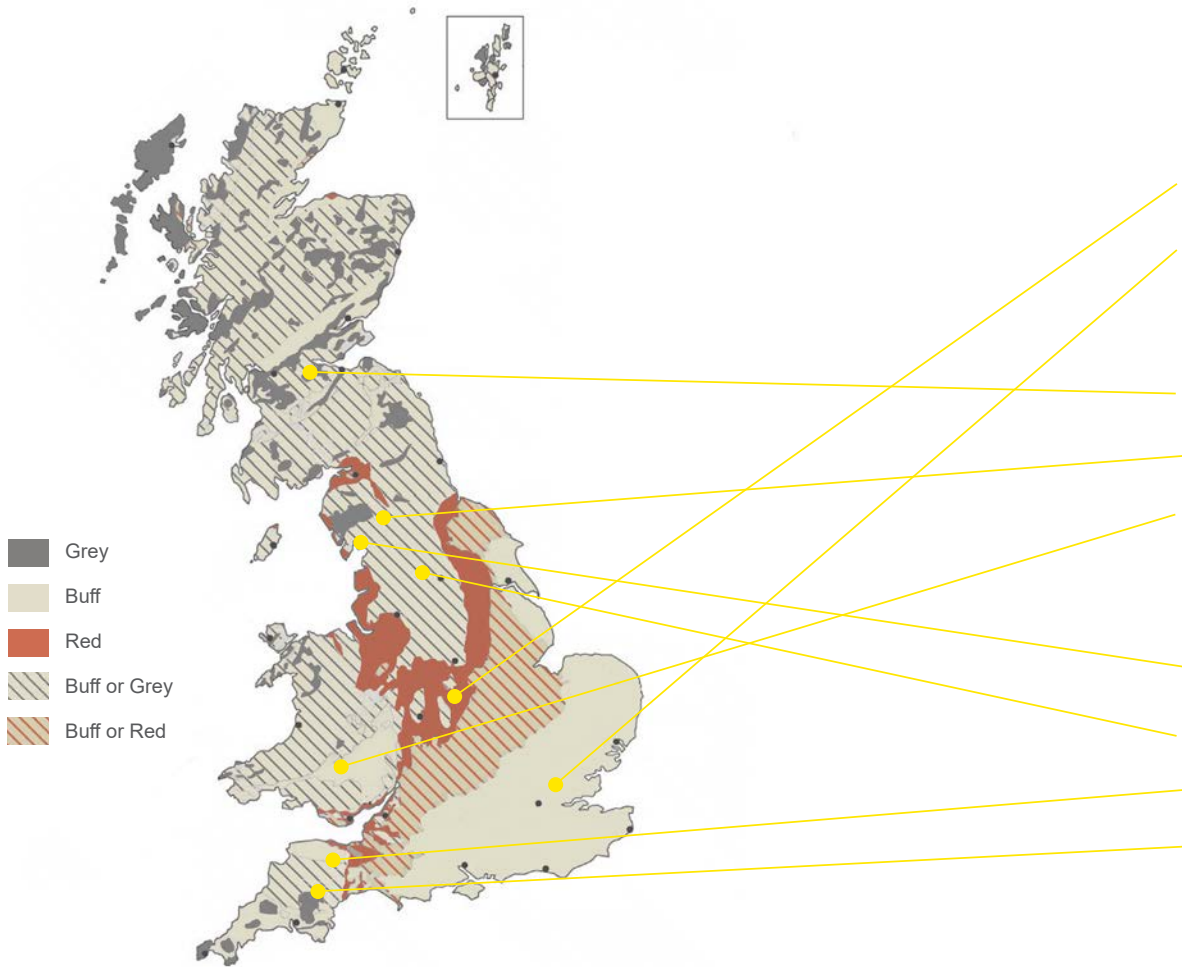
Figure 7.23 - Tree selection examples

7.8 Landscape Scenarios - Overview

Landscape Scenarios
A range of hypothetical landscape scenarios were selected and tested to develop and refine the landscape approach and design process. Nine scenarios were tested as illustrated on the following pages and summarised on the left.

The thumbnails on the left illustrate the 9 scenarios in plan which are located across Britain as illustrated on the next page.

Figure 7.24
Array of landscape scenarios



Landscape Context Scenarios

Category D

1. Urban City, Level, Midlands - Red
2. Urban Town, London Suburb - Buff

Category E

3. Urban, Island Cutting, Scotland Central Belt - Grey
4. Sub-Urban Business Park, Level, New Town/Northwest - Grey
5. Semi-Rural, Low Embankment, Wales - Buff

Category F

6. National Park, Level, Lake District - Buff
7. Semi-Rural/Industrial, Low Embankment, North - Buff
8. Industrial Park, Level, Southwest - Grey
9. Rural, Cat F mini, Level, Cornwall/Devon - Grey

Figure 7.25
Landscape context scenarios by location

7.8 Landscape Scenarios - Scenario 01

Design Manual for Medium
to Small Stations
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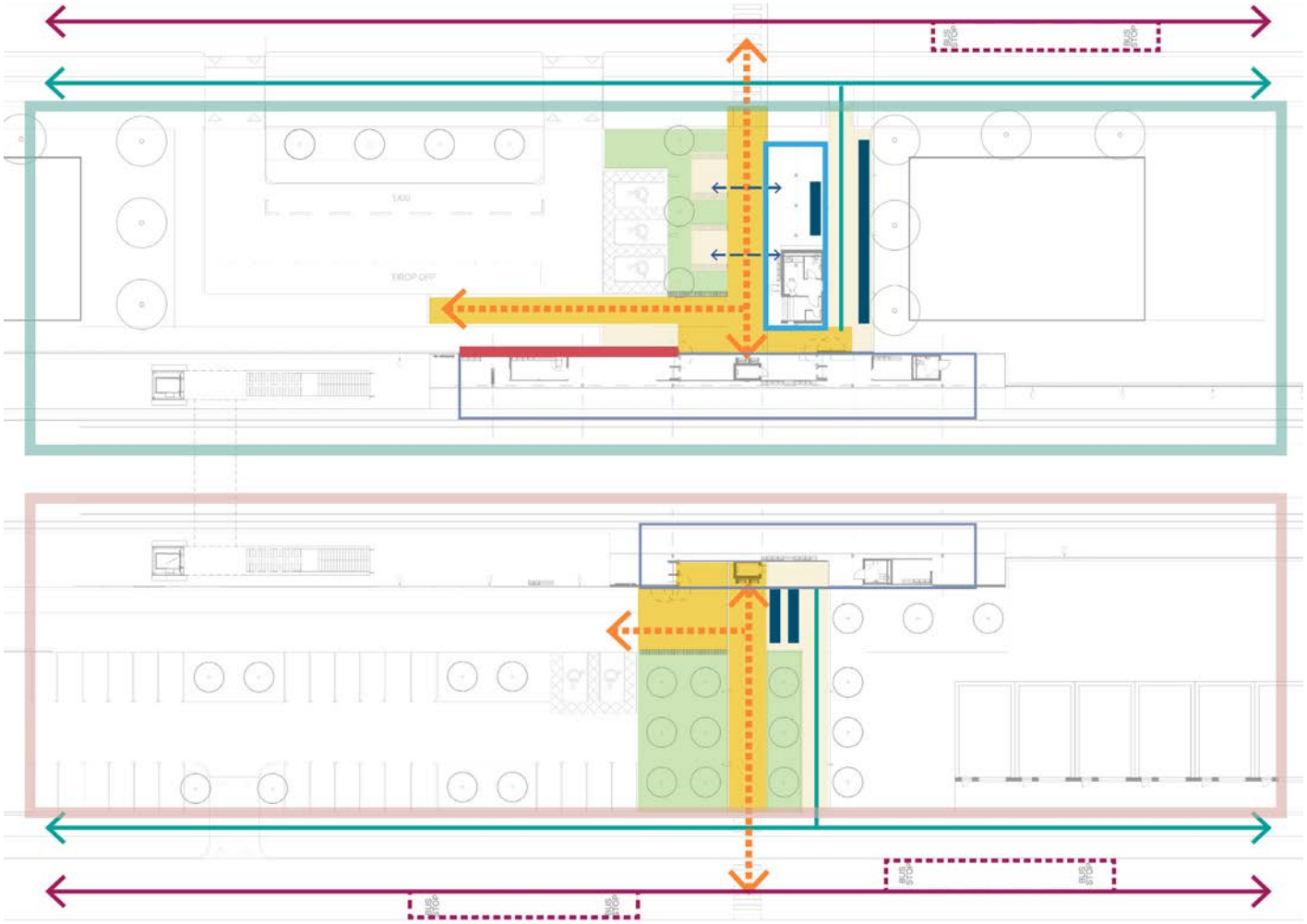
Spatial Analysis



