Dudley Net Zero Neighbourhood

PROPOSAL

06/07/2022

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EXECUTIVE SUMMARY

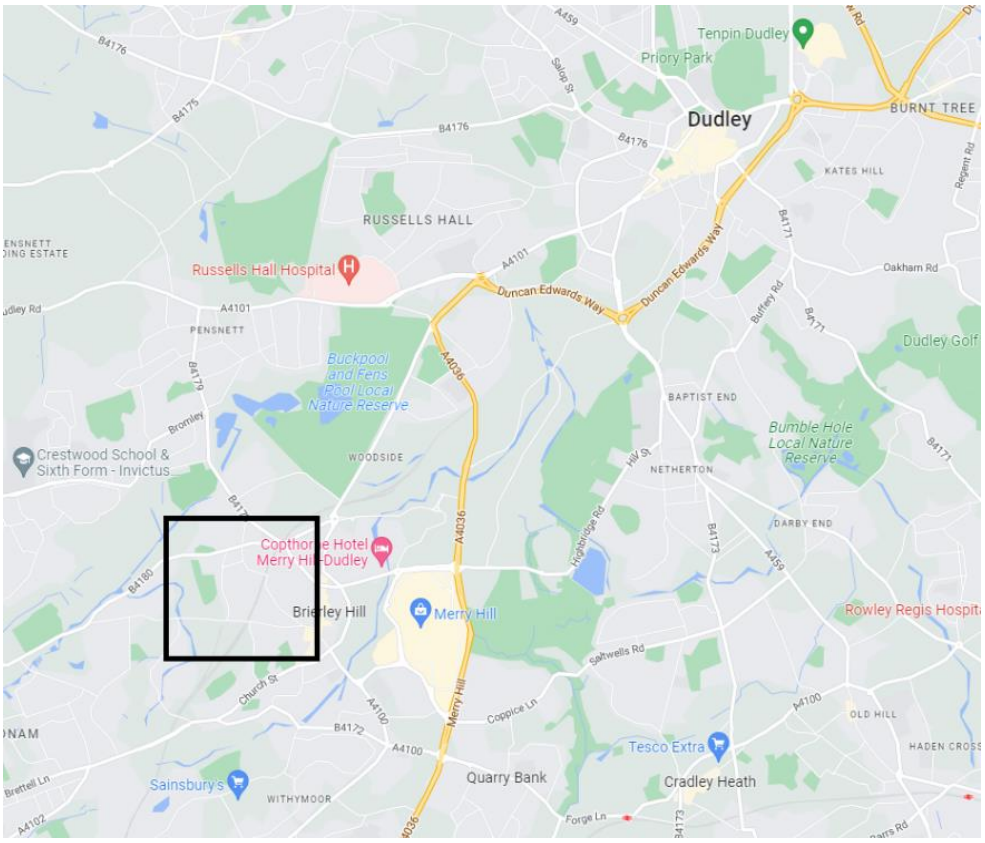

Figure 1 - High-level view of selected Net Zero Neighbourhood in Dudley

The main vision for this neighbourhood is to create a new high-quality Net Zero Canalside community. This will be achieved through:

- Improvements to the existing housing stock, commercial estate and to the outdate industrial estate.
- Several transport improvements including the potential to develop the disused railway into a cycle and walking pathways and the enhancement of canal corridors including surfaced cycleways with links to cycling and walking routes, as well as adjacent open spaces and green spaces.
- Management of demand and grid constraint to accommodate and plan for electrification for decarbonization.
- Excellent Green Infrastructure which will be protected and enhanced including green spaces and parks and improved links into Fens Pool Nature Reserve/SAC, the River Stour and open countryside to the south and west of the corridor.
- Educational programs and community engagement to co-design and spread the net zero mantra.

The Dudley Net Zero Neighbourhood (NZN) programme is rooted in the principle that the design of a new approach to energy efficiency is led by the community and the community, residents and businesses, are beneficiaries of investment and the short and long-term outcomes of that investment. The goal is for economic activity to work for humans whilst being regenerative of the environment. The WMCA Inclusive Growth Framework has 8 key principles and the NZN programme will deliver against each of them, within the scope of the funding call.

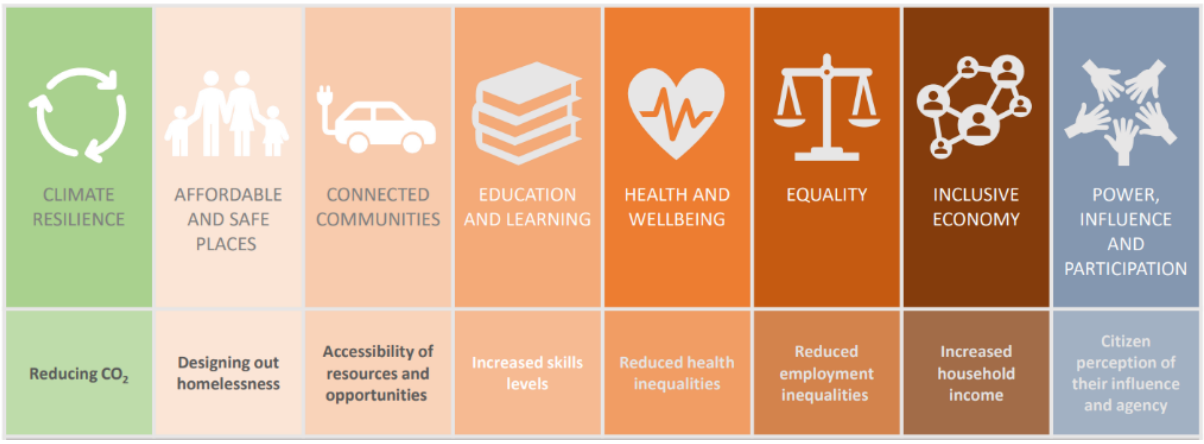

Figure 2 - WMCA Inclusive Growth framework

1 The Local Area

Brockmoor is the proposed area for the Net Zero Neighbourhood as it comprises of the key elements of a successful programme, including housing stock that needs improving, appropriate transport links/needs and the potential for local economic benefits. It comprises the LSOA Dudley 022D, including the following streets: Pheasant Street, Norwood Road, Station Road, Belle Isle and Foxdale Drive. The area then includes the continuation of Norwood Road into LSOA Dudley 022B, and Station Road into LSOA Dudley 022C. See *Appendix F* for relevant demographic GIS maps.

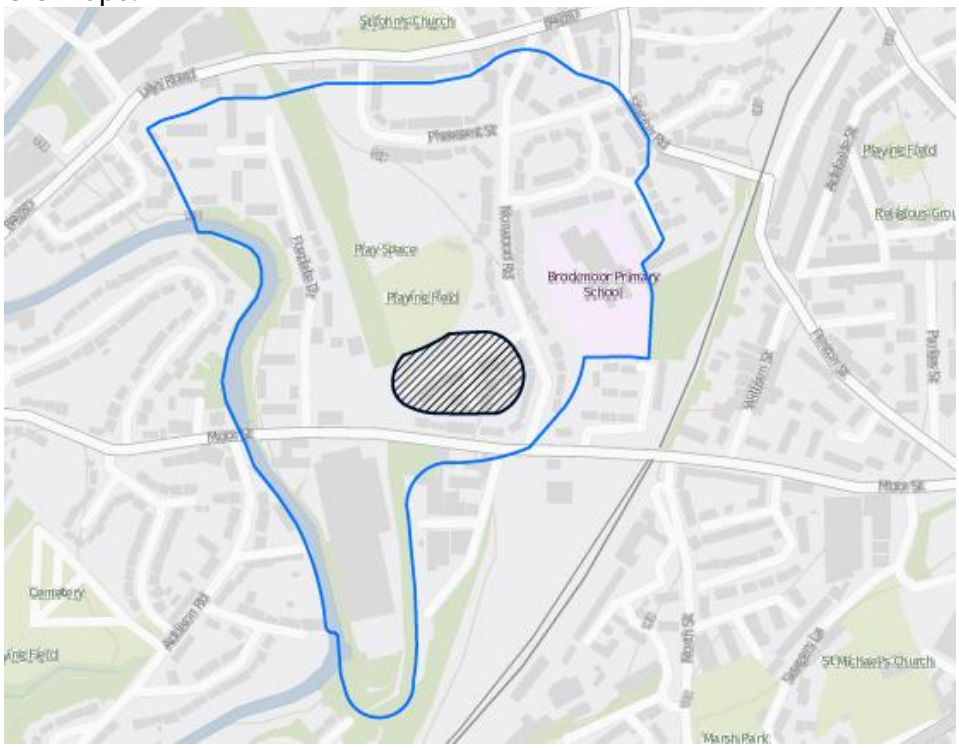

Figure 3 – Net Zero Neighbourhood boundaries (blue)

“The Wickets” area shown in *Figure 3* was removed from the total NZN (black crossed area), as these are new builds with very high rated EPCs and less potential for energy efficient improvements.

The whole proposed area is within Black Country Core Strategy Regeneration Corridor 11b (Brierley Hill-Stourbridge). The neighbourhood that we have identified (Circled in blue in *Figure 3)* is part of Brockmoor area. The neighbourhood falls into the wider Brockmoor and Pensnett Local Authority ward, it is bordered by Brierley Hill ward to the south, and Wordsley ward to the west. There are transport links into Brierley Hill eastbound via Moor Street and Brierley Hill Road, and via the canal to the west, which leads into Dudley, or down into Wordsley.

This neighbourhood includes 307 properties, 65 of which are Council owned. The percentage of Council owned properties in the neighbourhood is 21%, the average for the area of 19%. The SAP ratings of these houses are shown in table below:

Table 1 - Property tenure and SAP rating across the NZN

SAP Rating	Total	Local Authority	Private Rented	Owner Occupiers	Housing associations
C	69	11	27	30	1
D	185	46	52	82	5
E	49	8	21	20	0
F	4	0	4	0	0

This specific area was chosen because:

- It has high fuel poverty
- It is relatively close to the new metro
- Relatively close to industrial areas
- It has green space within it, an adjoining canal and a disused railway
- It has a representative mix of various housing, with some houses where energy efficiency improvements can be made quickly

1.1 Demographics and population

The population in the wider area including the Brockmoor and Pensnett ward, estimated by the Office for National Statistics in December 2020 was 13,546. 58.8% of the population aged 18-64, 25.1% aged 17 or younger, and 15.4% aged over 65. Regarding ethnic groupings, 91.7% are White, 4.8% are Asian and 1% are Black.

1.2 Defined neighbourhood

The area is primarily residential with an industrial estate in the south, a canal section in the west, within close proximity of Brierley Hill High Street in the east, and the B4180 a strategic public highway section to the north. The area includes Brockmoor primary school, Albion works industrial estate and a section of the Wombourne Branch disused railway.

The area is close to Brockmoor leisure centre, the Dell Stadium, a nature reserve and High Street the Brierly Hill shopping centre. Brierley Hill residents have a strong sense of community, as it historically grew through the industrial revolution and became an important centre. There is a local hub – Brockmoor Community Centre, a regular meeting point for a variety of functions.

1.3 Greenspace and natur conservation :

The neighbourhood has several greenspaces and amenities which present an opportunity for development of activities, enhancement of the neighbourhood and engagement with the community:

- Small areas of non-audited publicly accessible greenspace, including Foxhall Drive Open Space, Foxdale Drive Open Space and Norwood Road Open Space.
- High-quality, high-value publicly accessible greenspace at Pheasant Street.

Two outdoor sports sites within area, neither are publicly accessible. These are 'Norwood Cricket Pitch' (restricted access- members/tenants only) and Brockmoor Primary School playing fields (no public access).

The neighbourhood links to the wider area which provides potential for exercise and transport both through the Freight Railway Line to the east (Stourbridge Railway Line) and disused railway line to the west (Wombourne Branch Disused Railway). In addition, the Stourbridge Canal SLINC lies to the west, providing links to Buckpool and Fens Pool Local Nature Reserve, SINC and SSSI.

1.4 Recent Planning Applications:

Adjacent to the neighbourhood two planning applications have been submitted (1) Next to the Albion work industrial estate where 45 new builds have already been approved, (2) on Leys Road where initial clearance activities have already taken place.

This offers the opportunity for expanding the NZN principals beyond the 300 houses, through discussions with the master developer/housing developer to align on net zero principles and wider infrastructure and services integration.

1.5 Transport links

The Brockmoor area is situated 0.4 miles from Brierley Hill Town Centre, and 0.5 miles from the proposed Brierley Hill Metro stop. The area is well served by existing bus routes to Merry Hill and Stourbridge. Freight Railway line to the east of area and disused railway line to the west of area. The nearby Local Cycle Network runs along Station Road (Kingswinford to Brierley Hill via B4179).

2 The NZN Program

The consortium is composed of 5 partners -- EQUANS, SHAP (Sustainable Housing Action Partnership), Buro Happold, Connected Places Catapult and Keele University. All partners will form a culture of openness, honesty, and quality in everything we do on this scheme and for the future phases.

The delivery program is divided into two:

- **Phase 1 (2022-2025)** — corresponds to the first phase of capital funding kick-started through the £1.65m of investment from the WMCA in turn attracting additional fundings from the DMBC housing department, disability funding and the Boiler Upgrade Scheme.
- **Phase 2 (2025 onwards)** — corresponds to the remaining investment and work — infrastructure and community — that needs to occur to deliver a fully net zero carbon neighbourhood. Phase 2 will draw on the learnings and business models that are tried and tested in Phase 1.

2.1 Phase 1: Consultancy

In Phase 1, the consortium will assist in providing detailed feasibility studies, pursuit specific opportunity and engage with stakeholders to create deliverable opportunities and create an overarching NZN business case. These activities will be part of the consultancy section of Phase 1 (in blue)

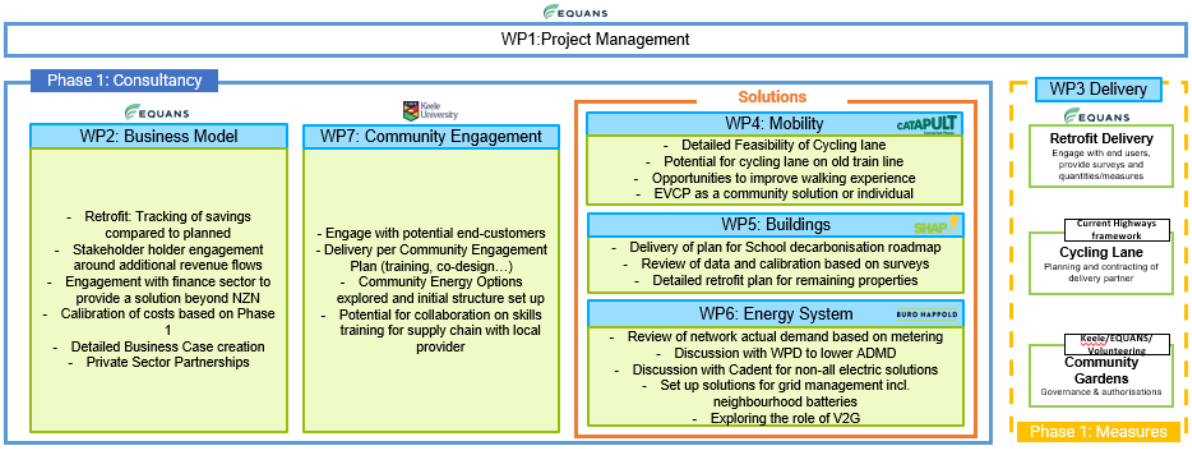

Figure 4 - Phase 1 delivery split consultancy and measures (see details APPENDIX E)

2.2 Phase 1: Measure Delivery

At the same time the consortium will deliver structural works by 2025 (*Figure 4*, in orange):

(1) Retrofit of 50 households across different tenures and EPCs– owner-occupiers, social landlords and private landlords

The retrofitting activity will be delivered by EQUANS, by the team that has been delivering for DMBC for the last 16 years.

(2) A cycle lane connecting the neighbourhood into the Highstreet and a destination parking facility

The cycling lane will be delivered by a third party in line with current procurement framework of the local authority and with the project management expertise of EQUANS.