1. Typical Scenario for Category D Station

Urban City, Level, Twin Track
Midlands
Red Paving Palette

- Primary Station Side
- Secondary Station Side
- Key Pedestrian Routes
- Cycle Routes
- Public Transport
- Building Canopy
- Activity Frame
- Cycle Parking
- Link to seating niches
- Primary area
- Secondary area
- Tertiary area
- Rain Gardens
- Feature Wall/Fence

7.8 Landscape Scenarios - Scenario 01

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Applying the Palette

1. Typical Scenario for Category D Station

Urban City, Level, Twin Track
Midlands
Red Paving Palette

- Primary Paving
- Secondary Paving
- Tertiary Paving
- Tertiary Paving - Cycle Route
- Asphalt
- Rain Gardens
- Wildflower seeding
- Activity Frame
- Cycle Stands
- Benches
- Extent of building canopy
- Trees - Typically 2-3m
- Trees - Typically 3-5m
- Trees - Typically 5-7m

7.8 Landscape Scenarios - Scenario 01

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Design Principles

1. Typical Scenario for Category D Station

Urban City, Level, Twin Track
Midlands
Red Paving Palette

- Rain garden planting as key feature of station frontage
- Clear 4m wide primary paved path to ticket machine, aligned with Tower
- Secondary paving area under Activity Frame
- Tertiary paving to cycle storage area and link to cycle route
- 2no. seating niches close to Activity Frame
- Seating close to platform entrance
- Primary paving from drop-off zone to platform entrance
- Wildflower verge along platform boundary
- Seating close to platform entrance
- Tree planting to primary and secondary station sides
- c.30% Welcome Mat area as rain garden

Applying the Palette

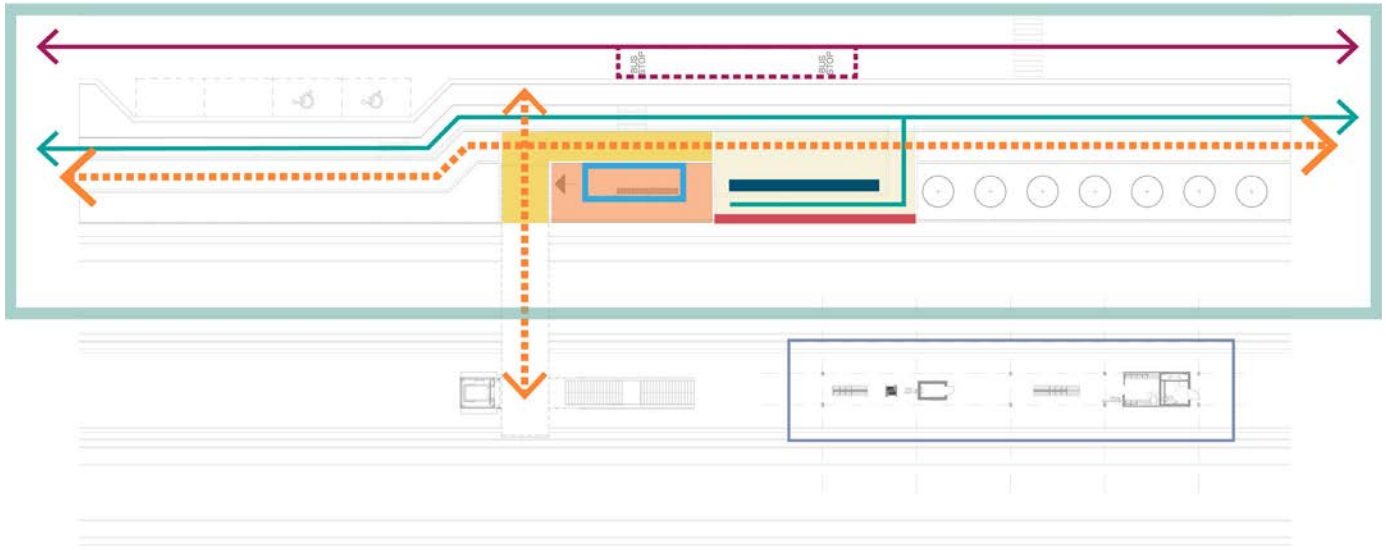
2. Typical Scenario for Category D Station

Urban Town, Level, Twin Track
London Suburb
Buff Paving Palette

- Primary paving
- Secondary paving
- Tertiary paving
- Tertiary paving - cycle route
- Asphalt
- Rain gardens
- Wildflower seeding
- Activity frame
- Cycle stands
- Benches
- Extent of building canopy
- Trees - typically 2-3m
- Trees - typically 3-5m
- Trees - typically 5-7m

7.8 Landscape Scenarios - Scenario 03

Spatial Analysis



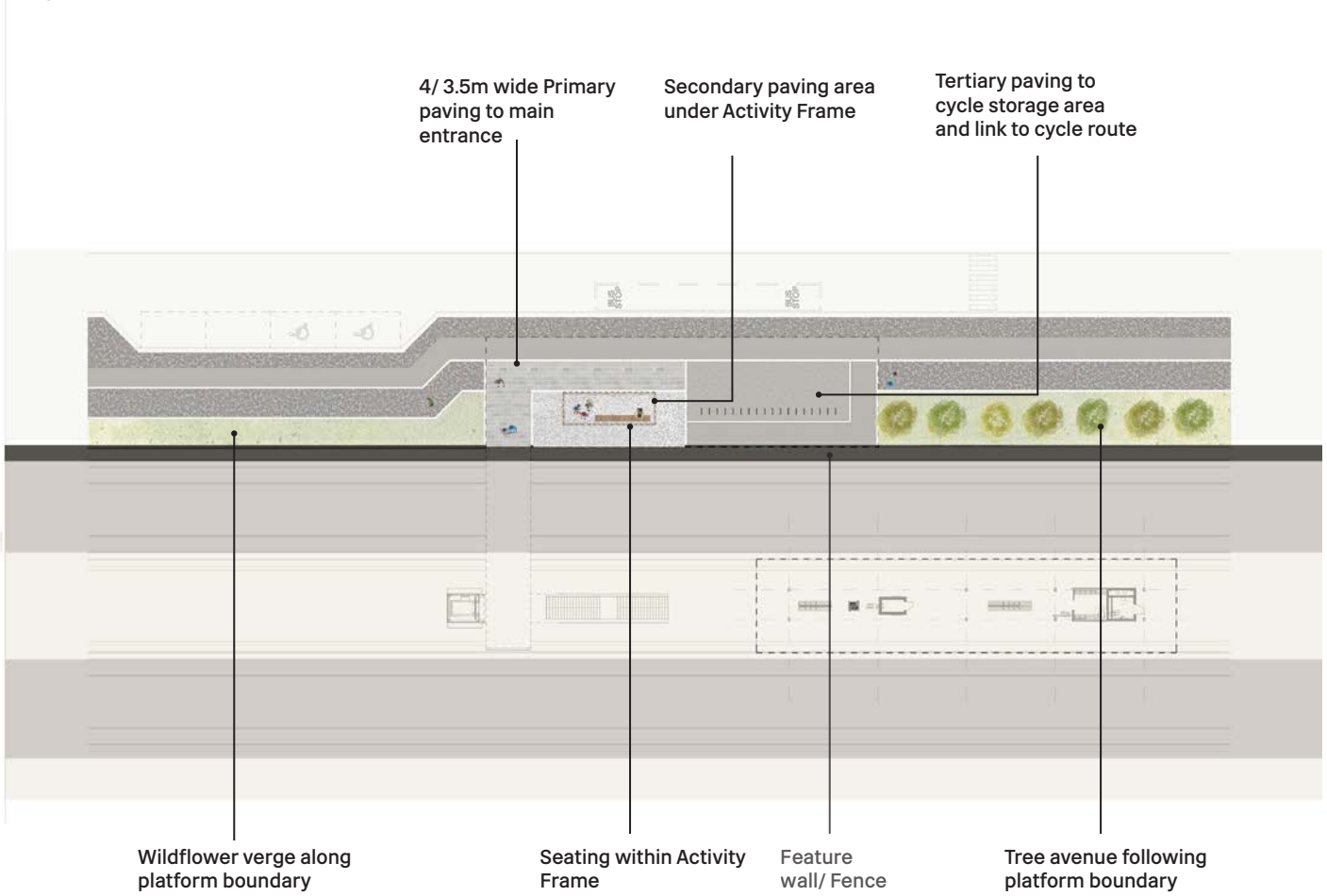
3. Typical Scenario for Category E Station

Urban, Island Cutting
Scotland Central Belt
Grey Paving Palette

- Primary Station Side
- Secondary Station Side
- Key Pedestrian Routes
- Cycle Routes
- Public Transport
- Building Canopy
- Activity Frame
- Cycle Parking
- Link to seating niches
- Primary area
- Secondary area
- Tertiary area
- Rain Gardens
- Feature Wall/Fence

7.8 Landscape Scenarios - Scenario 03

Design Principles



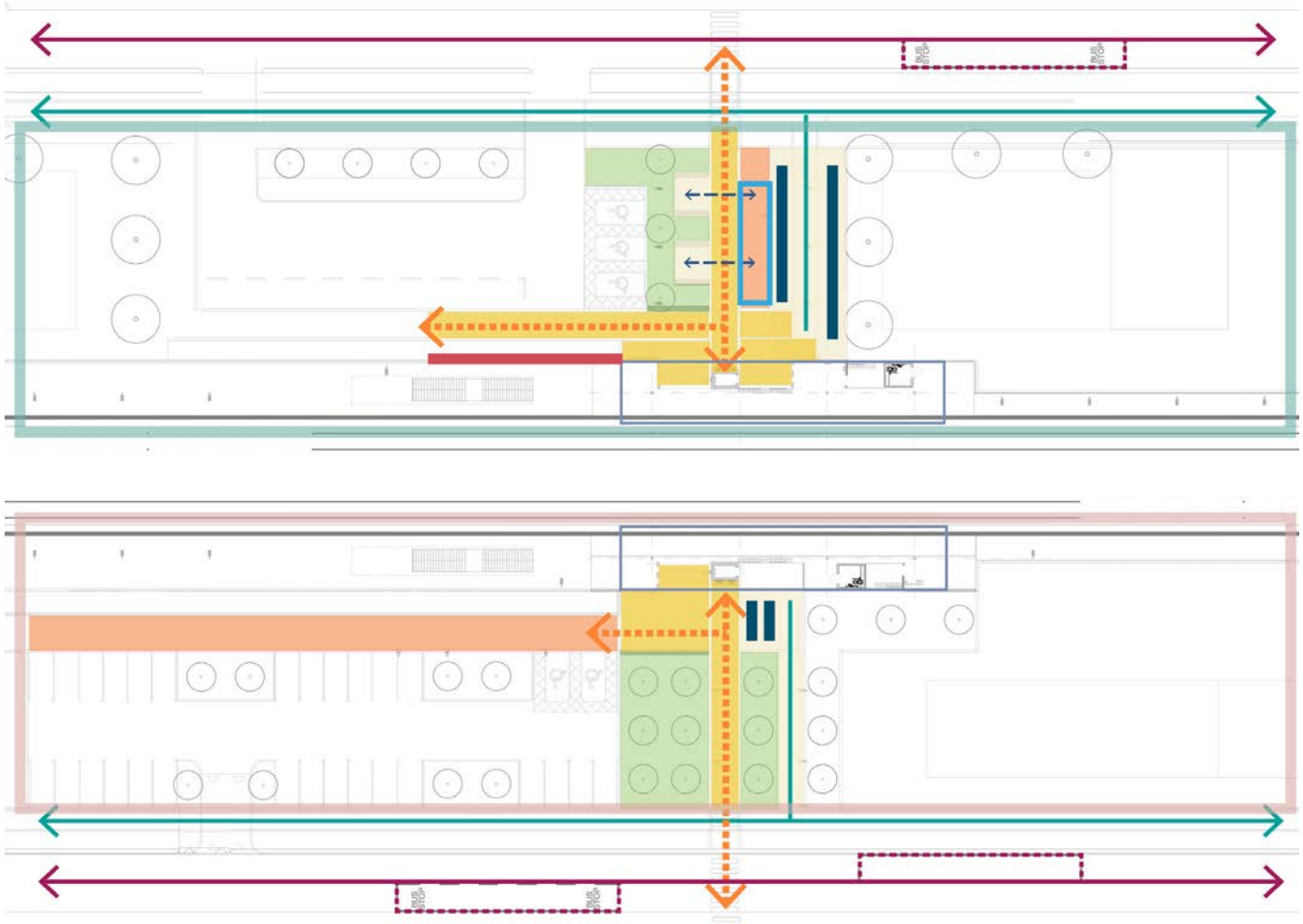
3. Typical Scenario for Category E Station

Urban, Island Cutting
Scotland Central Belt
Grey Paving Palette

- Primary paving
- Secondary paving
- Tertiary paving
- Tertiary paving - cycle route
- Asphalt
- Rain gardens
- Wildflower seeding
- Activity frame
- Cycle stands
- Benches
- Extent of building canopy
- Trees - typically 2-3m
- Trees - typically 3-5m
- Trees - typically 5-7m

7.8 Landscape Scenarios - Scenario 04

Spatial Analysis



4. Typical Scenario for Category E Station

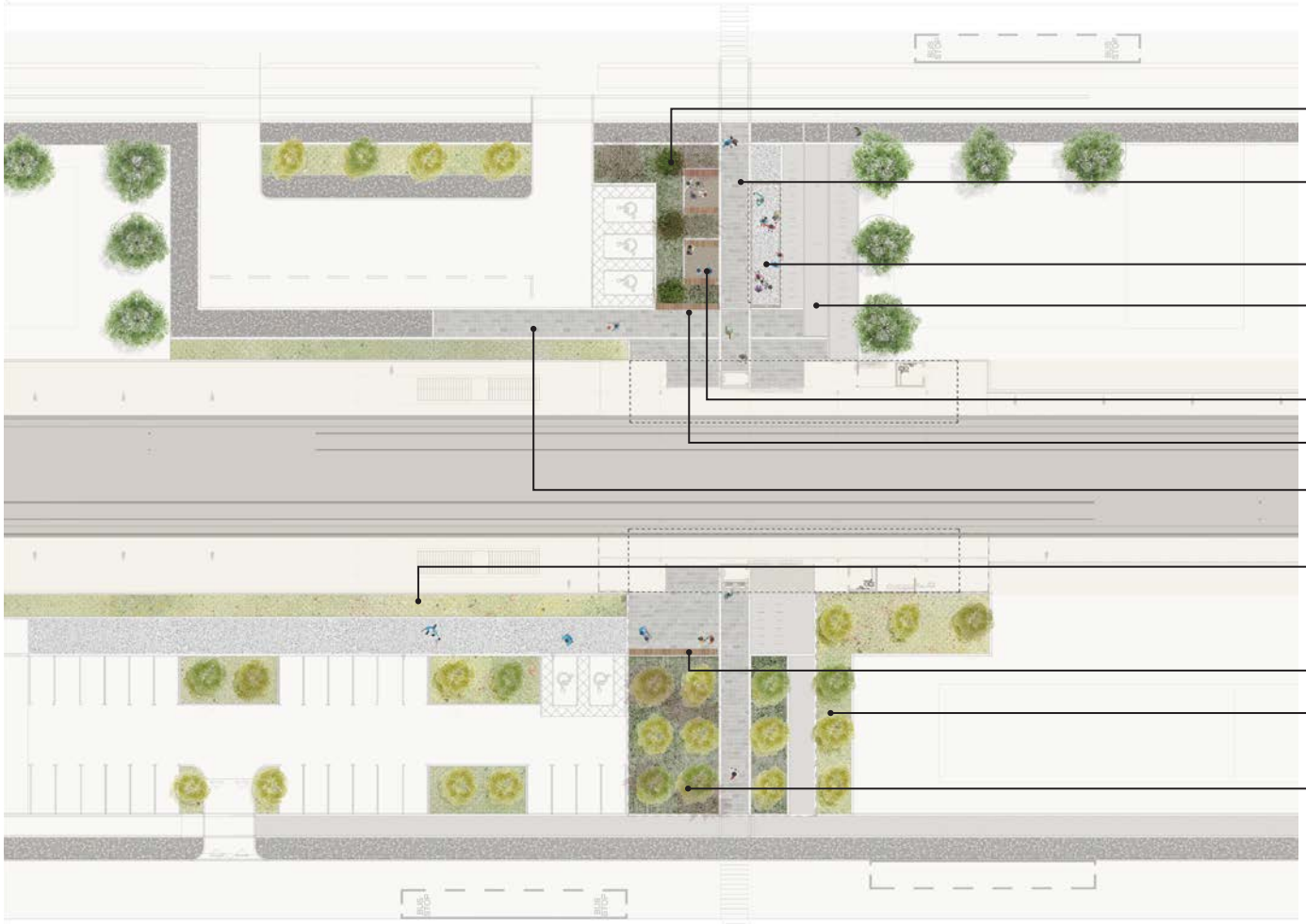
Suburban, Level, Twin Track
Northwest England New Town
Grey Paving Palette

- Primary Station Side
- Secondary Station Side
- Key Pedestrian Routes
- Cycle Routes
- Public Transport
- Building Canopy
- Activity Frame
- Cycle Parking
- Link to seating niches
- Primary area
- Secondary area
- Tertiary area
- Rain Gardens
- Feature Wall/Fence