(3) Community Gardens on empty green spaces owned by the local authority

The community gardens will be developed and deployed in collaboration with the community by Keele University and local/corporate volunteers.

Managing the scheme

The following milestones will be inputted into our programme:

- Resident Liaison Officer (RLO) activity
- Asbestos management according to survey findings
- Installation dates to meet DMBC requirements
- Trade-specific milestones
- Quality control audit
- Completion handovers and demonstrations
- Certifications, compliance data and registering
- Handover pack management:
    - Document management and storage
    - Tenant satisfaction questionnaires
    - Aftercare procedure

EQUANS experience

EQUANS has had great success in developing and delivering energy efficiency schemes across the Midlands, Nationally and with the Dudley Metropolitan Borough Council (DMBC) over the last 15 years. EQUANS have a dedicated in-house Sustainability Team who oversee all energy efficiency measures ensuring compliance and design and risk pathway success on funded domestic retrofit schemes.

EQUANS also have extensive experience delivering public building contracts for our clients, ranging from cyclical maintenance of heritage buildings to large scale new build contracts for public transport buildings and multi-use games areas.

The structural work in the built environment will deliver savings of 68 $tCO_{2,eq}$/yr. as well as reduction of energy of 54% in the 50 retrofitted houses. This will, at a time of hugely increasing energy costs, deliver significant value for the neighbourhood residents. The CO_2 savings that associated to the cycle lane will grow in line with adoption finally the community garden will primarily be an opportunity to educate the participants and promote behaviour change across the board.

3 Capital Investment

The approach to maximising outcomes from the Net Zero Neighbourhood opportunity in Dudley is to make full use of clear funding sources to deliver Phase 1 measures, utilising this certainty to develop new and innovative commercial approaches to fund future projects in the neighbourhood.

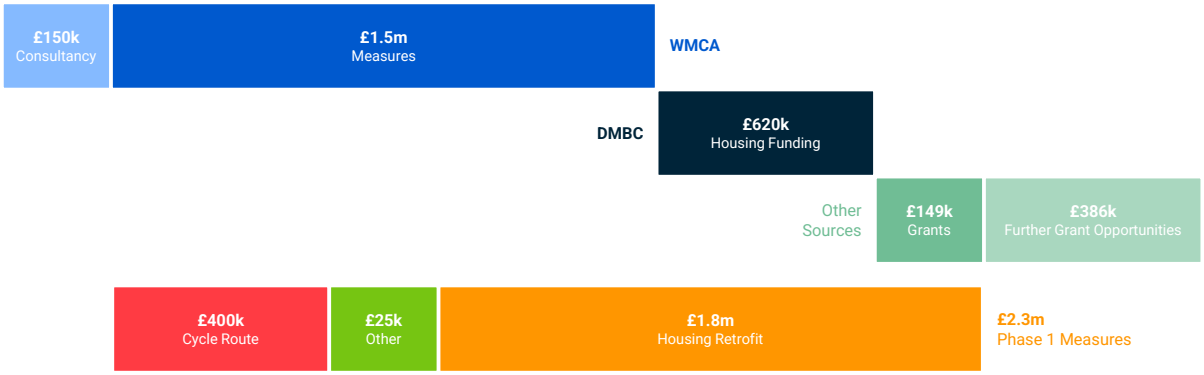

Figure 5 - Funding sources and initial spending

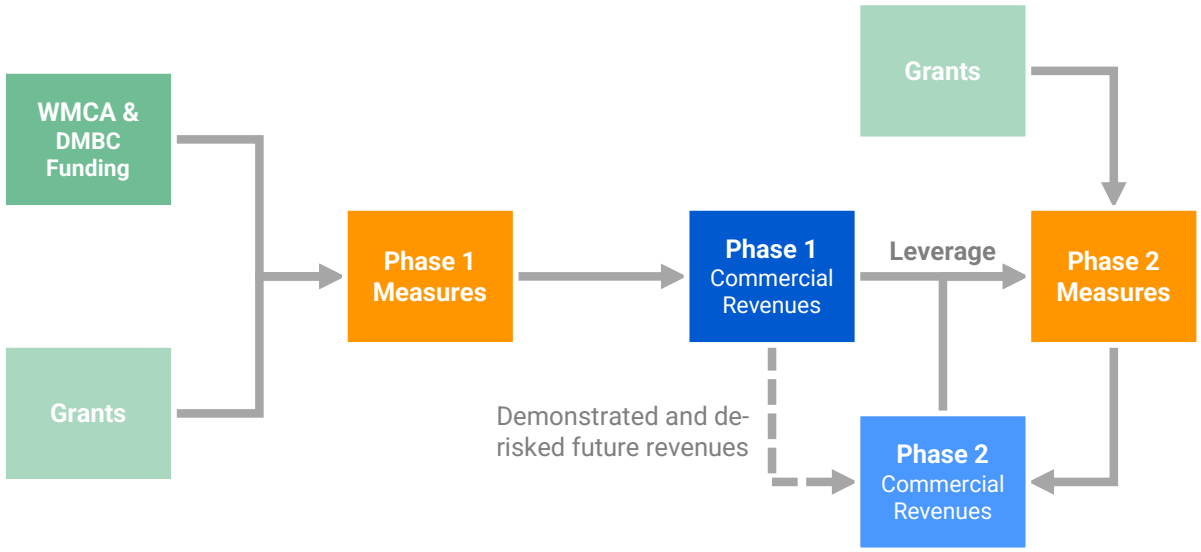

Figure 6 - Interconnection between Phase 1 and Phase 2 consultancy and delivery work

The key challenge of sourcing external, private funding for NZN solutions is in demonstrating and providing confidence in commercial returns from measures to repay investment.

The ability to deliver the Phase 1 programme without initial recourse to private finance enables true engagement with neighbourhood stakeholders (Council, owners, landlords, residents, businesses, DNOs, etc.) to co-design fair and equitable commercial models for contribution to measures. Removing immediate commercial pressures will allow this engagement to be more

transparent and should result in pilot arrangements that can be used as demonstrators for future phases of the project in Brierley Hill, and potentially across other NZN projects.

4 Community Engagement

The approach to the Community Engagement Plan (CEP) is grounded in participatory methods which have been developed as part of the community engagement work delivered by Keele University for the Zero Carbon Rugeley (ZCR) project. The Dudley NZN CEP starts from acknowledging the role of existing networks and groups within the community, and past and existing dialogues, building on these, as well as trying to bring in new voices on the future of energy systems and green transition. Initial pre-project community mapping work has been undertaken and covers:

1. Current relationships with residents in the proposed NZN area considering lines of communication between Dudley Council and their tenants, data collected as part of service provision by the Dudley Energy Advice Line (DEAL), local issues and data around anti-social behaviour (ASB), as well as historic engagement undertaken by Dudley Council and other community-based organisations.
2. Existing community-based assets and their capacities including initial scoping activity in conjunction with Dudley Council Housing Asset Management and Development team.
3. Existing community hubs, assets and public buildings and spaces, including community centres, local schools, green spaces, and how these will be utilised as key components of the Dudley NZN project and address local issues in the area.

Having outlined findings from initial community mapping work, the CEP demonstrates how it will meet key engagement objectives including:

- Project awareness and relationship building through recruiting residents and community gatekeepers as part of establishing two new community forums for participation (Community Ambassadors and Community Gatekeepers), including door-to-door recruitment of participants and outreach to key community leaders (e.g. ward councillors, faith leaders, school governors etc.).
- Generating insights from the community for user-centred design of NZN elements by designing and delivering community engagement activity in close conjunction with project partners and with advice and guidance from community ambassadors and gatekeepers.
- Increasing understanding of the components of NZN and their relevance through the design and delivery of 'NZN Champions' training program for community members to build their capacity to participate in user-centred design activities, as well as developing community projects around litter picking (in partnership with a local recycling business) and community food growing in "pocket parks" to tackle local ASB issues and situate waste management and green neighbourhood measures in the NZN context.
- Testing different NZN components with the community including trialling low-carbon transport solutions and facilitating focus group activity to understand attitudes to NZN solutions.

The CEP also considers opportunities for community asset ownership of NZN elements. This includes opportunities presented by the proposed renovation of the Brockmoor Community Centre and its potential use as a retrofit showcase, as well as consideration of Brockmoor Primary School and Moor Street Industrial Estate for the provision of community owned energy assets.

These engagement initiatives meet objectives across relationship building, community consultation, and catalysing low-carbon behaviour change. In addition to the sections below, a detailed CEP is appended to this document.

A - NET ZERO NEIGHBOURHOOD LOCAL AREA

1 Overview

Brockmoor is the proposed area for the Net Zero Neighbourhood. It comprises the LSOA Dudley 022D, including the following streets: Pheasant Street, Norwood Road, Station Road, Belle Isle and Foxdale Drive. The flats on Foxdale Drive are geographically set back compared to the houses and would have included more than 300 properties to be in scope and are therefore excluded at this stage.

The area then includes the continuation of Norwood Road into LSOA Dudley 022B, and Station Road into LSOA Dudley 022C. See *Appendix F* for relevant demographic GIS maps.

Figure 7 – Net Zero Neighbourhood boundaries (main imagine). Excluded flats on Foxdale drive (bottom right)

"The Wickets" area *shown Figure 7* was removed from the total NZN, as these are new builds with very high EPCs and less potential for energy efficient improvements.

The whole proposed area is within Black Country Core Strategy Regeneration Corridor 11b (Brierley Hill-Stourbridge). The neighbourhood that we have identified (Circled in blue *Figure 7*) is part of the Brockmoor area. The neighbourhood falls into the wider Brockmoor and Pensnett Local Authority ward, it is bordered by Brierley Hill ward to the south, and Wordsley ward to the west. There are transport links into Brierley Hill eastbound via Moor Street and Brierley Hill Road, and via the canal to the west, which leads into Dudley, or down into Wordsley.

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F	4	0	4	0	0

2 Built Environment

2.1 Housing stock

Overall, 307 properties have been included in the NZN. The dominant SAP rating is EPC D with 185 properties. 65 of these properties are part of the Council Estate, 132 are owner-occupiers and the remaining 104 are private rented properties. The 4 private rented properties are EPC F.

Property SAP Rating

SAP Rating	Number of Households
C	69
D	185
E	49
F	4
Total	**307**

Overall archetypes were defined by property age (*Table 3*), type (*Table 4*), wall constructions (*Table 5*) and heating type - all gas connected.

Table 3 - Domestic property age

Age	Number of Households
A: pre-1900	3
B: 1900-1929	12
C: 1930-1949	74
D: 1950-1966	58
E: 1967-1975	4
F: 1976-1982	14
G: 1983-1990	73
H: 1991-1995	44
I: 1996-2002	21
J: 2003-2006	3
L: 2012 onwards	1
Total	**307**

Table 4 - Domestic property type

Type	Number of Households
Flat: Detached: Top Floor	4
Flat: Enclosed End Terrace: Ground Floor	4
Flat: End Terrace	4
Flat: Semi Detached: Ground Floor	13
House: Detached	29
House: EnclosedEndTerrace	41
House: EnclosedMidTerrace	9
House: EndTerrace	28

House: MidTerrace	81
House: SemiDetached	93
Maisonette: Semi Detached: Top Floor	1
Total	**307**

Table 5 - Domestic property wall construction

Construction type	Number of Households
Cavity: AsBuilt	161
Cavity: FilledCavity	100
SolidBrick: AsBuilt	23
SolidBrick: External	18
SystemBuilt: External	3
TimberFrame: AsBuilt	2
Total	**307**

2.2 Commercial Buildings

In the south of the neighbourhood *Albion works* (*Figure 8*) is part of an employment zone. The building is a single storey complex of industrial units of steel framed construction with brick/blockwork walls surmounted by a pitched, insulated profiled sheeted roof incorporating lighting panels. The west/east facing roof with limited skylights, provides an opportunity to explore the potential for roof mounted Solar PV, with different ownership and utilisation models.

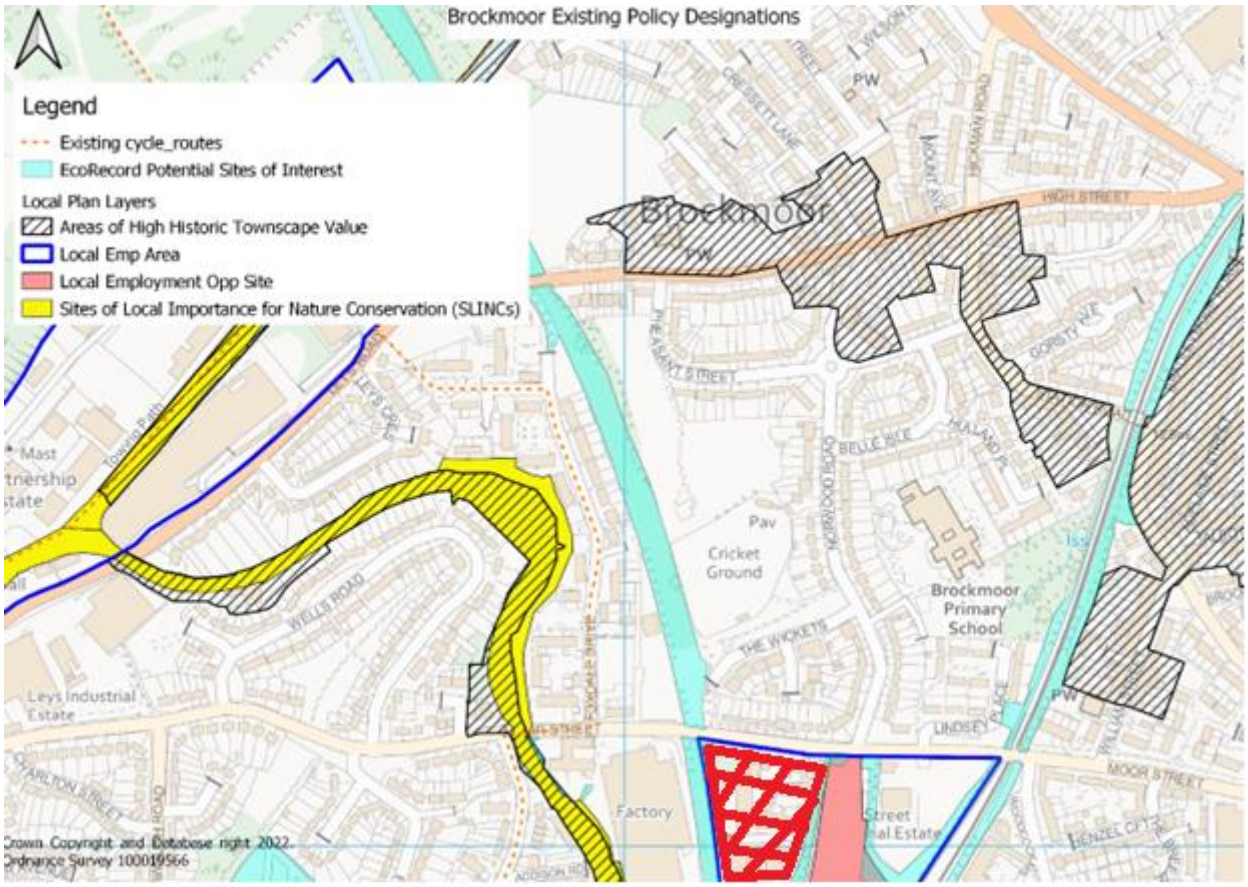

Figure 8 - Brockmoor Existing Policy Designations, Albion Works industrial estate in the red crossed area

The employment park contains 11 different Small Medium Enterprises (SME), see *Table 6* below:

Table 6 - Industrial estate SMEs

Name	Size	Activity
Cotmor	SME	Tool and Press works
Rubeza Ltd	Micro Company	Wholesale of wood, construction materials and sanitary equipment
Al Shaam Bakery	Micro Company	Manufacture of bread; manufacture of fresh pastry goods and cakes
PandP	SME	Metal tubes such as aluminium, bronze, brass and copper. Metal cutting on site
Wilson Metals	Micro Company	Wholesale of waste and scrap
At Sheds	SME	Manufacture of wood products; cork, straw and plaiting materials
AED Rollers	SME	Manufacture of steel drums and similar containers
TandW Casting	SME	Zinc die casting and plastic moulding in manufacturing
Thor Safety Ltd	SME	Manufacture of other fabricated metal products, not elsewhere classified
CVT	SME	MOT Vehicle testing

2.3 Other Buildings

The area includes 2 additional non-domestic assets and 2 significant green spaces:

- **Brockmoor Primary School** - Founded in 1887, Brockmoor Primary School is a mixed community school for children aged 3 to 11. It is a single storey, cavity wall building with a pitched roof fitted with sky lights and heated by gas central heating. The school has capacity for 498 children with 42.6% eligible for free school meals
- **Old Star Pub** - The Old Star Public House in Norwood Road is a small popular public house that is of the Victorian era, double fronted and of solid wall construction. It is heated by gas central heating
- **Norwood Cricket Ground** - A publicly owned green space, which has been out of use since 2019, but has recently been leased to a local sports team
- **Pheasant Street playing field**.