Design Principles

4. Typical Scenario for Category E Station

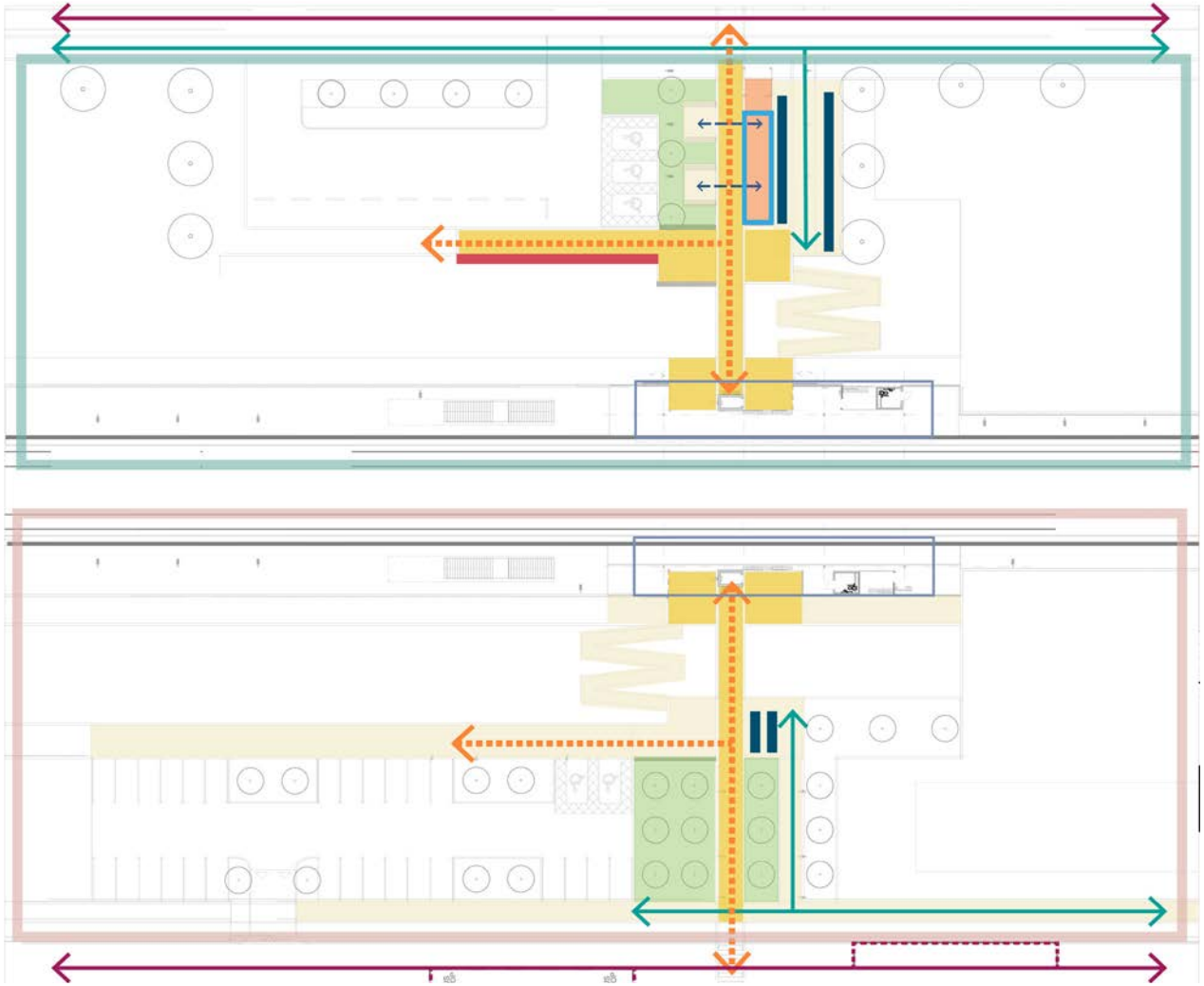
Suburban, Level, Twin Track,
Northwest England -New Town
Grey Paving Palette



- Rain garden planting as key feature of station frontage
- Clear primary paved path, aligned with edges of the ticket machine and Tower
- Secondary paving area under Activity Frame
- Tertiary paving to cycle storage area and link to cycle route
- 2no. seating niches close to Activity Frame
- Seating close to platform entrance
- Primary paving from drop off zone to platform entrance
- Wildflower verge along platform boundary
- Seating close to platform entrance
- Tree planting to primary and secondary station sides
- c.30% Welcome Mat area as rain garden

7.8 Landscape Scenarios - Scenario 05

Spatial Analysis

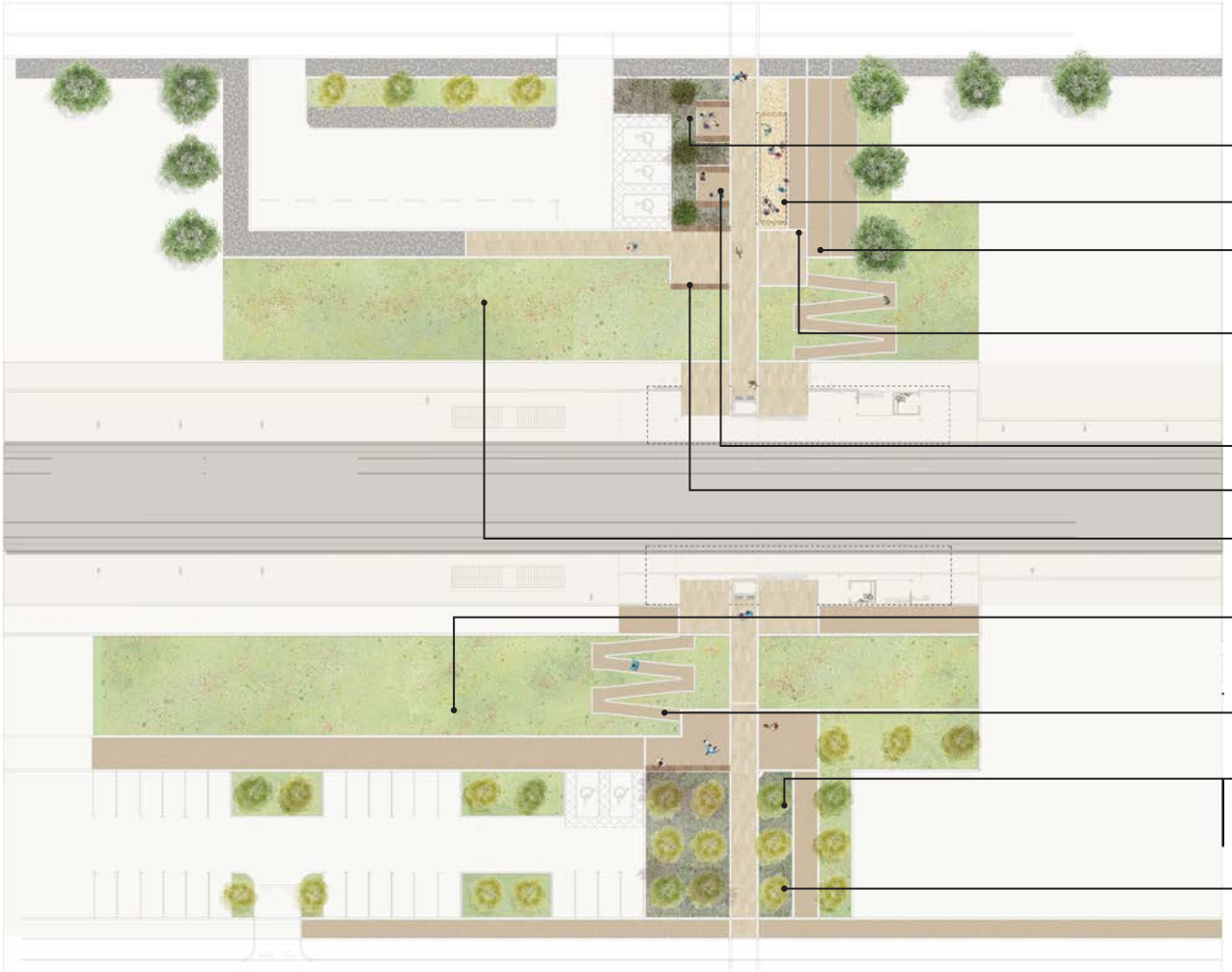


5. Typical Scenario for Category E Station

Semi-rural, Low embankment
Wales
Buff Paving Palette

- Primary Station Side
- Secondary Station Side
- Key Pedestrian Routes
- Cycle Routes
- Public Transport
- Building Canopy
- Activity Frame
- Cycle Parking
- Link to seating niches
- Primary area
- Secondary area
- Tertiary area
- Rain Gardens
- Feature Wall/Fence

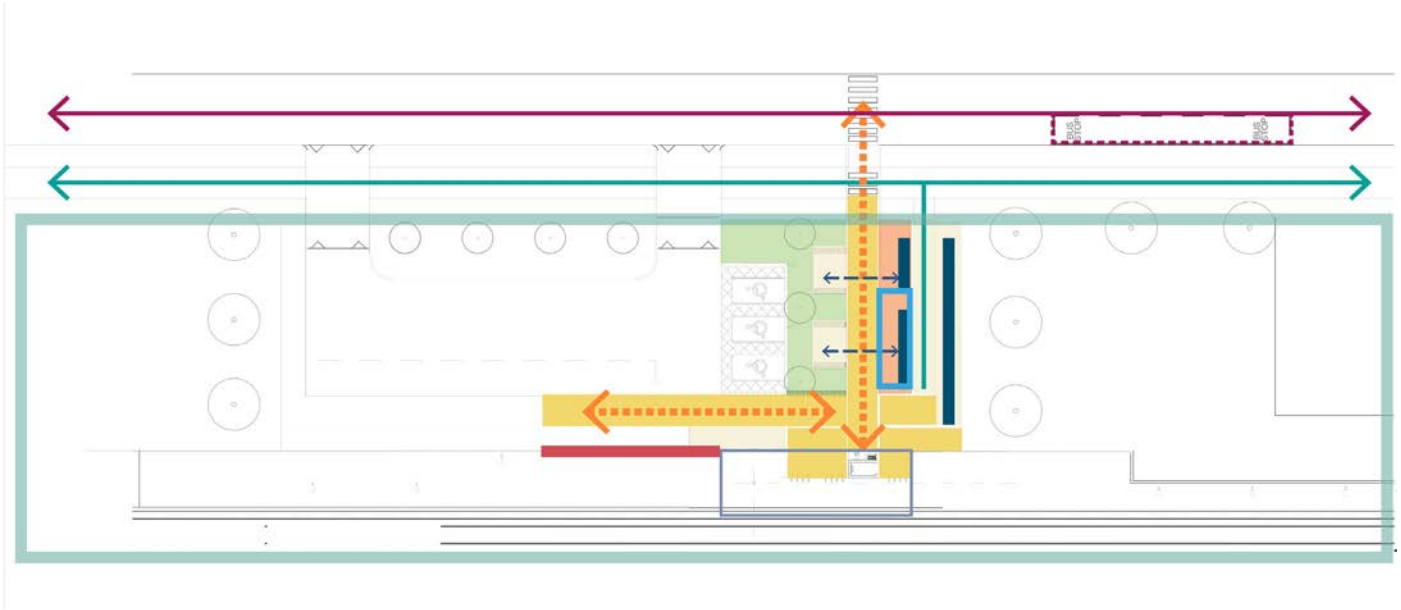
Design Principles



5. Typical Scenario for Category E Station
Semi-rural, Low embankment
Wales
Buff Paving Palette

- Rain garden planting as key feature of station frontage
- Secondary paving area under Activity Frame
- Clear primary paved path, aligned with edges of the ticket machine and Tower
- Tertiary paving to cycle storage area and link to cycle route
- Seating niches close to Activity Frame
- Seating close to platform entrance
- Primary paving from drop off zone to platform entrance
- Wildflower planting to embankment
- Tertiary paving to accessible ramp
- Tree planting to Primary and Secondary station sides
- c.30% Welcome Mat area as rain garden

Spatial Analysis



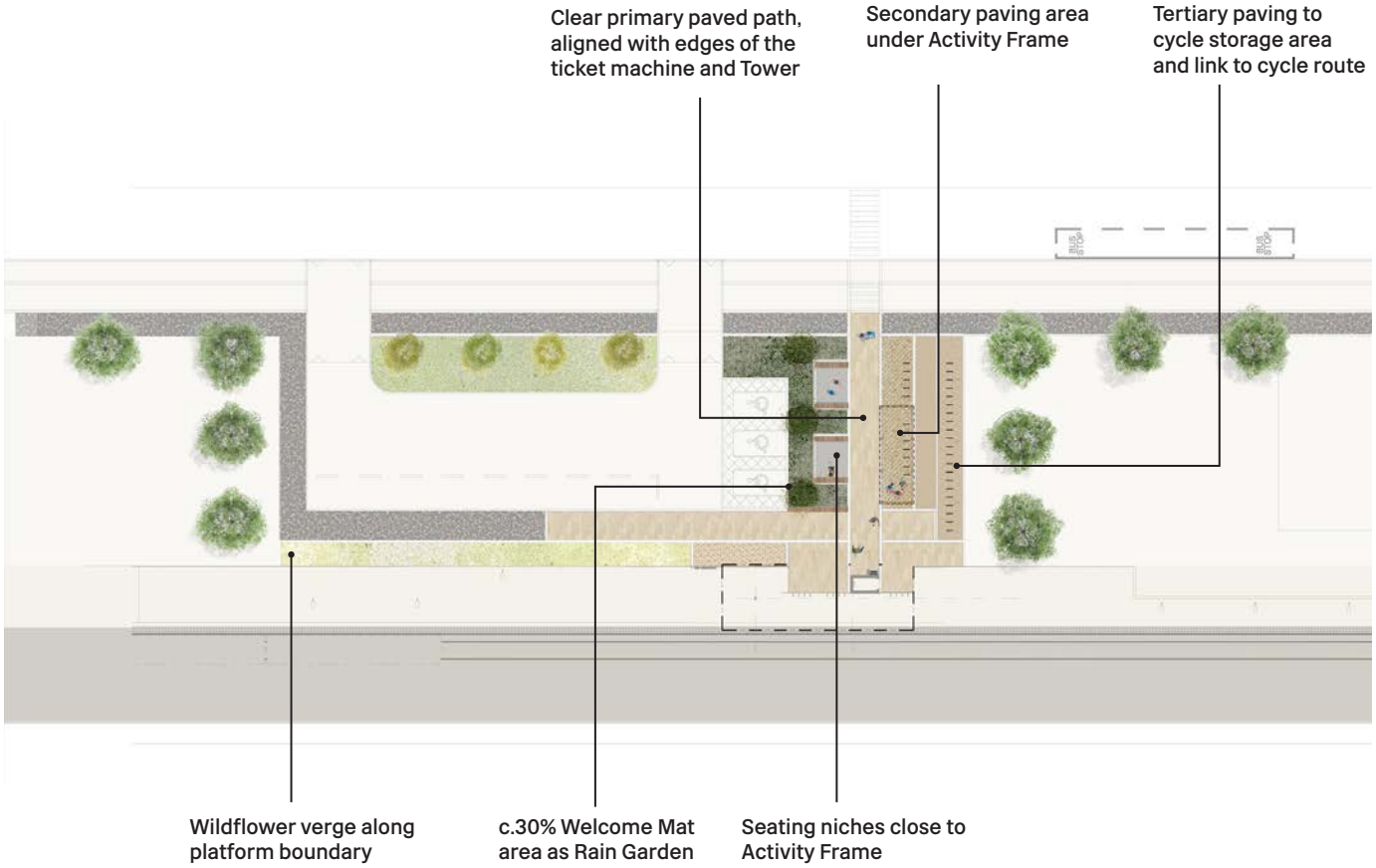
6. Typical Scenario for Category F Station

National Park, Level
Lake District
Buff Paving Palette

- Primary Station Side
- Secondary Station Side
- Key Pedestrian Routes
- Cycle Routes
- Public Transport
- Building Canopy
- Activity Frame
- Cycle Parking
- Link to seating niches
- Primary area
- Secondary area
- Tertiary area
- Rain Gardens
- Feature Wall/Fence