2.4 Wider neighbourhood investment

Brierley Hill town centre has been successful in a £10 million bid from the Future High Streets Fund. This will integrate a new Metro terminus, linking Brierley Hill to Wednesbury, and more widely, Wolverhampton and Birmingham. There will be refurbishments to the library and the reopening of the public toilets. Planters will be added to the High Street making it more visually appealing. Improvements to the traffic flow through the town centre to improve air quality and reduce energy consumption and congestion are included.

Brierley Hill is also receiving £1.8m of funding from, the High Streets Heritage Action Zone. This will be used to repair and reinstate architectural details to historic buildings, bring vacant floor space back into use, and enhance the Public Realm and improve green spaces.

3 Transport

Within the Dudley Local Authority, 77% of the household have at least one car[1].In terms of origins and destination, within the neighbourhood itself the Brockmoor Primary School is a main destination. In the wider area it would be the local High Street, the Merry Hill Shopping Centre as the Boroughs Strategic Centre to the west and the leisure offering to the north, including the Dell Stadium and the nature reserves. Further travel for employment could require journeys into

[1] ***Table KS404EW, 2011 Census, Car or van availability, local authorities in England and Wales, ONS Data set).*** **Data from the 2021 will be released shortly and will be used to update data forming the baseline for this study.**

Dudley, Wolverhampton, and Birmingham. Overall, the area is also a major transit point to reach the High Street and Merry Hill.

3.1 The road networks

The Norwood Road and Pheasant Street area is the network that serves the Brockmoor Primary School, which is off Belle Isle and is a 20 mile per hour zone, with speed cushions enabling cyclists to navigate across the road. Although the quality of the road could be improved, and segregated pathways could be created, slow traffic speeds create a good basis for cycling and walking.

The B4180 serves industrial traffic and is constrained width with standard width and footways. Moor St in the south of the neighbourhood is a major axis to connect into the High Street and further on to Brierley Hill Shopping Centre. An active travel network in the area could increase connectivity beyond the immediate neighbourhood.

A cycle lane could be created by widening the road onto adjacent green spaces owned by the National Highways enabling segregated cycling facilities, linking up into the Brierley Hill strategic centres and into the metro to Worcester and Birmingham.

3.2 Public transport links

The Neighbourhood is currently connected through 3 bus routes from the *transport for west midlands (TfWM)* the 226, the 250 and the 251 going to Merry Hill and Stourbridge, see *Figure 9*. Additional connection can be found on the High Street travelling into Wednesbury for Birmingham and Wolverhampton.

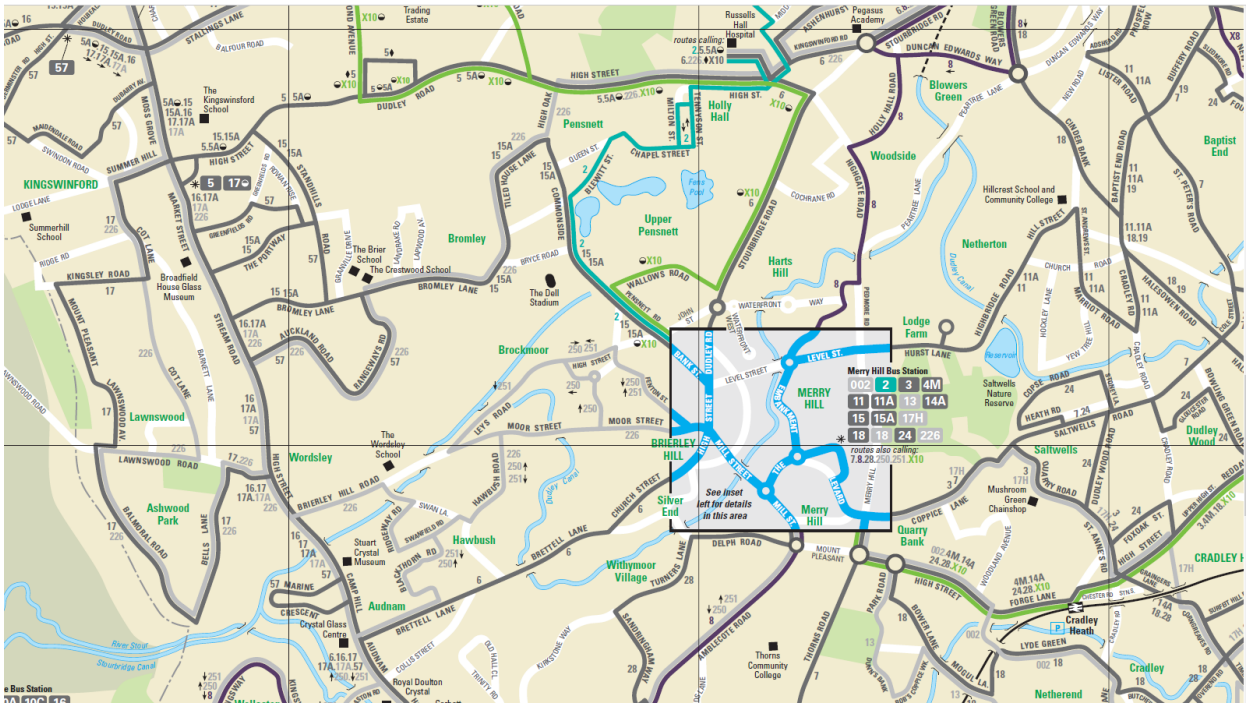

Figure 9 - Transport for West Midlands bus services in the NZN

The neighbourhood will also be benefitting from the metro coming to Brierley Hill and Merry Hill in 2024 connecting to Wolverhampton and Birmingham through light rail services, see *Figure 10*.

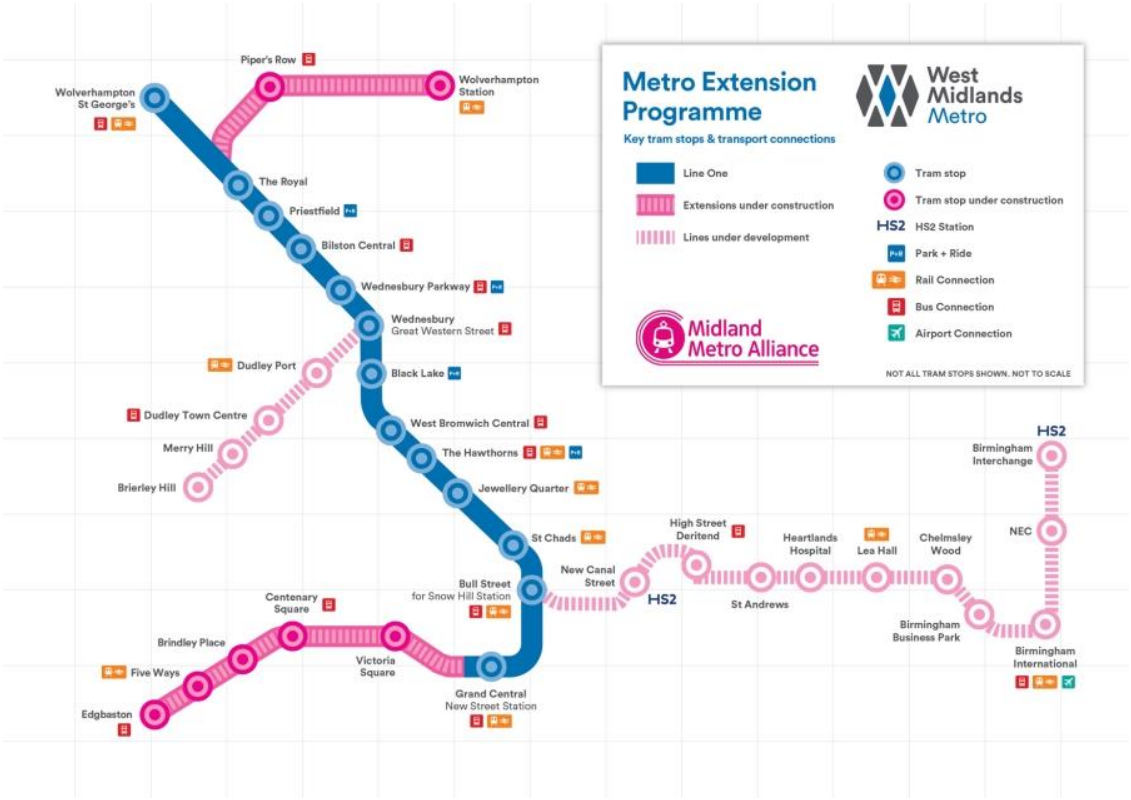

Figure 10 - Metro Extension Programme

3.3 Railway lines

To the east of the project area, adjacent to Bradleymore Road and Fenton Street is the Stourbridge Railway Line This is currently used for freight purposes and connects the Tata Steel works at Brierley Hill to Stourbridge Junction. A second railway line lies to the west of the site, this line is formally known as 'Wombourne Branch Disused Railway', which intersects the site between Foxdale Drive and the open space located off Norwood Road (this can be identified as the light green line on the map below). While the site has not been identified as a formal transport corridor, there is an opportunity to utilise this former railway line as an active travel corridor on the dismantled pathway, helping to connect the project area with nearby leisure areas (such as the Dell Stadium, Pensnett), as well as Buckpool and Fens Pool Local Nature Reserve acting as a north to south corridor connecting with the existing canal network.

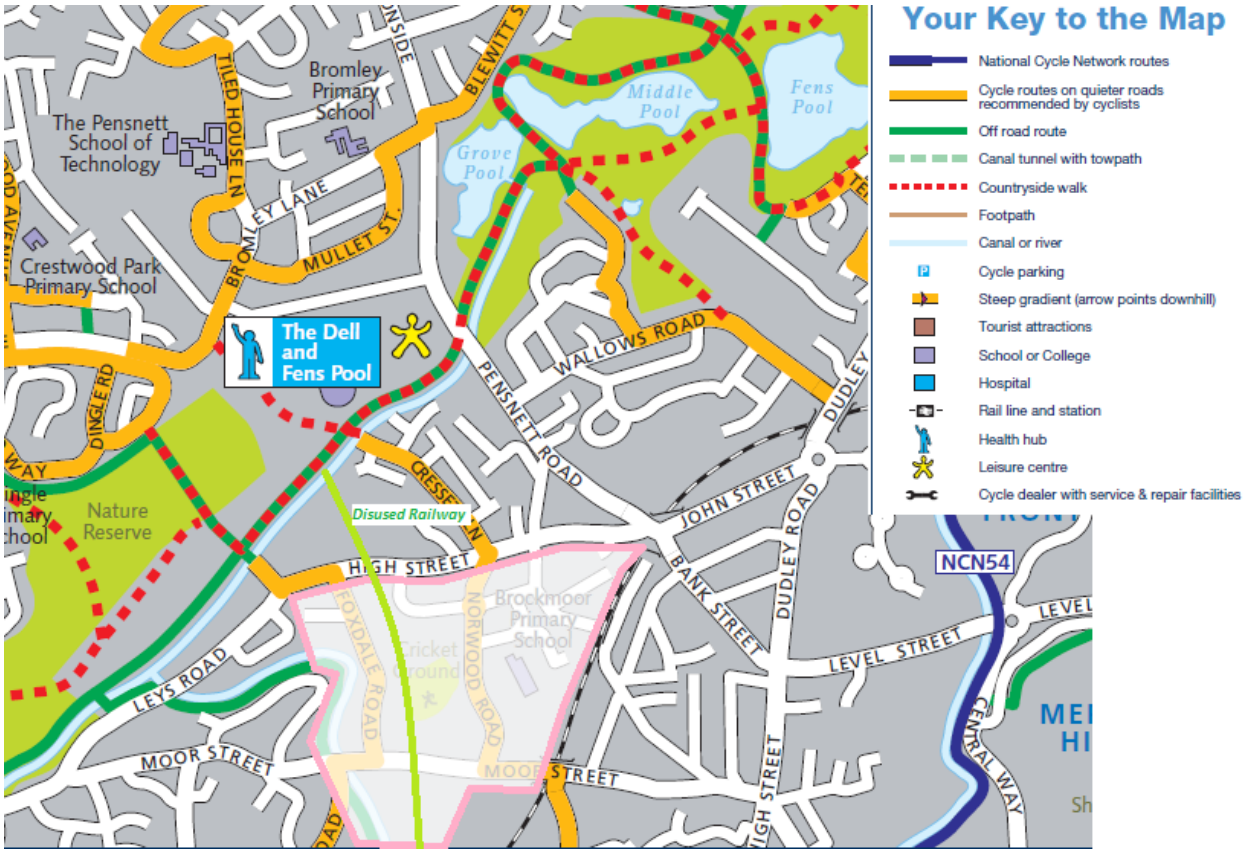

Figure 11-Cycle pathways with potential extension on disused canal

The disused railway line is owned by Network Rail. The site is currently identified an EcoRecord Potential Sites of Importance; these are sites that potentially contain areas of important semi natural habitats, but currently fall outside of the local site system. The disused line is a linear site comprising semi natural habitats, including woodland, scrub, grassland, and tall herbs and helps to provide a habitat line between key sites and the open countryside. Furthermore, adjacent to the project areas western boundary is the Stourbridge Canal, a designated Site of Local Importance to Nature Conservation, see *Figure 12*.