7.8 Landscape Scenarios - Scenario 06

Design Principles

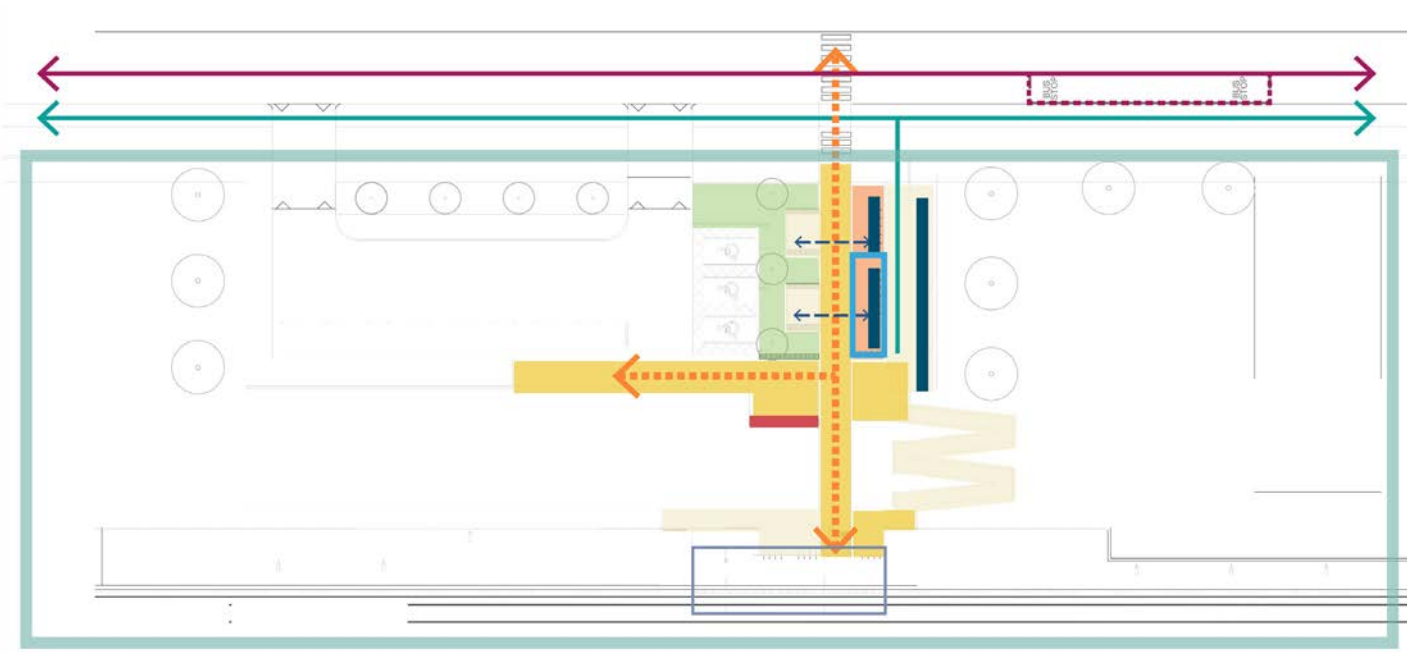


6. Typical Scenario for Category F Station

National Park, Level
Lake District
Buff Paving Palette

- Primary paving
- Secondary paving
- Tertiary paving
- Tertiary paving - cycle route
- Asphalt
- Rain gardens
- Wildflower seeding
- Activity frame
- Cycle stands
- Benches
- Extent of building canopy
- Trees - typically 2-3m
- Trees - typically 3-5m
- Trees - typically 5-7m

Spatial Analysis

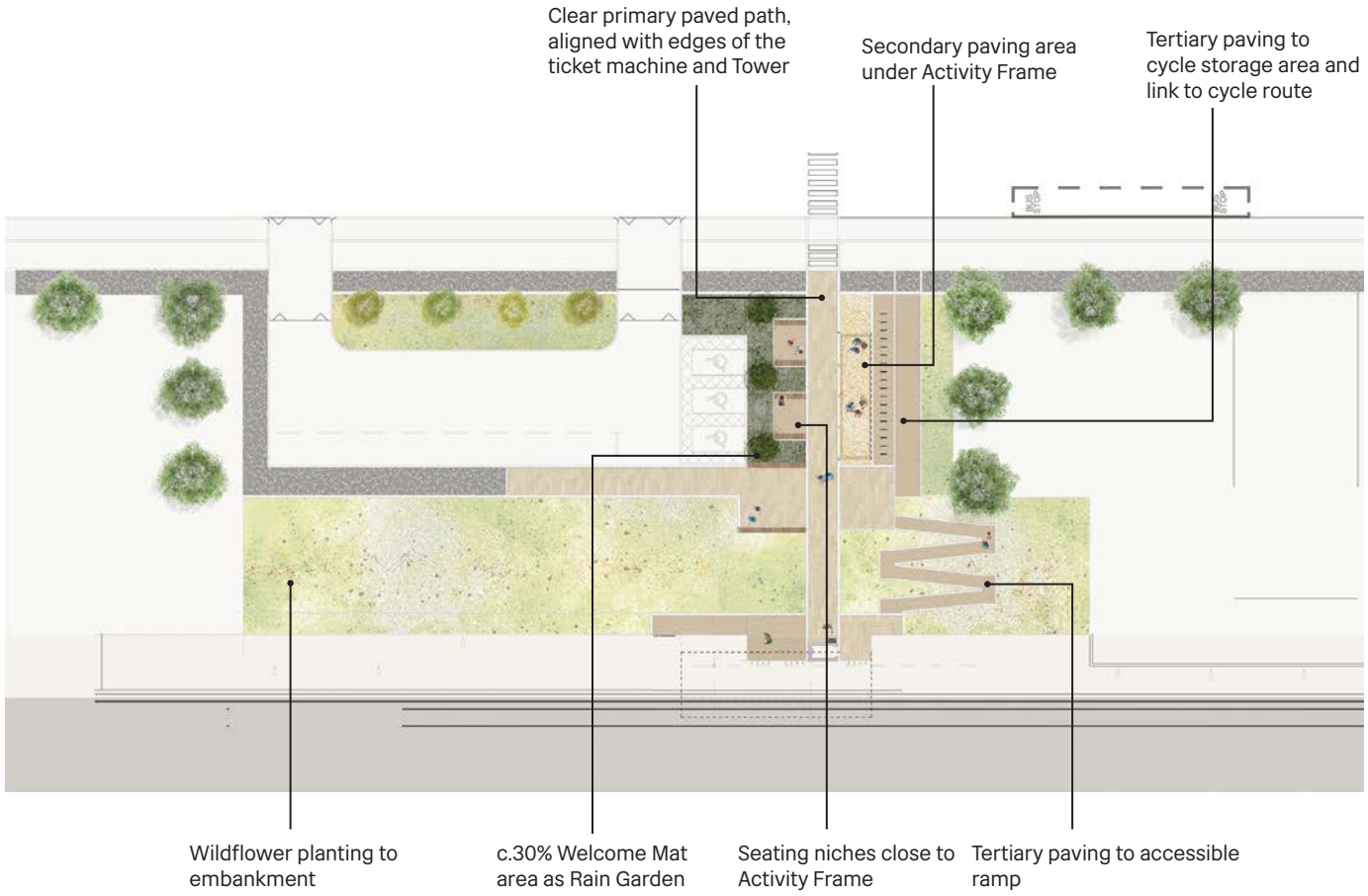


7. Typical Scenario for Category F Station

Semi Industrial, Low Embankment
Northern England
Buff Paving Palette

- Primary Station Side
- Secondary Station Side
- Key Pedestrian Routes
- Cycle Routes
- Public Transport
- Building Canopy
- Activity Frame
- Cycle Parking
- Link to seating niches
- Primary area
- Secondary area
- Tertiary area
- Rain Gardens
- Feature Wall/Fence

Design Principles



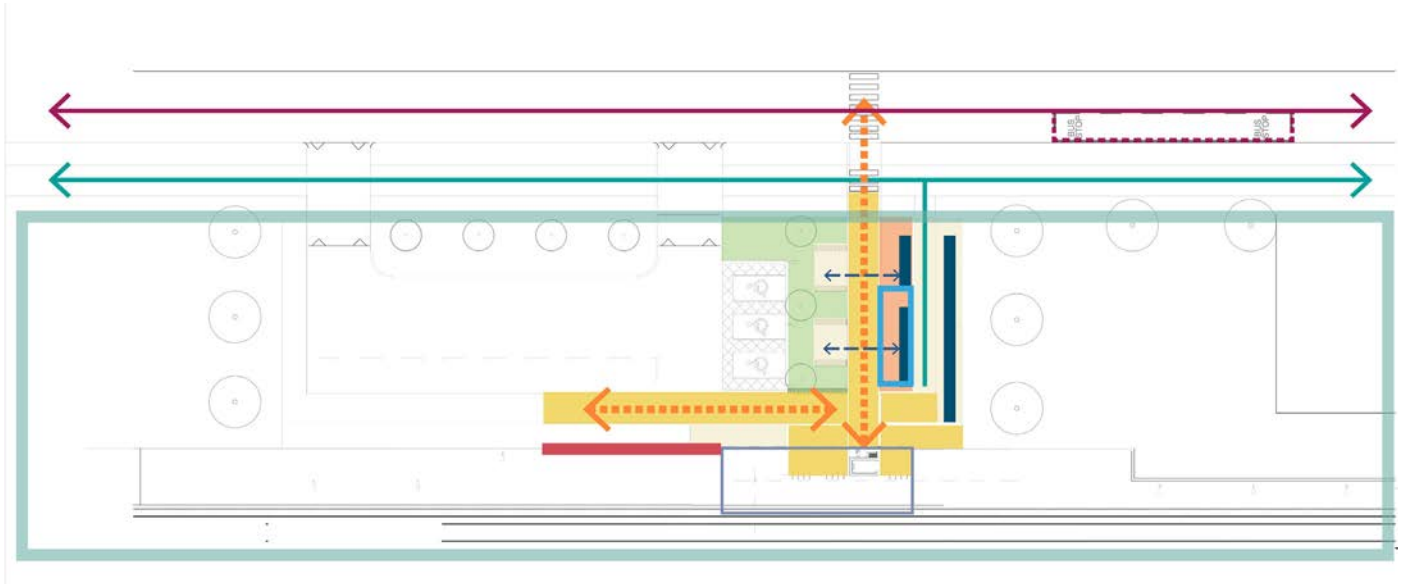
7. Typical Scenario for Category F Station

Semi Industrial, Low embankment
Northern England
Buff Paving Palette

- Primary paving
- Secondary paving
- Tertiary paving
- Tertiary paving - cycle route
- Asphalt
- Rain gardens
- Wildflower seeding
- Activity frame
- Cycle stands
- Benches
- Extent of building canopy
- Trees - typically 2-3m
- Trees - typically 3-5m
- Trees - typically 5-7m