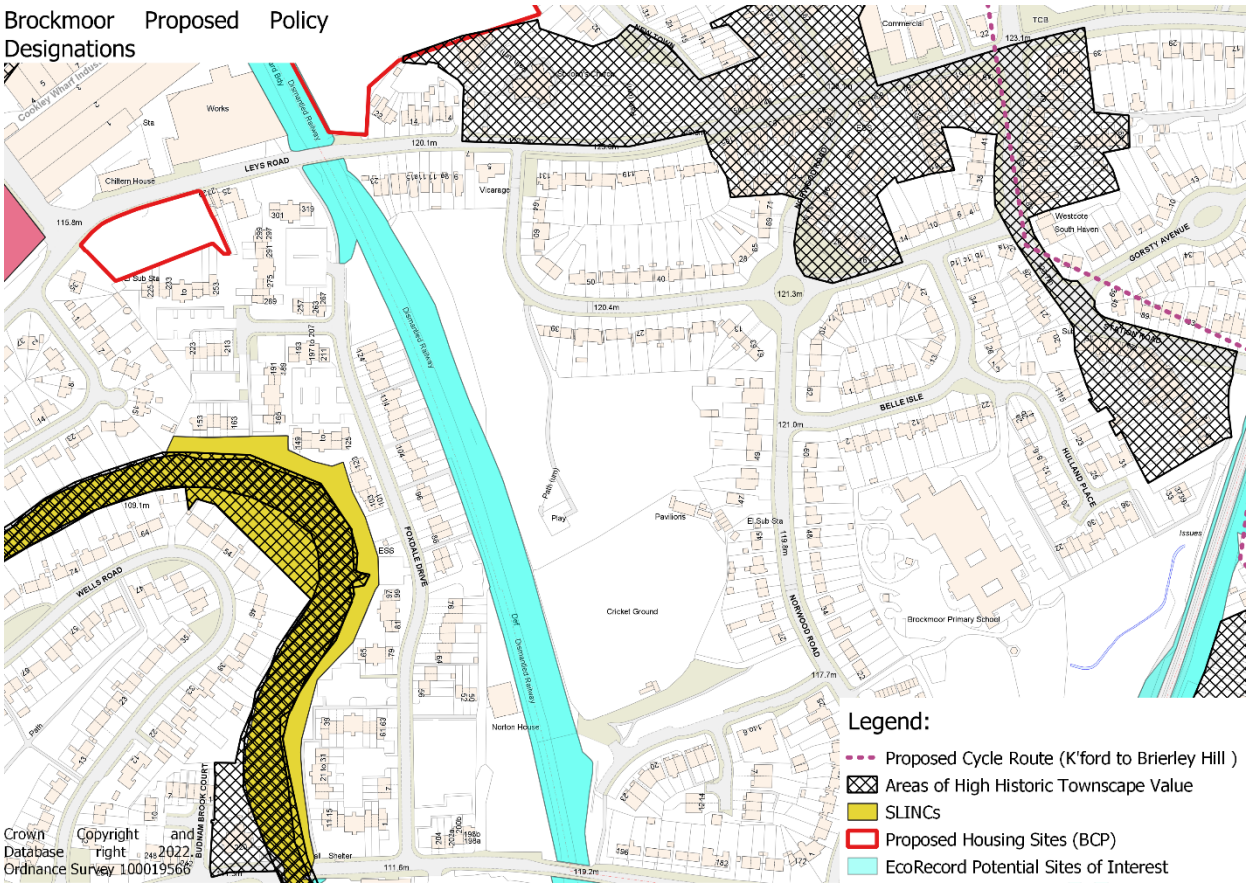

Figure 12 - Brockmoor Policy Designation

3.4 The canal

The Stourbridge extension canal to the west of the site goes to a range of destination including the leisure offering in the north. It has benefitted from investment from the Council and the Canal and River Trust (CRT), bringing its pathway up to a high standard. There is opportunity to increase the connection points improving links to the canal and interconnecting pathways with adjacent cycle routes.

4 Energy System

The local grid in the area under investigation is owned by Western Power Distribution (WPD) and services individual homes and businesses in the area.

Information is publicly available from WPD that has some details of the network assets that are connected in the area and from this information it shows that there are 4 substations that feed a total of 679 houses around the targeted area, with a total capacity of 1.43 MVA as shown in *Table 7*.

Table 7- Substation information from WPD asset data

Substation Name	Rating kVA	Total Number of customers served	Primary substation feed
92 Norwood Road	500	168	Hinksford 132 kV
Leys Road	300	149	Hinksford 132 kV
Foxdale Drive	315	160	Woodside 132 kV
45 Norwood Road	315	202	Woodside 132 kV

The information from WPD is not complete regarding their connections and cabling, so assumptions are made as to how the substations are connected and which residences they supply.

Assumptions made:

- Boundaries of areas served by each substation
- Number of properties targeted by this study that are served by each substation
- Connection types to each building
- Connection cable and protective device sizes
- Connection topography
- Geographic building locations.

Using these assumptions, it was possible to group the residences that would likely be served from each substation, see
Figure 13.

Figure 13 - Assumed substation zoning

The information from WPD highlights that the substations are utilised more heavily during the day than at night, and that they are loaded to at least 50% of capacity at this time, see *Table 8*.

Table 8 - Substation zoning

Substation Name	Rating kVA	Day Max demand kVA	Day demand utilisation	Night Max demand kVA	Day demand utilisation
92 Norwood Road	500	277	55%	167	33%
Leys Road	300	187	61%	166	53%
Foxdale Drive	315	191	72%	190	60%
45 Norwood Road	315	228	62%	115	38%

5 Community

An initial pre-project Phase of community mapping activity has been undertaken by Keele University in conjunction with the Housing Asset Management and Development team at Dudley Council. This is only an initial scoping activity and will be followed by additional community mapping work at the project start stage.

5.1 Relationships with residents

The Dudley NZN area includes 65 council owned residences, the Local Authority has good open lines of communication with residents. In addition, the Dudley Energy Advice Line (DEAL) has engaged with 61 households in the NZN area since 2019, providing:

- Behaviour advice in relation to energy consumption
- Information on energy providers (including tariff comparisons), advice on available discounts, and support applying for energy vouchers
- Advice on energy measures including insulation and heating systems.

Households saved an average of £138 through cheaper tariffs, discounts, and vouchers with around half accessing insulation, heating and other energy measures following advice from the line. DEAL will be key community gatekeepers for the Dudley NZN project, providing crucial insights into energy issues in the NZN area and facilitating engagement with community members to promote an understanding of the NZN solutions.

Anti-social behaviour (ASB) has been flagged as an issue by residents, with local authority data recording 126 ASB reports in the NZN area since 2015. Fly tipping is the most significant issue in the area, accounting for 92 of the ASB reports, with Foxdale Drive being a particular problem area with the small plots of publicly owned green space offering a potential explanation.

In the remaining residences, it is difficult to measure the current level of community engagement as no targeted engagement has been undertaken with owner occupiers or private landlords in the specific NZN area. Pre-existing engagement with these groups will only be captured where it overlaps with other community engagements in the area. Or as part of historic engagement with the residents' prior involvement in a solar thermal carbon saving initiative, installed in the mid 1990's for residential properties along Norwood Road. Any solar technology has since been removed from council owned properties. This engagement does however suggest at least some degree of energy literacy, certainly amongst residents who participated in the trial. This offers an opportunity to build on this earlier engagement in a neighbourhood wide context.

Historic engagement has also been undertaken at the Brockmoor Community Centre where events on energy advice have been facilitated for local residents across the broader Brockmoor and Pensett Local Authority ward. This makes understanding the level of engagement in the NZN area difficult but shows some understanding of energy issues locally.

5.2 Existing resident or community-based organisations and their capacity

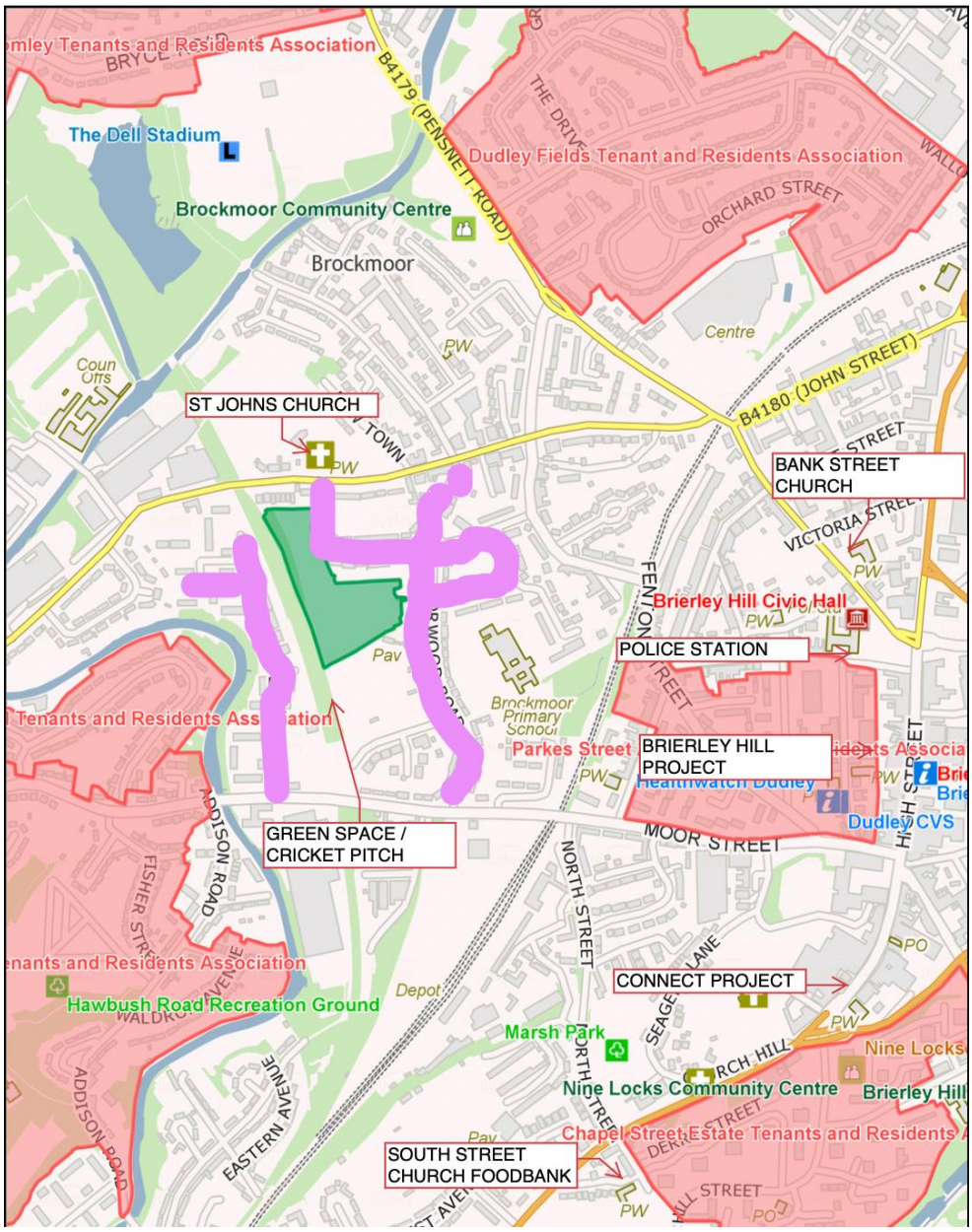

Figure 14 - Community-based organisation in and near to the Dudley NZN

There are several community-based organisations currently operating in the vicinity of the NZN area, see *Figure 14*. These include:

- The Connect Project on Brierley Hill High Street which offers a range of services to post-16 age groups and operates a café. The Connect project has no history of specific engagement in the NZN area
- The Brierley Hill Project which offers mentoring and well-being services for young people and adults. The project has no history of engagement in the NZN area, but has good community engagement, particularly amongst younger people and existing volunteering networks.

Both organisations will reach a broader community than the residences identified as part of the NZN area but are nonetheless key community gatekeepers with on-the-ground knowledge of the area.

The same is also true of the surrounding churches in the area, including St Johns, Bank Street and South Street churches. The churches cover various denominations and in addition to their

usual services, host social activities in the community, operate foodbanks and offer function spaces for events. The Brierley Hill Police Station situated on Bank Street can also provide key insights into the community, particularly in relation to any social issues in the area like ASB and fly tipping. The project can support community engagement activities aiming to improve environmental awareness and preventing anti-social behaviour.

Currently there is not a Tenants and Residents Association covering the NZN area. However, scoping activity will be undertaken with the Dudley Federation of Tenants to identify the size of their membership in the area, if any, and understand local housing issues for tenants.

5.3 Existing Community hub or other 'public buildings'

The NZN area itself has only two public use sites; Brockmoor Primary School bordering Belle Isle and Norwood Cricket Ground along Norwood Road. Whilst this is publicly owned, the land is currently leased by a local sports team. These sites can act as useful hubs for community activity and networks, providing opportunity for broader project aims of developing understanding around aspects of NZN's.

In addition to public use buildings within the NZN area, there are several community hubs in proximity of the NZN which engage with a broader set of residents than in the red line boundary. These will still act as key points of contact and community gatekeepers.

Included is the Brockmoor Community Centre which has a high level of engagement from older community members through their Darby and Joan club. As the community centre is a valuable local asset and is currently the focus for potential renovation by the Local Authority, it presents a distinct opportunity to become a key component of the Dudley NZN project. As well as being an ideal venue to host community engagement events, a potential retrofit pathway for the centre will be explored in Phase 1 of the project (see Community Engagement Plan page 70) and could act as a showcase for wider retrofit activity and promote more frequent future use through the provision of low-cost energy, heat and comfort to users.

Dudley Council has experience of improving energy demand, energy generation and monitoring through actions undertaken under its Corporate Energy Strategy 2018 – 2021 which reports:

"Significant progress has been made in other areas such as data quality. An energy management software package1 is now used to validate gas and electricity bills, monitor and target energy reduction and for carbon reporting purposes. The software has led to the identification of a number of sites which were being erroneously billed, or over-billed. A programme of 'advanced meter installations' at both corporate and housing sites is also well underway and once competed will virtually eliminate estimated bills. As advanced meters can be re-programmed remotely, there is greater potential to exploit a range of tariffs in order to realise financial savings."

This learning and introduction of new systems will be applied into planning for retrofit of community and public buildings.

5.4 Existing Community assets

Alongside key community assets in the area like the Old Star Pub as well as local churches and community centres, there are 2 main green spaces in the NZN area which can be considered community assets. These are:

- **Norwood cricket Ground** A publicly owned green space which has been out of use since 2019 but has recently been leased to a local sports team.
- **Pheasant Street playing field** (including a play area), which is the largest green space in the NZN area and borders with the cricket ground.

In addition to these spaces, small plots of publicly owned green space have been identified along Foxdale Drive by the Dudley NZN project as potential assets for reuse as “pocket parks” and community food growing projects (see Community Engagement Plan page 70), which the WMCA report ‘Levelling up through green infrastructure investment’ offers as a potential solution to the issue of fly tipping (ref) with Foxdale Drive being a hotspot for the issue. Whilst there is a nearby community garden in Hawbush Recreation Ground, the NZN project presents a significant opportunity to develop more localised community infrastructure, situating local food growing in the context of an NZN.

6 Policies

Dudley prides itself on being the historic capital of the Black Country and an important part of the industrial revolution. The creation of a Net Zero Neighbourhood will give Dudley the opportunity to demonstrate its leadership in the development of the fourth industrial revolution: Low Carbon.

Dudley is a core member of the West Midlands Combined Authority and is therefore committed to the #2041 climate change target and 5-year action plan together with the application of the principles of the Inclusive Growth Framework to decision making on investment in NZN. Dudley declared a climate emergency on 6 July 2020 and is committed to the WMCA 2041 climate emergency target and 5-year action plan.[2]

“Forging a Future for All” the Council Plan 2022-25 sets out Dudley’s strategic direction for the next three years. The plan has different meaning to different groups. The four priorities in the Council Plan 2022-25 are for Dudley to be:

- The borough of opportunity
- A safe and healthy borough
- The borough of enterprise and ambition
- The destination of choice.

Overall, the Council works to make Dudley amongst the best places in Britain to live and work and one that we can all be proud of.

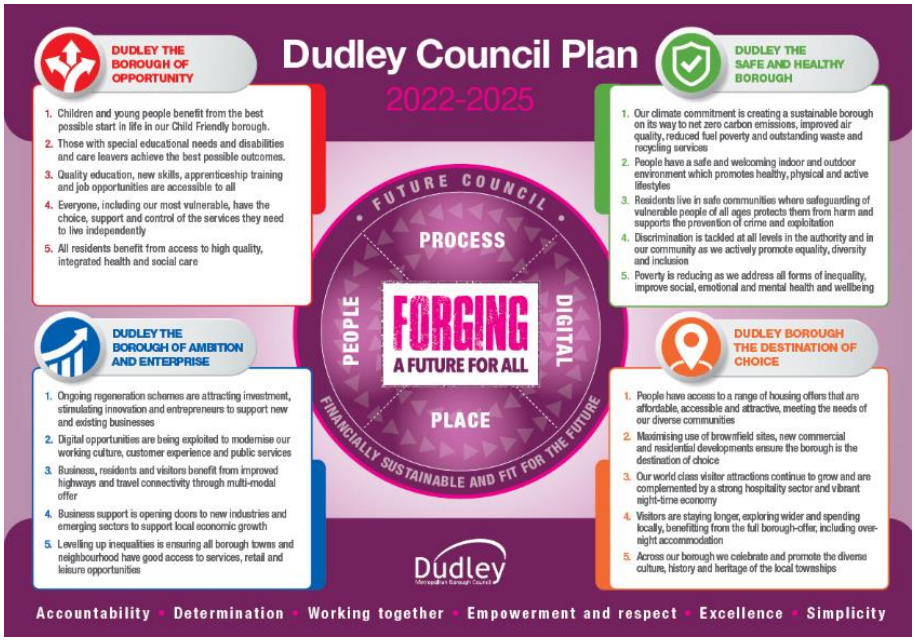

Figure 15 - Dudley Forging a future for all

[2] https://www.wmca.org.uk/media/4871/wm-net-zero-fyp-summary-tech-report.pdf

The NZN plan takes a number of these potential activities forward to realisation. These outcomes directly relate to the WMCA Inclusive Economy Agenda and the donut economics model, noting that climate change impacts disproportionately on some groups (elderly and young for example), and that minimisation of negative impacts runs alongside maximising opportunities offered by development to the low carbon economy and net zero neighbourhoods.

7 Co-benefits: Social and Economic Benefits

7.1 Job creation and local labour

Dudley, in common with the rest of the West Midlands is still struggling to emerge from the impact of the Coronavirus Pandemic, and indeed as a region is recording the slowest recovery. This is largely due to the continued significance of the production especially manufacturing sector. The Pandemic, the associated lockdown and movement restrictions, are not however the sole factor for the output deterioration. It merely intensified existing trends, notably in the aerospace and automotive sectors, as well as in the precision components sector that supply these. Aerospace performance after an almost 18-year period of robust demand growth rates globally, demand has faltered from 2019. Similarly, in the automotive sector, hit by acute shortages of microchips, is rapidly shifting to electric vehicle production, where component demand is estimated to be 30% of the equivalent demand needed for the manufacture of traditional combustion engines. Additionally, the West Midlands is perhaps the most export-orientated regional economy for manufactured goods, with many producers near the apex of global supply chains, the interruption of which has stymied output. Before the Covid pandemic, West Midlands outputs were approximately 29% of GVA.

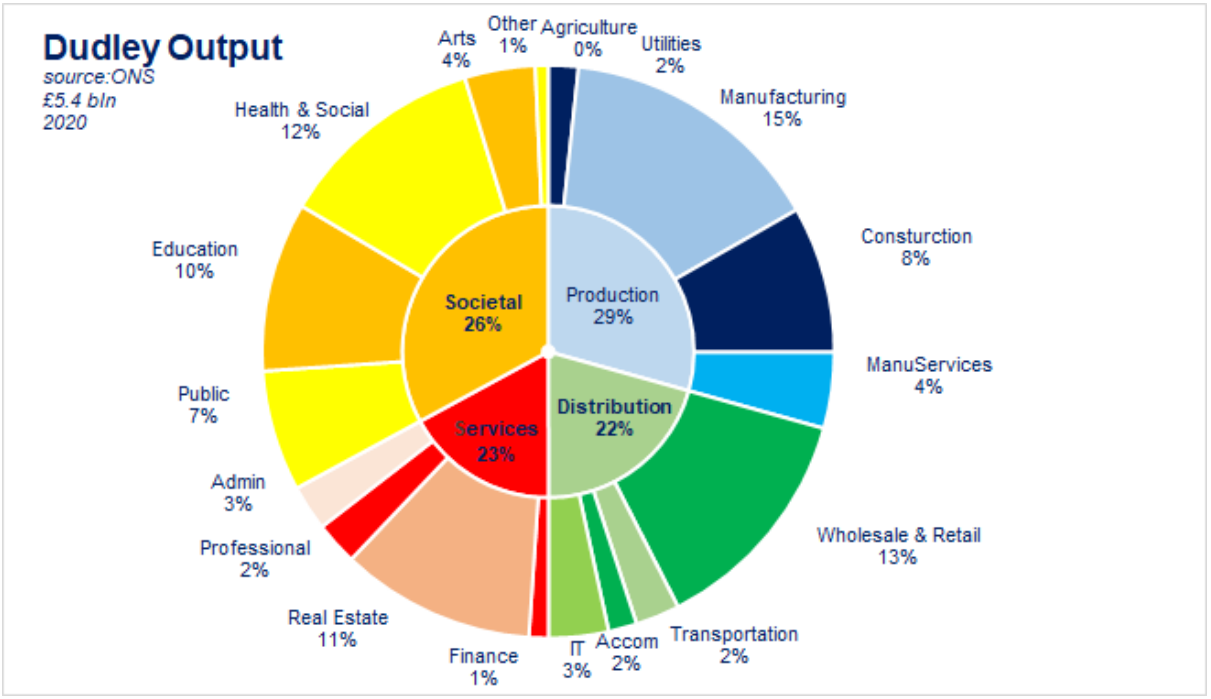

Figure 16 - Industry types in Dudley

It is however important to note, notwithstanding the impact of the Pandemic, manufacturing output nationally and in Dudley in reals terms is still approximately a third greater than it was in the 1970s and probably three times larger than in the 1950s. Despite the massive haemorrhage of labour, which was particularly profound in Dudley and the Black Country, output has continued to grow as capital replaced labour in the productive process. Moreover, the structure of the Dudley economy remains balanced and diversified, with significant interaction and interconnectedness between manufacturing and key service sector enterprises, such as in design, marketing, software and especially in integration of advanced technology and automation in the manufacturing process.

In Germany, the service sector enterprises that are wholly or partially dependent on manufacturing for business are called connected industries, see *Figure 16* they have been rather clumsily termed ManuServices. This sector is expected to be a key growth area over the next decade or so, as the economy is transformed by the long-awaited Industry 4.0 and the greater deployment of the Internet of Things. Dudley's plethora of SME businesses, with 88% of companies employing less than 10 staff and 10% between 10 and 50, tend to operate in multiple sectors exposed to best-market-practice lending itself to the adoption of such new innovative practices. Indeed, the Dudley economy lends itself to take advantage of these new opportunities. Thus, instead of being left behind, the Dudley economy is poised to be transformed.

What it lacks is adequate public sector infrastructure, not least in the housing sector, and notably in lack of access to an internationally competitive broadband.

Employment by occupation

(Jan 2021-Dec 2021)	Dudley *(numbers)*	Dudley *(%)*	West Midlands *(%)*	Great Britain *(%)*
Soc 2010 major group 1-3	68,900	45	46.2	49.7
1 Managers, directors and senior officials	14,400	9.4	9.6	10.5
2 Professional occupations	27,700	18.1	22.6	23.7
3 Associate professional & technical	26,800	17.5	14	15.3
Soc 2010 major group 4-5	38,900	25.4	19.2	19
4 Administrative & secretarial	17,800	11.6	10.2	10.2
5 Skilled trades occupations	21,200	13.8	8.9	8.8
Soc 2010 major group 6-7	20,900	13.6	16.3	16.2
6 Caring, leisure and Other Service occupations	12,700	8.3	9.7	9.2
7 Sales and customer service occs	8,200	5.3	6.6	6.9
Soc 2010 major group 8-9	24,500	16	18.3	15.1
8 Process plant & machine operatives	11,900	7.8	7.1	5.5
9 Elementary occupations	12,600	8.2	11.1	9.6

Source:NOMIS

Figure 17 - Employment by occupation across the UK and Dudley

In terms of employment, some 45% of the labour force are in professional, scientific, or managerial jobs and a further in 10% in skilled or administrative positions. However, despite this bias, there remain significant skill shortages. In part this can be seen in the educational attainment levels of the resident population, with only 35% of the population having a degree or equivalent qualification, compared to the British average of 44%. Furthermore, there is an undoubted problem with regards of job-specific skills, for instance in the HGV sector where employers are reluctant to invest in the necessary skills training only to see the successful trainee disappear to a competitor.

Dudley Employee jobs				
2020	Dudley	Dudley	West Midlands	Great Britain
	(employee jobs)	*(%)*	*(%)*	*(%)*
Total employee jobs	112,000	-	-	-
Full-time	73,000	65.2	67.8	67.9
Part-time	39,000	34.8	32.2	32.1
Employee jobs by industry				
B : Mining and quarrying	20	0	0.1	0.2
C : Manufacturing	15,000	13.4	10.9	7.9
D : Electricity, gas, steam and air conditioning supply	400	0.4	0.5	0.5
E : Water supply; sewerage, waste management and remediation activities	600	0.5	0.7	0.7
F : Construction	7,000	6.2	4.4	4.8
G : Wholesale and retail trade; repair of motor vehicles and motorcycles	22,000	19.6	16.1	14.9
H : Transportation and storage	5,000	4.5	6	5.1
I : Accommodation and food service activities	6,000	5.4	6.2	7.2
J : Information and communication	2,000	1.8	2.9	4.5
K : Financial and insurance activities	1,500	1.3	2.5	3.5
L : Real estate activities	3,000	2.7	1.6	1.8
M : Professional, scientific and technical activities	6,000	5.4	7.1	8.7
N : Administrative and support service activities	4,500	4	9.8	8.8
O : Public administration and defence; compulsory social security	4,500	4	3.9	4.6
P : Education	10,000	8.9	9.2	9
Q : Human health and social work activities	18,000	16.1	13.8	13.6
R : Arts, entertainment and recreation	2,000	1.8	1.9	2.2
S : Other service activities	2,500	2.2	2.6	1.9

Source: NOMIS

Figure 18 - Employees jobs by industry

A similar problem persists in the construction sector, where for a variety of reasons there is a shortage of skilled and practised crafts workers. Retrofit projects in addition to providing market exemplars of new building techniques and technologies, help address this problem by developing apprenticeship for the bustling sector, as being promoted by Dudley College.

Furthermore, in terms of sector employment, many workers are locked into low-skill, low-paid jobs, whereas there is demand for highly skilled technical operatives elsewhere in the economy. What is lacking are training programmes that enable people to shift to another. Such programmes are also needed to attract the economically isolated or dissuaded from seeking formal employment into the labour market. There are significant pockets of social and economic deprivation within Dudley, for instance it is calculated that 15% of all households have no-one in full-time employment.

With the increasing tendency for part of the workforce to work-from-home either wholly or partially, retrofit projects may need to consider how the housing stock can be modified to accommodate such activities. This has an obvious carbon reduction impact given the reduction in commuting.

A local retrofit/low carbon technologies supply chain has the advantage of providing new work opportunities for existing construction companies looking to diversify their services as well as offering new career opportunities for people looking to work in a new sector. As a career opportunity, retrofit/the low carbon economy have the potential to offer work for low and medium

skilled workers as well as offering opportunities to progress to very highly skilled jobs (at NVQ level 7).

7.2 Potential Social Benefits

The data used in the study pre-dates the recent deterioration of economic performance, notably the cost-of-living crisis and especially the surge in energy prices, and therefore in all likelihood the characteristics depicted here have become even more problematic. Moreover, the Covid-19 pandemic disrupted the accurate collection and collation of data.

The combined population of the two LSOA's is 3,637, of which 1,813 are male and 1,824 are females. The median age of Dudley 022D is 34.9 and in Dudley 022D 34.3, with population densities equivalent to 3,397 and 4,580 per sq. km respectively. According to the latest ONS English Deprivation Index, both LSOAs rank in the second bottom 10% of all English LSOAs, with 022B ranked 3,875 and 022D 4,150 (out of a total 32, 844 LSOAs) in 2019. As stated, both COVID-19 and the subsequent deteriorating economic conditions is anticipated to have intensified deprivation.

Dudley NZN Area: English Deprivation Ranking

Source: ONS 2019		Dudley 022B	Dudley 022D
Index of Multiple Deprivation	Rank	3,875	4,150
Index of Multiple Deprivation Decile	Rank	2	2
Income Rank	Rank	4,323	3,868
Income Decile	Rank	2	2
Employment Rank	Rank	3,176	4,855
Employment Decile	Rank	1	2
Education, Skills & Training	Rank	8,358	3,651
Education, Skills & Training Decile	Rank	3	2
Health Deprivation & Disability	Rank	2,731	6,105
Health Deprivation & Disability Decile	Rank	1	2
Crime Rank	Rank	3,530	9,767
Crime Decile	Rank	2	3
Barriers to Housing & Services	Rank	25,440	23,185
Barriers to Housing and Services Decile	Rank	8	8
Living Environment Rank	Rank	6,632	2,181
Living Environment Decile	Rank	3	1
(where 1 is most deprived)		*32,844 Englsih LSOAs*	

Figure 19 - English Deprivation Ranking

Although the Dudley NZN performs poorly (the bottom 2 or 3 deprivation deciles) or very poorly (the first decile) on barriers to housing and associated services it performs comparatively well (ranked in the eighth decile the housing stock itself is in the weaker bands). For instance, in terms of fuel poverty, by either the 2019 definition (LIHC indicator) where some 10.8% in Dudley 022B and 11.6% in Dudley 022D were in fuel poverty or by the new 2020 definition (LILEE indicator) households in fuel poverty was calculated to be equivalent to 19.9% and 18.8% of all households respectively. Thus, by either Indicator a significant proportion of the housing stock in either LSOAs was inadequate to meet energy efficiency standards.

Under the LIHC definition the calculated average household fuel poverty gap in the West Midlands was £443 according to 2018 tables and although according to the LILEE indicator the equivalent household gap was £216, shifts in global and domestic energy markets would more than suggest that the average fuel poverty gap was deepened. Moreover, with real wages and welfare benefits stagnating if not being heavily eroded, the acceleration of consumer price

inflation can be expected to have a disproportionately greater impact on households in the lower income households, where energy costs are a higher proportion of household expenditure compared to wealthier ones.

The quality of the housing stock is reflected in the evolution of median house prices. In 1995, the median house price for England was £55,000 compared to £41,628 in 022B and 39,740 in 022D. By 2021 the difference between English median house prices has widened to £140,000 and £163,000 in 022B and 022D respectively. This was a result of English median house prices quadrupling (growing 418%) over the period whereas in the study these price indicators only doubled.

Any project such as the Dudley NZN that seeks to improve local housing conditions and the wider living environment through the creation of a Net Zero Environment.

As a pilot project Dudley NZN will demonstrate the social and economic benefits that can be derived from sustainable housing retrofits. Notably by easing the financial burden, providing a healthy comfortable environment and crucially a platform to overcome the barriers that deny people effective access to the wider economy and society.

Potential Benefits of a Net Zero Neighbourhood	
Estimated Impacts	Value per person (£)
JSA: fiscal gains from workless claimant becoming employed	18,084
Tax gain from employment at £22,000 p.a.	1,900
Income support gains through improving wage rates	9,912
N.I. contribution at £22,000 p.a.	1,500
Energy Gap Reduction	213
Multiplier Impact of construction investment per £1	2.84
Multiplier impact on health improvements per £1 invested	0.42

Figure 20 - Impact Estimation of Net Zero Neighbourhood

With some 307 housing units anticipated to be included in the project, the local economic benefits could conceivably be significant if a localised (Dudley/Brierley Hill) focus of workforce recruitment is adopted. The removal of a person from un-or-under-employment (such as Zero Hours Contracts) not only has a positive impact on the individual but also fiscally, both nationally and locally.

Similar development of a net zero neighbourhood should through the simple reduction of greenhouse gas emissions produce positive health effects. Whilst the adoption, over the medium-term, should, provided there is a return to more normal energy market conditions, provide a considerable boost to household incomes.

Indeed, economically, reducing the fuel poverty gap has both direct and indirect benefits. Firstly, the very fact of reducing fuel poverty, should make available additional spending for these households, which has multiplier effects for the local economy. Simply alleviating fuel poverty offers potential household income gains currently estimated on average in the West Midlands of £213.

Furthermore, the actual improvement of energy usage and associated efficiency gains, relay in part to physical remediation of housing, with construction multipliers equivalent to 2.84 for every

£1 expended. Similarly, health gains measured crudely in potential easing of health expenditure is estimated as a multiplier of 0,42 for every £1 invested.

Secondly, any necessary physical rehabilitation of energy inefficient dwellings, such as but not exclusively housing retrofit, would stimulate employment demand again in some of the economically weaker communities, if in commissioning work bias was given toward micro- and smaller entities within the SME sector.

Finally, per Dudley Health, Wellbeing and Safety 21 document "*Effective carbon reduction actions have the potential to make a significant positive impact on the health and wellbeing of Dudley residents and on contributing to reducing inequalities on health and wellbeing. The primary shared benefits on health and wellbeing from climate actions are shown in the diagram below"* as per *Figure 21*.