7.8 Landscape Scenarios - Scenario 08

Spatial Analysis

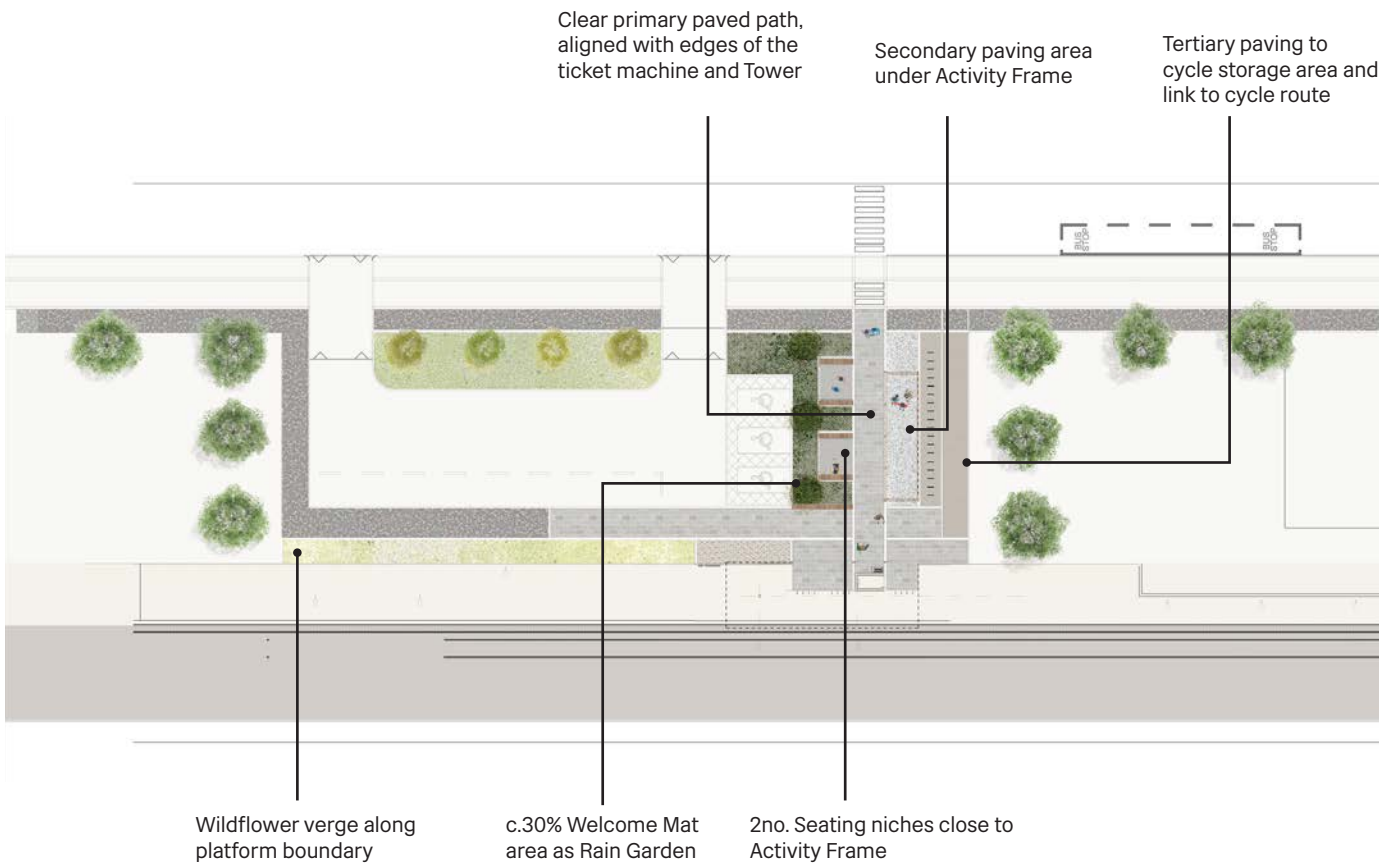


8. Typical Scenario for Category F Station
Industrial Park, Level
Cullompton
Grey Paving Palette

- Primary Station Side
- Secondary Station Side
- Key Pedestrian Routes
- Cycle Routes
- Public Transport
- Building Canopy
- Activity Frame
- Cycle Parking
- Link to seating niches
- Primary area
- Secondary area
- Tertiary area
- Rain Gardens
- Feature Wall/Fence

7.8 Landscape Scenarios - Scenario 08

Design Principles

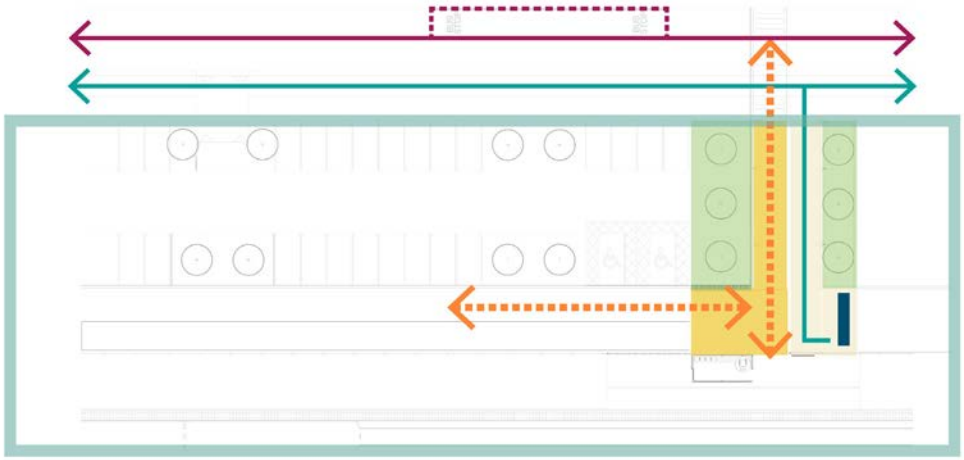


8. Typical Scenario for Category F Station

Industrial Park, Level
Cullompton
Grey Paving Palette

- Primary paving
- Secondary paving
- Tertiary paving
- Tertiary paving - cycle route
- Asphalt
- Rain gardens
- Wildflower seeding
- Activity frame
- Cycle stands
- Benches
- Extent of building canopy
- Trees - typically 2-3m
- Trees - typically 3-5m
- Trees - typically 5-7m

Spatial Analysis



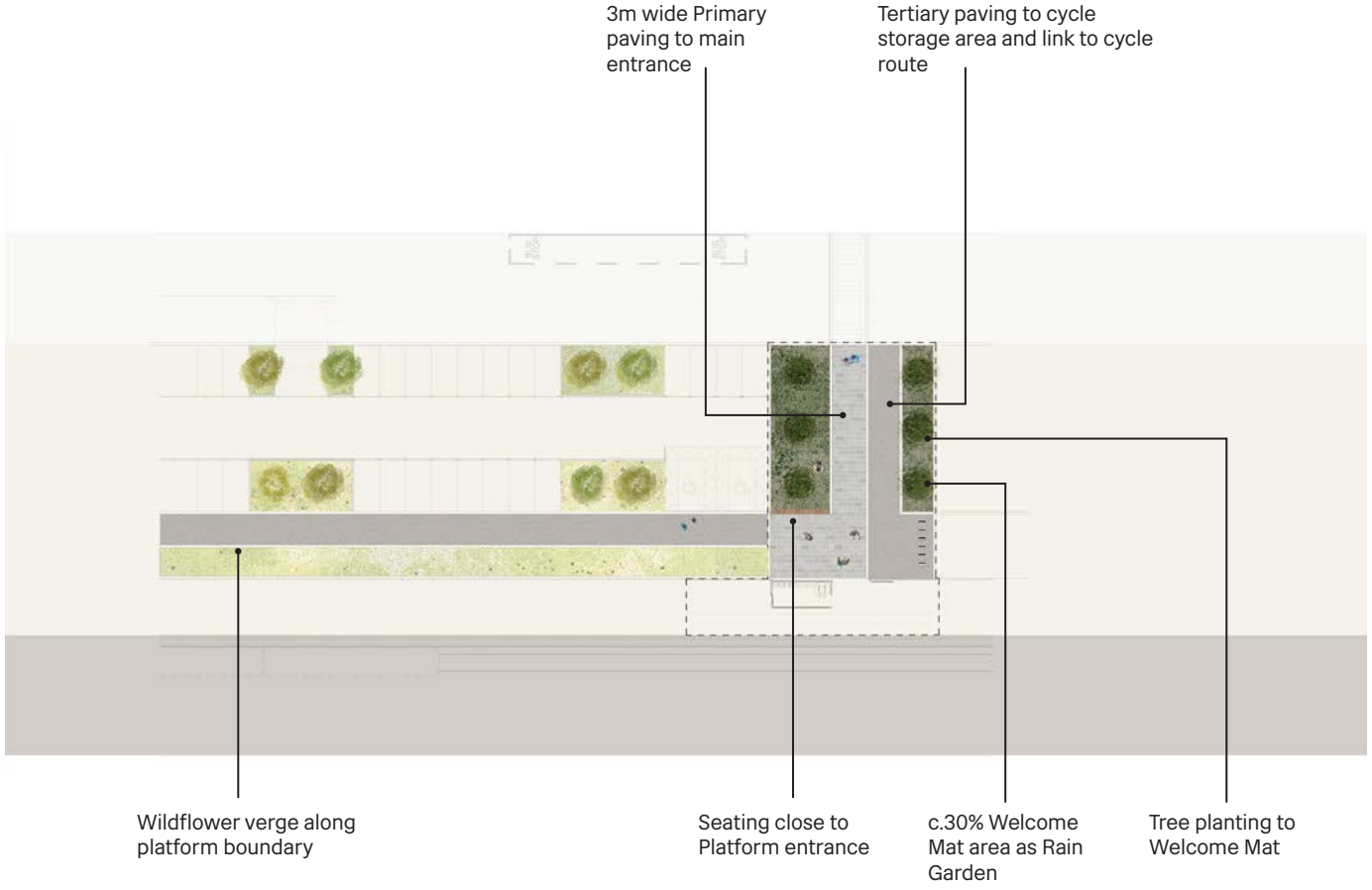
9. Typical Scenario for Category F-mini Station