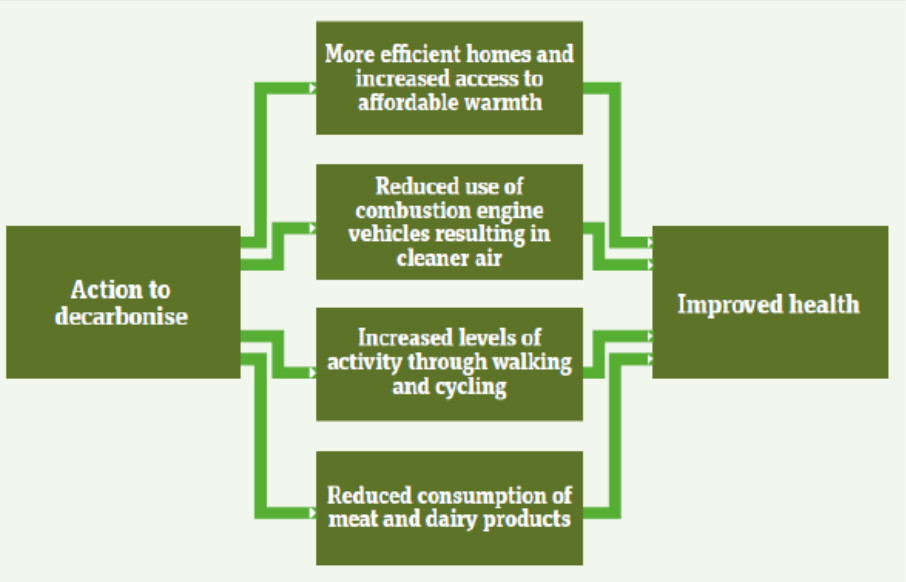

Figure 21 - Decarbonisation health benefits

At an aggregate level more efficient use of resources could not only release capacity to be made available for other sectors but reduce the incidence of non-performing payers.

7.3 Training and Skills

To deliver the substantial change needed in the UK economy by 2050, local government will play a key role in facilitating technology transitions in homes and businesses, informing constituents, supporting local businesses and the upskilling of the local workforce. Whilst the raft of national and local government net zero targets will drive demand for low-carbon goods and services over the coming years, it is crucial that there is a workforce in place to deliver the change needed by 2050.

The *LGA Green Jobs* report (2020) found that in 2018 there were 185,000 full-time workers in England's low-carbon and renewable energy economy. In 2030 across England there could be as many as *694,000 "direct jobs employed in the low-carbon and renewable energy economy, rising to over **"and**1.18 million by 2050.*

In 2018, the UK Government projected that the low-carbon economy could grow by 11% per year up to 2030, which is substantially higher than the projected growth rate for the economy as a whole (estimated at 1-2% per year), illustrating the potential for green growth as driven by international, national and local climate change targets. While the recovery from the Covid-19 (coronavirus) pandemic will lower UK economic growth, as the economy recovers, this could ignite and give rise to a greener global future, accelerating and prioritising investment in the UK's

low-carbon sector (see Dudley figures *Figure 22*). Immediate opportunities include retraining of gas fitters to provide low carbon heating engineers for installation and maintenance.

More widely across the supply chain, construction professionals require capacity building to address low carbon requirements of new projects. However, the supply chain (including skills and training providers) is clear that the market will respond without Government grant if the forward investment pipeline is confirmed. *The Scaling up Better Homes* report found that a viable business model can be created from the retrofit of 300 homes, doubling as demand and supply grows in a managed system. The NZN programme provides the opportunity for Dudley to begin this managed retrofit programme within a low carbon whole place approach. It will create new creative and technological zones, focusing on advanced manufacturing and boosting the strong manufacturing infrastructure which employs 14% of the workforce compared to a national average of 8.5%.

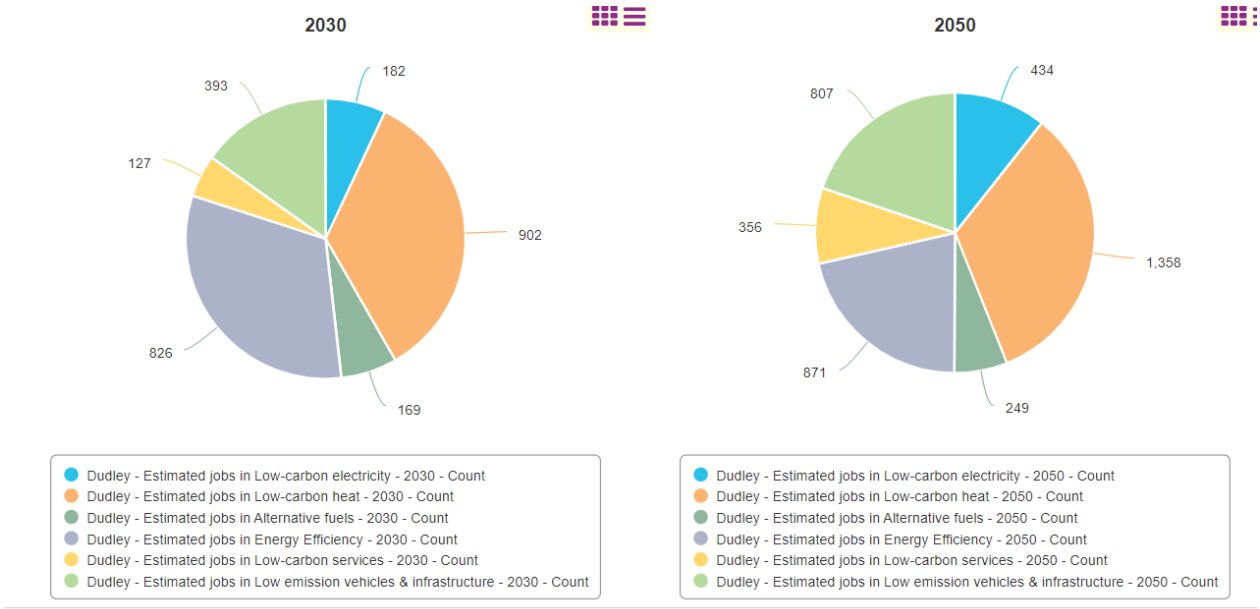

Figure 22 - Breakdown for each green sector for 2030 and 2050 in Dudley

NZN programme outcomes will include not only improved homes and mobility but models for finance, improved processes to enable the development of the building blocks for a local NZ economy including changes in the provision of energy through working with Energy Capital and a community demanding the opportunities arising from creation of a NZ Dudley.

B - NET ZERO NEIGHBOURHOOD DESIGN

The Dudley Net Zero Neighbourhood design looks at providing a system wide solution which is sustainable, low carbon, readily investable and that drives the regeneration of the neighbourhood and local energy infrastructure while offering additional services and value to the residents.
The design considers:

- The build environment – retrofit for existing housing, new build standard for adjacent new builds and commercial spaces
- Transport – active travel, EV charging and increased public transport access
- Energy system – constraint management and planning
- The community – at the heart of the design to create a NZN with the community enabling a net zero ready community.

The Dudley NZN will respond to a number of Dudley MBC polices and strategies and against WMCA, Inclusive growth and UN SDGs objectives, see *Table 9*.

Table 9 -Dudley NZN response to Dudley MBC polices and WMCA objectives

Dudley Economic Development Strategy 3 Strategic Aims	**Place**	**Business and Enterprise**	**People and Communities**
WMCA #2041 actions	• Invest in the resilience of our places • Create places and connections that help us meet the climate challenge	• Use our industrial past to create a new future • Decouple prosperity from the consumption of energy and resources	• Change our economy without leaving anyone behind
Inclusive Growth principles	• Climate resilience	• Connected Communities • Inclusive Economy	• Affordable and Safe Places • Health and Wellbeing • Equality • Power, Influence and Participation
UN SDGs mapped against #2041 5-year plan	• Make space for sustainable transport • Invest in comfortable homes and buildings		• Unite people across the region by creating common cause and addressing inequalities • Build wealth and recycle it through the region through skills and community ownership

1 The built environment

The built environment accounts for 25 %[3] of the total CO_2 emissions in the UK. Most of the emissions of the built environment are linked with the heating of building as it is primarily reliant on natural gas. The emissions link to the electrical load has decreased substantially over the past years considering the decarbonisation of the electricity sector.

As the UK pushes to decarbonise the built environment an increased focus is put onto making homes more efficiency reducing the heating need in while also the decarbonising the heat primarily through a transition to electrical heating sources but also hydrogen in areas hard to electrify.

1.1 Domestic Retrofit

[3] https://www.ukgbc.org/news/new-report-confirms-that-net-zero-is-achievable-for-the-built-environment-sector-by-2050-but-only-with-urgent-government-action/#:~:text=The%20built%20environment%20is%20directly,national%20transition%20to%20Net%20Zero.

EPC data from Parity was used to establish the housing types and key metrics of each house in the area, such as energy use, house size, wall types, and current levels of insulation.

Observed criteria	Nb of variables
House type	10
Wall type	9
Age	5

For each archetype, the percentage change from the average for each archetype was established informing that impact per measure and cost per measure for each house.

Methodology

Fabric First

A fabric-first Net Zero solution based on specific house information was created, applying specific measures — floor improvement, glazing replacements, wall insulations, roof insulations — to achieve significant reduction in heat demand from ~113kWh/m^2 to ~52kWh/m^2. These focused on wall, roof, and floor insulation, amongst others. The impacts of these measures and how these vary per house was based on learnings that from a recent Net Zero project.

Technology

Additional measures were applied to electrify and reduce further the carbon footprint of the post fabric-first heating demand based through ASHP using SHAP in house models. To support the increased electricity demand and minimise the impact on bills, PV panels were added to each house based on roof space, from a survey of the area and capping the size at 3.6kWp to remain within current regulation on generation. Finally, a modest standard battery storage of 5kW was added to each property as part of the solution, to help increase self-consumption, reduce local network constraints, and potentially gain revenue from participation in wider flexibility markets via aggregation.

Smart technology and markets

For each technology smart controls will complement the technologies while in parallel SMERTER2 metering while be enabled. Indeed, domestic flexibility could reduce peak electricity demand by up to 23% and increase revenue through SECURE, DYNAMIC and RESTORE distribution system operators (DSO) services[4].

If electric vehicle charge points (EVCP) with vehicle to grid capabilities were to be installed additional savings could be achieve in response to one-off “Turn up” and “Turn down” events and potential access to the balancing mechanism grid service.

Costs

For the retrofit products base costs from another project were used and applied to this area, adjusting them for this specific area, based on property type, age and wall type, and property size. The original cost data was from Parity information and calibrated with detailed whole house surveys on a set of individual properties. The outcome of these costs has also been reviewed with EQUANS in house Quantity Surveyors using latest costs from current retrofit projects.

Design solutions

A solution for each property was designed based on the SAP rating and the archetype. This results in the following findings:

Table 10 - Domestic retrofit solution

SAP	Average Fabric First	Average Technology	Average Improvement	Average TCO_2 saved
C	£17,761	£23,605	56%	0.71
D	£22,602	£23,832	54%	0.92
E	£25,307	£24,258	50%	1.15

[4] https://www.flexiblepower.co.uk/locations/western-power-distribution/flexibility-services

F	£21,393	£24,355	53%	1.09

Initial Phase 1 Delivery: 50 houses
The categories of properties selected for Housing Retrofit measures are as follows:

Category	Properties	Efficiency	Heating	Total
Social Housing	18	£402,588	£427,890	**£909,241**
Owner Occupied	23	£392,554	£426,390	**£740,180**
Private Rental	9	£194,131	-	**£194,131**
Total	**50**	**£989,273**	**£854,280**	**£1,843,553**

Properties for each category were selected based on a desktop analysis of measure costs and efficiency impacts, focusing on properties on Norwood Road, with a good mix of tenures.

- Social Housing measures selected for properties in the neighbourhood (Belle Isle and Norwood Road) with planned Boiler Replacements in 2023 and 2024. Insulation efficiency measures, ASHP, Solar PV and Battery Storage all to be implemented maximising carbon savings and avoiding continued spend on gas heating.
- Owner Occupied properties to receiving the same measures — insulation efficiency measures, ASHP, Solar PV and Battery Storage — in most cases, to create pilot opportunities for able-to-pay commercial relationships on an up-front or as a service. Additionally, 4 properties identified as potentially being in Fuel Poverty have been included receiving efficiency measures only, maximising the social impacts by reducing the bills only while following a no regrets fabric-first approach supporting further measures in future.
- Private Rental properties to receive efficiency measures only, maximising social impacts by reducing the bills only and opening potential commercial opportunities with landlords for heating measures in future.

1.2 New build

Dudley is part of the Black Country Consortium and shares the Black Country Garden City vision and key principles[5]. There are currently no accredited Garden City schemes in Dudley and the net zero neighbourhoods' initiative will be used to encourage developers to apply for Garden City accreditation of new housing developments, in particular, developments adjacent to the neighbourhoods' boundaries, where 3 potential new build sites have gone through planning. Wider Garden city characteristics can be supported by the NZN initiative which will provide models and mechanism to ensure that new housing is prepared for The Future Homes and Buildings Standard, a set of standards that will complement the Building Regulations to ensure new homes built from 2025 will produce 75-80% less carbon emissions than homes delivered under current regulations by developing and enabling local supply chain capacity for low carbon housing construction, local area energy generation and storage and new collaborative partnerships.

EQUANS has experience in delivering zero carbon new builds considering two forms of construction that enable traditional and modern methods of delivery in the process: Masonry, Structural Insulated Panels (SIP's). Depending on the delivery methods two options are possible:

The consortium will engage with the house builders in an attempt to share best practices around zero carbon build and integrate the new houses to align with the principles of the net zero Neighbourhood.

5 [2] https://www.blackcountrylep.co.uk/our-strategy/place/black-country-garden-city/garden-city-principles/

1.3 Commercial buildings and others

Albion works:

As for domestic properties, commercial buildings do not have a one size fits all solution. The initial step would be to review the activities, energy consumption and associated carbon of each business in the Albion works. As there are overlaps around the businesses that occupy Albion works, a road map specific for each activity set could be created instead of for each business. These roadmaps would enable these businesses to understand the journey towards decarbonisation but would also enable similar SMEs across the region to get a better understanding of the required actions. This will enable more targeted investment and better access to grant funding applications. In addition, it has the potential to increase operational efficiency and reduce operational costs for the businesses. Furthermore, EQUANS will signpost to additional business assist programme which can provide business growth/low carbon planning and delivery support.

In addition to the operational carbon, the building will need to be assessed for energy generation/storage opportunities. Given the size of the roof and its orientation there is potential for Solar PV either as a solution financed by the landlord or financed as a community energy project providing low cost and low carbon electricity for its tenant.

Brookmoor Primary School:

Schools sit at the very heart of their communities, presenting a valuable opportunity to influence positive behaviors and strengthen support for the net zero transition. Through collecting and analyzing energy and carbon data, building surveys and benchmarking current emissions, decarbonization measures and operational optimization can be identified for the specific school.

As well as improving energy efficiency and building performance, it is important to bring the pupils on the decarbonization journey alongside the building. This can be done by supporting and growing teachers' understanding of climate change and assist them by providing engagement tools to utilize with pupils and communities. In turn, this can help pupils understand what is happening to their school, as well as the part they can play in creating a cleaner, greener, more sustainable world both at home and in the school.

2 Transport

There is no single intervention that can lead to transport decarbonization, but transport measures must broadly focus on modal shift to enable the safe and efficient movement of people and goods, whilst minimizing greenhouse gas emissions and air pollution.

Vehicle emission components include those from using vehicles, such as tailpipe emissions, brake dust, tyre wear, etc. This includes emissions associated with getting fuel to the vehicle and those associated with the lifecycle of vehicles. This includes the carbon footprint of a vehicle's raw materials, manufacturing of components, assembly, maintenance, and end of life.

As well as greenhouse gas emissions and air pollution, road vehicles also contribute to noise pollution and congestion, and represent an inefficient use of energy, which will be an increasingly precious resource moving forwards.

2.1 Walking

Walking is the simplest and most environmentally friendly mode of travel. It requires no special equipment and is good for health and wellbeing. The average person walks a mile (1.6 km) in around 15-20 minutes. *Figure 23* illustrates the destinations within a 1.6km walking distance of the Dudley NZN.

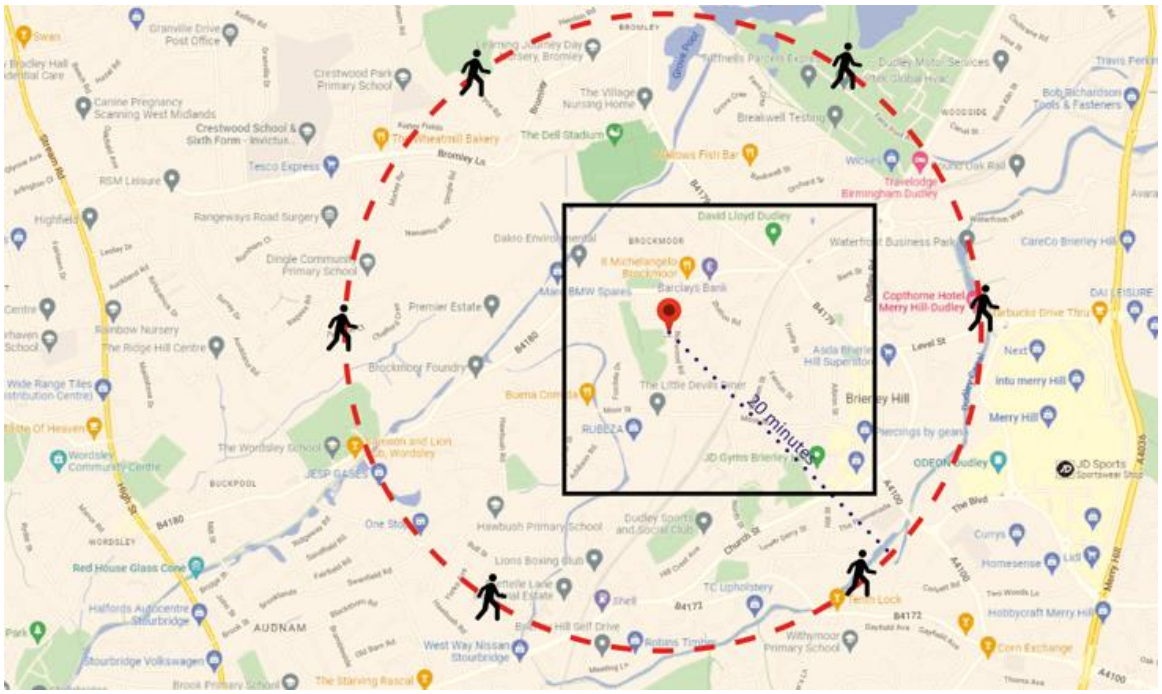

Figure 23 - 20-min walking distance from neighbourhood

Pedestrian activity has additional societal benefits. Local shops can benefit from footfall, and neighbourhoods can feel more secure with people around who might report incidents or deter crime or vandalism. Quiet streets, pedestrianized areas, parks and canal tow paths, as well as providing a pleasant walking environment, can become a place for children to play and people to meet. Improving the walking environment can help foster a sense of community.

The enjoyment of the walking experience depends heavily on environmental factors. A twenty-minute walk alongside a busy highway can feel longer and less pleasurable than one along a stimulating route with interesting architecture, landscaping, gardens, etc. Investing in improved walking environments, and ensuring they are as pleasant, safe and convenient as possible, is in the public interest. It could be argued that significantly higher proportion of the overall transport budget should be invested in this vital infrastructure.

The first step would be to ensure existing footways are functioning as intended. Transport for London has issued 'Pedestrian Comfort Guidance for London', which includes a process for determining the level of comfort on any particular section of footway, based on footway widths (which may be reduced due to street furniture or other obstructions such as people standing, or sitting) and pedestrian flows. Mitigation measures can include removing or repositioning street furniture, increasing the footway width or measures to deter footway parking. *Figure 24* shows an example, taken from Google Streetview, of cars parking on the footway along Pheasant Street, within the Dudley NZN. Clearly, such parking can be problematic for pedestrians that wish to walk side by side (such as parents with children), parents with large pushchairs (especially double-width push chairs) and mobility scooters.

Figure 24 - Two-wheeled footway parking along Pheasant Street(left) and Norwood Road (right), within the Dudley NZN

Such parking not only inconveniences pedestrians, but it is also contrary to the overall message highlighted in many policy documents that walking is the most important mode of travel.

Pedestrian priority can be established with new surface treatments, or even small detail such as corner radii. Manual for Streets discusses the impact of tightening corner radii to reduce vehicle speeds and enable pedestrians to follow the desire line (*Figure 25*).

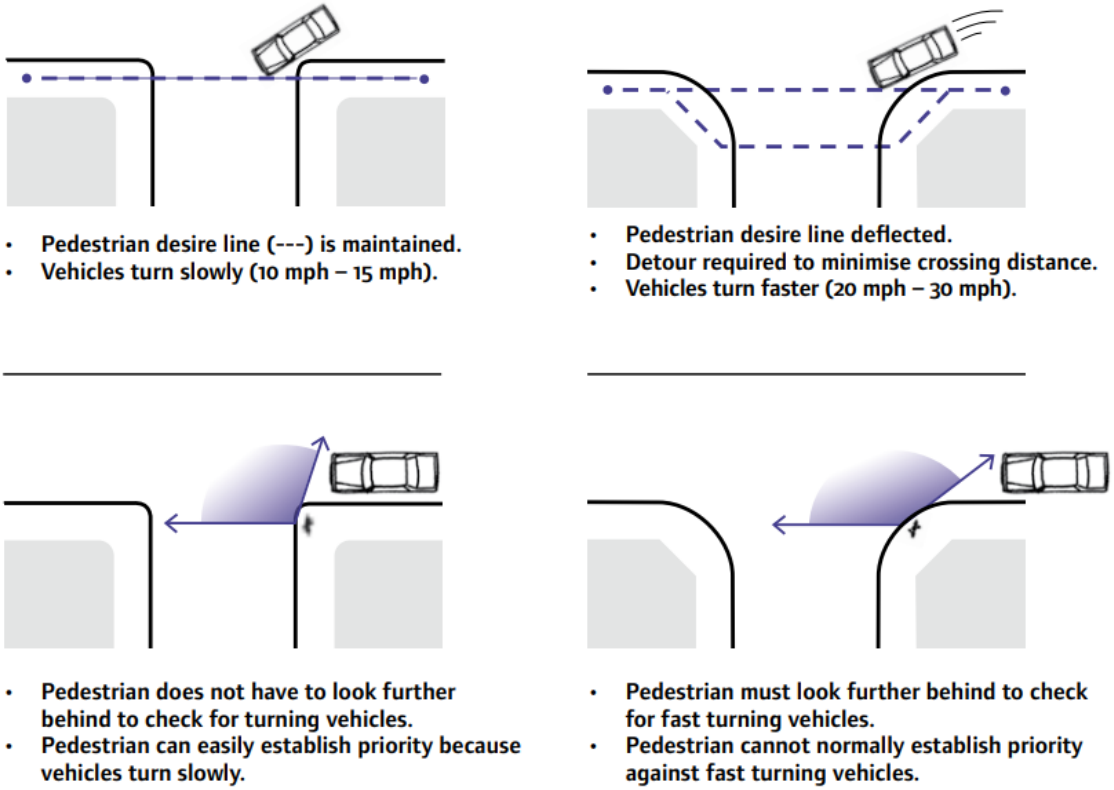

Figure 25 - Extract from Manual for Streets

Such treatments are often combined with raised crossing points, to emphasise pedestrian priority, as shown on *Figure 26* (left). Even this, which is a UK example, could go further to encourage not just walking, but also cycling and micro mobility vehicles. In the Netherlands, the equivalent junction treatment might look like on *Figure 26* (right).

Figure 26 – left: UK example of raised, uncontrolled crossing point of a side road (source: 'The Alternative Department for Transport' website), right: Example of raised, uncontrolled crossing point of a side road (source: 'The Alternative Department for Transport' website).

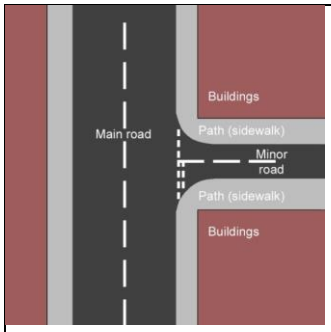	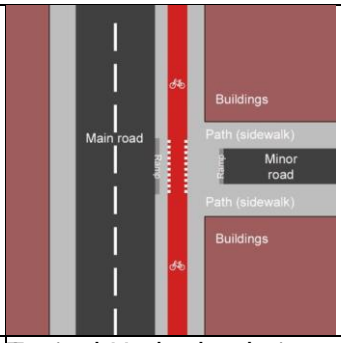
Typical UK junction – encourages pedestrians gives way to vehicles. No cycle provision.	Typical Netherlands junction – encourages vehicles to give way to pedestrians and cyclists

Figure 27 - Difference between UK and Netherlands junction treatment (source: 'The Alternative Department for Transport' website)

In *Figure 27* the above example, not only is pedestrian and cycle priority emphasised, it also sends a clear message to motorists that turn onto the side road that they are entering a lower speed area, which is of benefit to pedestrians along the road.

It should be considered that pedestrians include all types of people, toddlers on scooters and bicycles, the elderly, people with physical mobility impairments, hearing problems, the blind and partially sighted, those with cognitive impairments, joggers who are trying to beat their personal best on a running app, those with push chairs or riding mobility scooters.

Some pedestrians may benefit from benches so that they can stop to rest along the journey, whilst others may appreciate the provision clean, public toilets may encourage them to walk.

The project will investigate the main walking routes from the area and consider whether such interventions might be suitable and feasible in the local context.

2.2 Cycling

Cycling offers a convenient and fast journey option for those with access to a bicycle and suitable cycling infrastructure. It is a healthy and enjoyable mode of transport which can promote not just physical, but also mental wellbeing.

There are many different types of cyclists, all of which have different needs, and require different types of bicycles, from light-weight racing bikes to electrically assisted cargo bikes.

		
Lycra-clad	Everyday	Bike hire users
		
Personal cargo bike users	Passenger carriers	Children
		
Deliveries		

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Different types of cyclists have different needs (see **Error! Reference source not found.**). Whilst lycra-clad cyclists may prefer to cycle on road to maintain a higher speed, rather than use cycle lanes, for most other types of cyclists, cycle lanes are essential for encouraging usage. In 2020, DfT published 'Gear Change: a bold vision for cycling and walking'[6], which states:

> ***"Evidence from the UK and abroad is clear. Physically segregated bike tracks on main roads, including at junctions, are the most important thing we can do to promote cycle use. They give people the confidence to cycle and dramatically increase the numbers of people cycling."***

Cycling infrastructure can also make it easier for goods to be delivered by bicycle and further encourage the rise in electrically assisted cargo bikes.

Within the NZN, the local residential roads are generally traffic calmed with 'speed cushions' which slow road traffic whilst providing a channel for cycling. Some routes feature relatively steep gradients, which may pose a challenge for some cyclists, but there could be interventions to help facilitate the use of electrically assisted bicycles.

Proposed cycling infrastructure

Moor Street segregated cycle pathways

The consortium is proposing to explore bringing a cycling lane to Moor Street to the south of the neighbourhood which would significantly improve the access from the neighbourhood to the high-street and expand significantly the cycling network connecting potentially into the wider leisure offer, the canal route and the disused railway where the transformation into a cycle highway will be explored (*Figure 28*). To complement the offer and create a user-friendly infrastructure 5 U-loop cycle parking would be added onto the High Street as a main destination

[6] **https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904146/gear-change-a-bold-vision-for-cycling-and-walking.pdf**

for the cyclists. The total cost corresponding to these 410m plus the corresponding parking facility is estimated at £400k[7]

At the outset of the Delivery Phase, a detailed feasibility looking at impact time and costs will establish which section of the cycle lane/bridge should be built next.

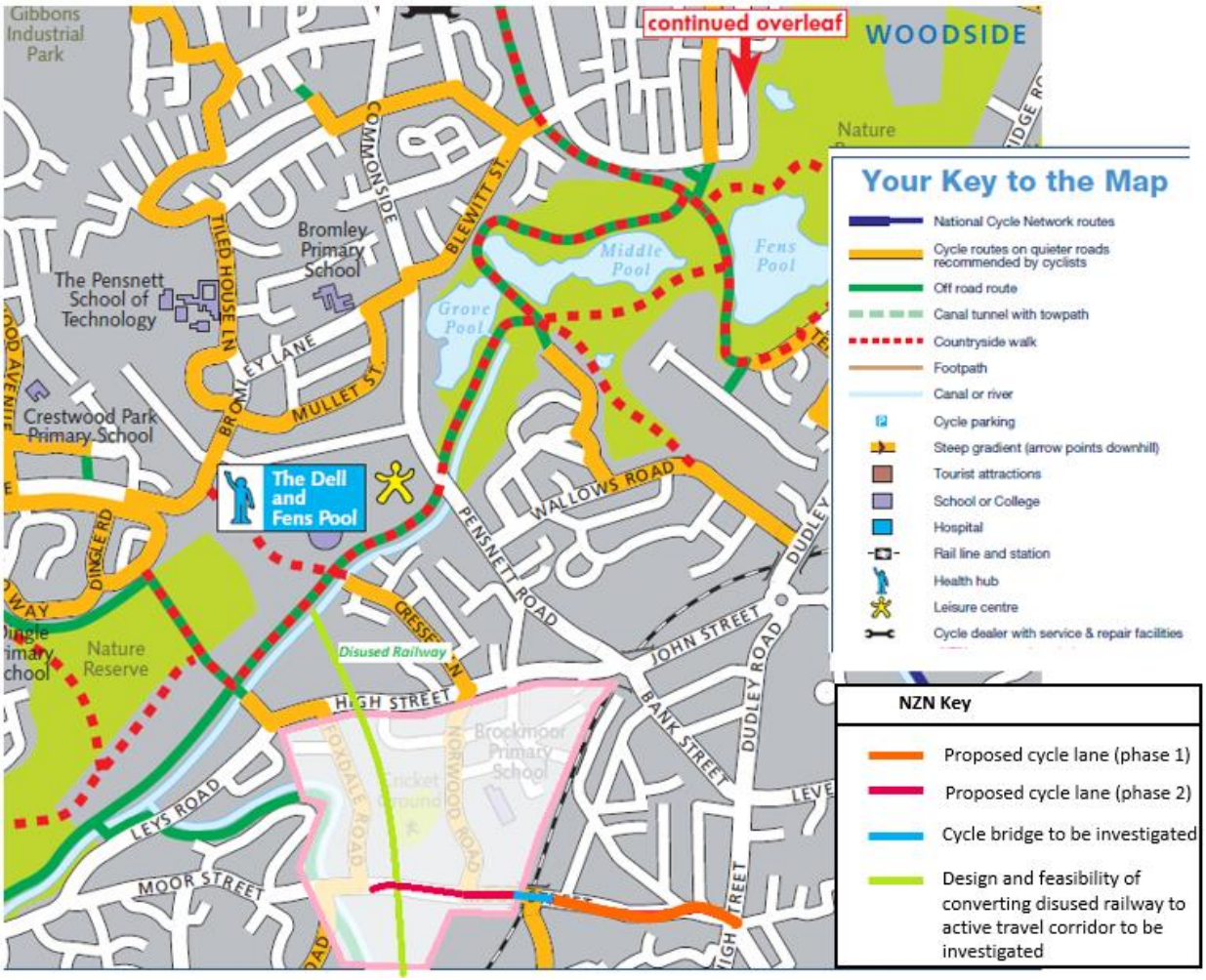


Figure 28 - Cycle network with proposed NZN addition

A New 'Active Travel' Corridor

To the east of the site, the 'Wombourne Branch Disused Railway' (*Figure 29*) provides a unique opportunity.