Rural, Level
South-West England
Grey Paving Palette

- Primary Station Side
- Secondary Station Side
- Key Pedestrian Routes
- Cycle Routes
- Public Transport
- Building Canopy
- Activity Frame
- Cycle Parking
- Link to seating niches
- Primary area
- Secondary area
- Tertiary area
- Rain Gardens
- Feature Wall/Fence

7.8 Landscape Scenarios - Scenario 09

Design Principles



9. Typical Scenario for Category F-mini Station

Rural, Level
South-West England
Grey Paving Palette

- Primary paving
- Tertiary paving
- Tertiary paving - cycle route
- Asphalt
- Rain gardens
- Wildflower seeding
- Cycle stands
- Benches
- Extent of building canopy
- Trees - typically 2-3m
- Trees - typically 3-5m

Appendix
7.9 Light Fitting Selection

The light fitting selection table below should be read in conjunction with the lighting design strategy guidance in section 5.9.

Selection criteria are categorised as follows:

Should have - now: refers to minimum requirements accepted for the products recommendable for procurement.

Should have - new: refers to requirements which are expected to be met by majority of products and only exception would be if technology not yet available to allow functionality for certain product types.

Would have: refers to a more sustainable approach recommended by Arup and provides ideas for Network Rail to explore with manufacturers on an ongoing basis over the coming 2-5 years.

	Should have - now	Should have - new	Would have - possible next steps
Sustainability factors	• EU Ecodesign directive compliant • Manufacturer can provide information on all materials' origins for calculations • Luminaire manufacturing is EU-based - 90%+ by material weight • All packaging is recyclable (and is recycled) • Modular components (light source, body, driver) that can be easily disconnected for maintenance and upgrade • Junction boxes, wiring and control system equipment are easily disconnected for reconfiguration and upgrade (e.g. smart cameras and data retrival)	• Calculate and publish EPD (Environmental Product Declaration) Note: rapidly changing legislation will mean this requirement is to be re-confirmed and reviewed until legislative agreement on EPDs is reached. • UK-based manufacturing - 90% of luminaire by weight • Extended offering for servicing the luminaire for 20 years (parts) • Minimal use of packaging • No glue or epoxy potting used in the luminaire (with electronics exception)	• Fully UK/EU/EEA-based production of luminaire an all its components • All energy used for manufacturing and transportation is from renewable sources • All packaging is returned to the manufacturer • The luminaire design is open source or IP owned by Network Rail and can be manufactured by different companies • CIBSE TM66 CEAM Score of 2.5 or higher
Light source	• Modular, replaceable and upgradeable without extensive skill required • Lamp life 70k+ hours to L80B10 or higher • Balance of spread/low glare • High efficacy over 100lm/cW	• Lamp life 100k+ hours to L80B10 or higher • Proven low-glare • Warranty for 5+ years on colour fidelity • Zhaga compliant	• Module can be disassembled fully into components and reused/recycled by a large number of companies

Figure 7.26 - Light Fitting Selection Table

	Should have - now	Should have - new	Would have - possible next steps
Materials	• Body made out of recyclable materials • Optimal balance of robustness/minimal material use 30 years design life (body, upgradeable gear+light source) • Use very high quality luminaires - minimum 10-year warranty for body parts, 5 years for drivers and light source • High IP and IK rating to prolong design life	• Minimal use of finishes to increase recyclability • Coordination with ceiling systems to reduce material quantity (e.g. IK rating to take into account location within the ceiling) • Use of the luminaire profile to be used for other services cabling (cameras, speakers etc) to save on conduits amount • Body is made of minimum 30% recycled materials • Manufacturing and transport emissions at net zero	• Body is made from fully post-consumer recycled materials • Optics made out of recycled materials • No toxic and pollutant materials used in the luminaire • Use of luminaire body to house other setrvices e.g. sensors collecting data or digital infrastructure
Optics	• Precise distribution to light the platform only where needed • Robust and vandal-resistant optics to minimise need of guards • Replaceable optics, with components available at least for the lifetime duration of the luminaire	• Modular optics to change as needed	• Open source design for optics, so it can be manufactured on as-needed basis by a variety of manufacturers
Controls	• Smooth dimming to 10% with no perceptible flicker • Lighting control system integration for sensors and scheduling • Open protocol (e.g. DALI+) which can be upgraded and updated as time moves on • Constant light output	• Gradual lighting - lighting turning on gradually if one PIR sensor is triggered • Proven security and resilience of the lighting control system • Wireless control	• Linked to train services to save energy and limit impact of station at night

Figure 7.26 (cont.) - Light Fitting Selection Table

7.10 Reference Documents

A wide range of Network Rail and industry-wide documents and guidance notes were used in compiling this Design Manual.

Below is a list of the most relevant standards and guidance documents referenced within this Guide. These documents are drawn from a range of sources and have been used in the development of this Guide. The list is not intended to be exhaustive but provide the user of this Guide with a sound basis upon which to develop any small and medium station scheme.

Station Design - General Standards/Guidance:

- Network Rail Principles of Good Design
- Station Design Guidance (NR/GN/CIV/100/02)
- Station Capacity Planning (NR/GN/CIV/100/03)
- Station Facilities and Amenities (NR/GN/CIV/200/03)
- Public Toilets (NR/GN/CIV/200/04)
- Vertical Circulation (NR/GN/CIV/200/05)
- Wayfinding (NR/GN/CIV/300/01)
- Network Rail Stations Strategy and Delivery Plans
- Network Rail Standard Footbridge Designs
- Network Rail Investment in Stations – A Guide for Promoters and Developers
- DfT Better Rail Stations Report
- TfL Interchange Best Practice Guidelines
- DfT Secure Stations Scheme –Guideline 8: Crime Reduction Strategy
- Railway Safety and Standards Board – Group Standards Railway Safety Principles and Guidance
- National Technical Specification Notices (NTSNs) Railway Safety and Standards Board – A Guide to RSSB
- RIS 7016 INS Interface between Station Platforms, Track and Trains (Issue 1.1 2019)
- RIS 7700 INS Rail Industry Standard for Station Infrastructure (Issue 3 2018)
- RIS 7701 INS Automatic Ticket Gates at Stations (Issue 1 2011)
- GI/GN7520 Lighting in Railway Premises
- GC/RT5212 Railway Clearances
- BS 9992:2020 Fire safety in the design, management and use of rail infrastructure. COP

Accessibility and Inclusivity:

- Inclusive Design (NR/GN/CIV/300/04)
- DfT Design Standards for Accessible Railway Stations
- BS 8300-1 & 2 : 2018 Design of an accessible and inclusive built environment
- Design for Disabled People: A Code of Practice
- CABE The Principles of Inclusive Design
- The Equality Act 2010
- DPTAC – Disabled Persons Protection Policies
- The Autism ASPECTSS™ Design Index

Placemaking and Community:

- Medium and Small Station Implementation Manual (NR/GN/CIV/100/09)
- Public Realm Design Guidance for Stations (NR/GN/CIV/200/10) ThinkStation Report
- ExploreStation Report
- HUB Making places for people and trains
- CABE Building for Life: Great Places to Live
- CABE Delivering Quality Places
- CABE The Value of Urban Design
- CABE Urban Design Principles

Sustainability

- Network Rail Environmental Sustainability Strategy 2020-2050
- NR/GN/CIV/100/04 Climate Action Design for Buildings & Architecture
- DfT The Stern Review on the Economics of Climate Change

Heritage:

- Heritage Care and Development (NR/GN/CIV/100/05)
- English Heritage Managing Heritage Assets

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7.12 Acknowledgements

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