The project has investigated land ownership. Practical considerations and discussions with the landowner associated with creating a new active travel corridor will be needed as this could provide a pleasant and direct corridor not just for residents, but for the wider community.

[7] **Cycle City Ambition: typical costs of cycling interventions - GOV.UK (www.gov.uk)**

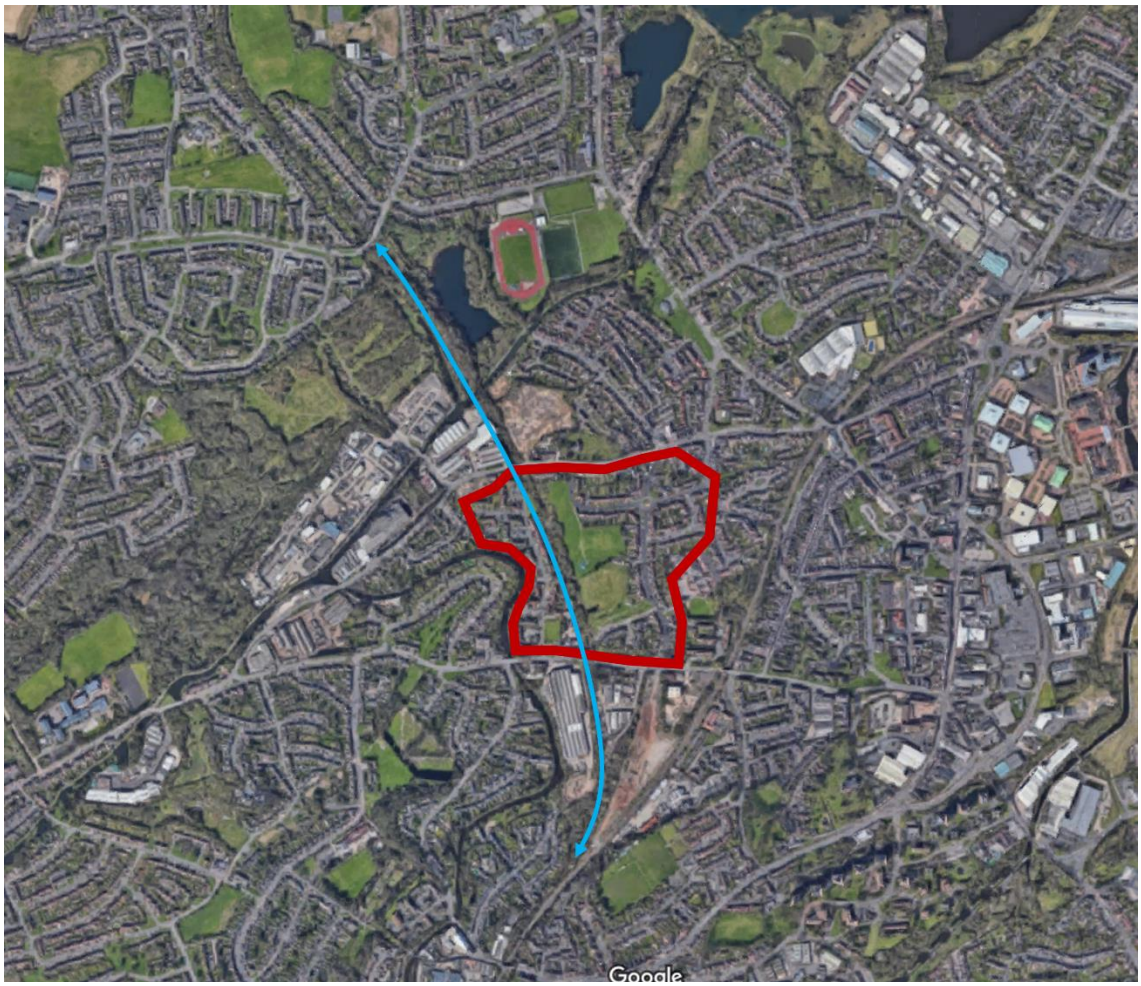


Figure 29 - Former Railway line to the west of the NZN (blue line)

2.3 Micromobility

Micromobility involves the use of electric, lightweight vehicles. Such vehicles do not necessarily need to be pedalled, thus making them easier to use for some users. Such vehicles use a tiny fraction of the energy of an electric car, both to use and to manufacture. E-scooters have become extremely popular around the world.

The ongoing DfT-led trials of e-scooters has produced a wealth of data on how to incorporate such vehicles into the local transport system, and it is possible that regulations will soon change to allow privately-owned vehicles to be used legally on public roads (although their illegal use is already common in many areas).

It is expected that more vehicle types will emerge, which might include three or four wheeled vehicles with increased stability, storage space for belongings and seats, which will make them usable to a wider proportion of society.

The infrastructure required for such vehicles is broadly similar to cycling as the two modes tend to operate at similar speeds.

2.4 Electric Vehicle Charging

The sale of new petrol or diesel cars will be outlawed from 2030, and the sale of new hybrid cars will be outlawed from 2035. To avoid creating an exclusive society where those without certain types of residential dwellings are unable to charge an electric vehicle, we must start implementing solutions for everybody to transition to this zero-emission future.

Whilst the favourable solution is to promote alternative modes of transport and reduce car dependency, it is recognised that certain journeys will continue to require use of a private car.

Within the NZN, the majority of households have the benefit of private driveways, which enables the homeowner or landlord to install electric vehicle charging points and for the resident to have exclusive use of the charging point. For the purposes of predicting the energy demands of the NZN, it is assumed that by 2030, all private driveways will have a 7kW hour charging point installed. In reality, some residents may choose not to, and some may choose to install more than one, but, as an average, this seems a reasonable assumption.

EV Car Club

Interestingly, there is a way of capitalizing on the investment of installing a private charging point and renting its use to others. This enables the owner to help recover the costs while enabling people in the Neighbourhood to purchase a car without having to install a EVCP.
For example, Just Park enables users to book a private driveway for a specified period of time, and there is now the ability to filter to those driveways with electric vehicle charging, with the app handling the financial transaction and communication.

Shared EVCPs

Local authorities or a community group could lead the creation of community charging hubs, which could provide a selection of charging points, from 7kW for those that wish to charge at low cost overnight, to 50kW or higher for those that need a quick top up.

EV parking spaces could also be provided for EV car club vehicles, which enables users access to an electric car without the cost or hassle of car ownership.

EVCP Foxdale Drive

To the north-west of the NZN, Foxdale Drive includes an area of parking with spaces allocated to individual dwellings, as shown in the photograph below. It would be challenging for any one resident to privately install a charging point, but a community initiative could install the cabinets and cabling for all of the spaces to be connected. This is known as ‘passive provision’. Each resident who wants one could then contribute to the costs of the charging post.

Figure 30 - EVCP parking opportunity for Foxdale Drive

Vehicle to Grid (V2G)

EV charging will, in the future, be a requirement rather than a luxury. But we should acknowledge how EVs could help the grid, rather than just provide an additional demand upon it. Vehicle to Grid (V2G) technologies are gaining traction, and in the future, it could be common to use the car

battery to power the home to flatten the peaks. For the user, this will result in significantly lower energy bills.[8] In the US, Ford are already marketing the F-150 on the basis that it could power the home in the event of an outage[9], which could be an attractive proposition in areas where power outages are common.

2.5 Shared Mobility Hub

"A mobility hub is a recognisable place with an offer of different and connected transport modes supplemented with enhanced facilities and information features to both attract and benefit the traveller".

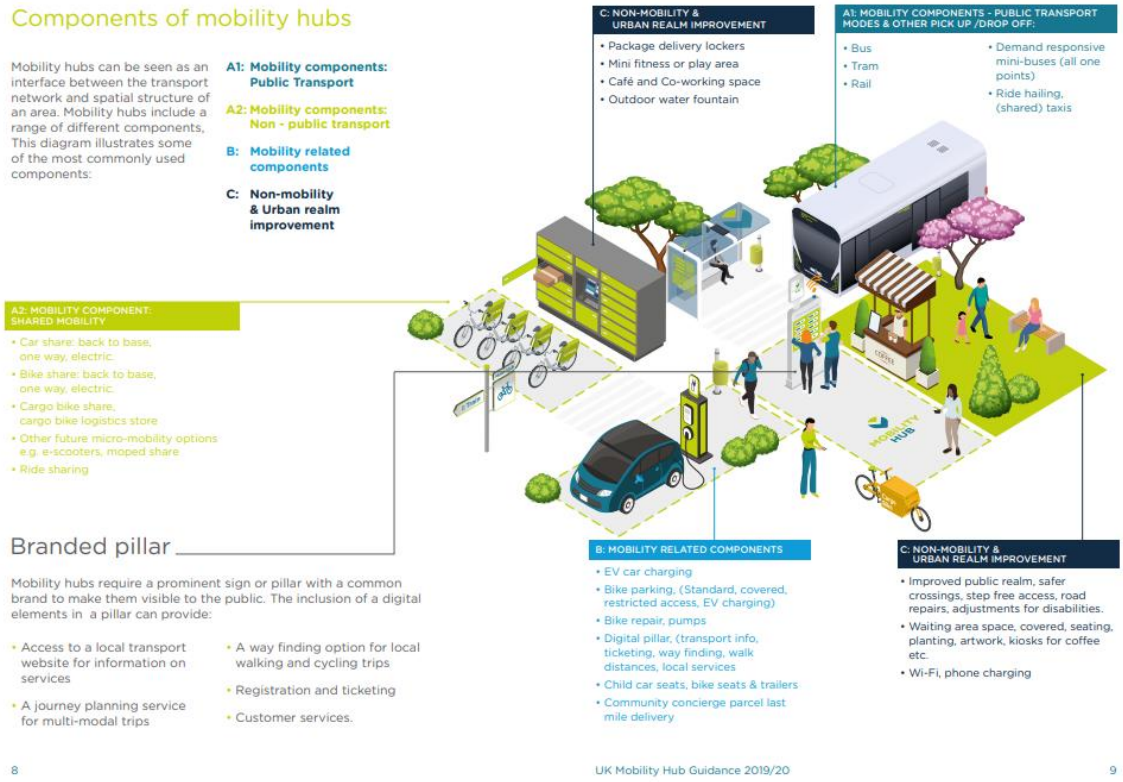


Figure 31 - Shared Mobility Hub concept. Source: CoMoUK

The idea of a shared mobility hub is promoted by CoMoUK, as illustrated with the quote, and extract above. As shown in *Figure 31* a mobility hub can facilitate a coming together of many mobility and non-mobility related components. As such, it is not a solution on its own, but can complement the provision of many of the ideas described in other sections of this report.

Such a hub could, for example, accommodate shared electrically assisted bicycles and other micro mobility vehicles, and provide electric vehicle charging points for the local community and / or parking for an electric vehicle car club. The project could look at potential sites for such a hub within the NZN.

2.6 Public transport

The neighbourhood is currently deserved by 3 bus lines and over the next two years a new metro station will appear at the High Street, just under 15 minutes by foot. Additional connections through micro mobility and other options described above will enable more people to be connected into the network.

3 Energy System

[8] **https://www.autocar.co.uk/car-news/consumer/vehicle-grid-charging-could-your-electric-car-pay-bills**

[9] **https://media.ford.com/content/fordmedia/fna/us/en/news/2022/02/02/f-150-lightning-power-play.html**

Figure 32 shows the network model constructed in DigSilent Powerfactory. To create the model, some assumptions of equipment and connections was required as set out below.

Assumptions:

- Transformers were modelled with the sizes detailed in the WPD information and zoned as per the assumed zoning
- Connections from transformers to the residences included in the trial were modelled as three Phase connections as the Phases of the connections was unknown
- Cables in the street were modelled with 325 A current carrying capacity
- Cables to dwellings were modelled with 163 A current carrying capacity
- MV cables were modelled with a 520 A current carrying capacity at 11 kV.

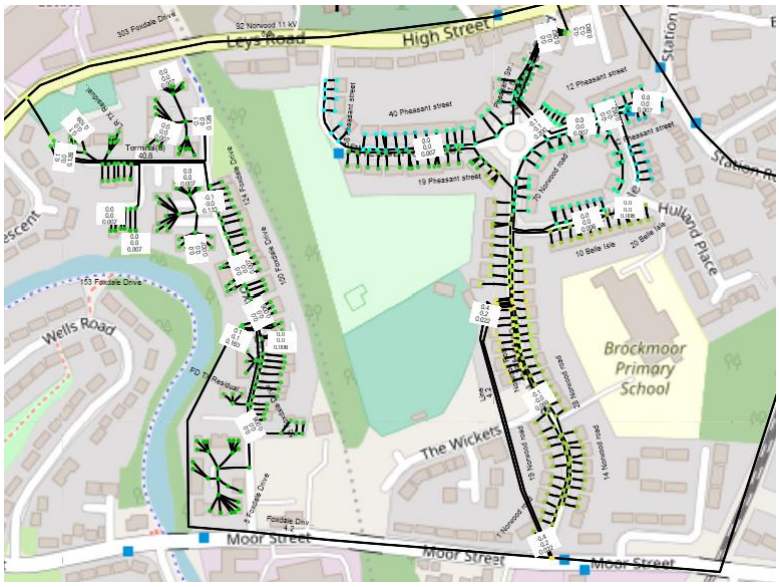


Figure 32 - Power factory model of area under review

To establish what capacity is available for use by low carbon technology, it was first required to establish the residual load on the network from those properties not involved in the study.
The existing maximum day and night loads were averaged, and that average distributed across all of the connections. This resulted in a value of 1.12 kVA per dwelling and the residual loads for each substation are shown below in *Table 11*.

Table 11 - Residual load on substations from premises not in study

Substation Name	Number of customers not in study	Residual load from houses not in study
92 Norwood Road	106	110 kW
Leys Road	106	140 kW
Foxdale Drive	93	104 kW
45 Norwood Road	68	69 kW

To establish what the existing network was capable of handling, several scenarios as shown in *Table 12* were devised that would show the varying stages of electrification towards a zero-carbon future.

Table 12 - Power system modelling scenarios

Scenario	Heat pump roll out	Heat pump diversity factor	EV roll out	EV Diversity factor
1	307 properties	1	307 properties	0.5
2	307 properties	1	14 of properties	0.5
3	307 properties	0.5	14 of properties	0.5
4	50 Properties	1	0 EV's	0

These scenarios would utilise the WPD After Diversity Maximum Demand **ADMD** calculation technique. The reason for using the ADMD calculation technique was to ensure the network was designed in line with current WPD guidance on allowable diversity factors applied to EV charging and heat pumps. This ADMD technique represents a worst-case scenario that doesn't take into account the cyclic nature of energy usage but instead uses a full load current and applies a diversity factor to that load that reduces it. This load in reality would unlikely be seen in daily operations and it does not consider any smart systems that limits potential load on the network.

The diversity factors to be used in the scenarios are from the WPD technical standard SD5A/3.[10] The item loads used for the scenarios is shown below in *Table 13*.

Table 13 - Load items and their loads

Item	Load kVA
EV Charger	7.4
Air Source Heat Pump	3,5,6 and 9 kVA depending on house size
Small power	1.1 kVA

3.1 Scenarios

Scenario 1: WPD ADMD, Heat pumps and full EV rollout

This scenario represents the one touch philosophy for the DNO with regards to upgrading the network at the site. It shows the maximum load that would be encountered on the network for the associated dwellings if they all connected a heat pump and an EV charger as set out in the scenario parameters. The loading encountered by the transformer is shown in *Table 14* and graphically by red and amber lines for overloading in *Figure 33*.

Table 14 - Scenario 1 transformer loading

Transformer name	Capacity rating kVA	Load %	Load kVA
45 Norwood Road 2-Winding Transformer	315	287.4	905
92 Norwood 2-Winding Transformer	500	177.0	885
Foxdale drive 2-Winding Transformer	315	201.4	635
Leys Road 2-Winding Transformer	300	186.9	561

[10] **https://www.westernpower.co.uk/downloads/3370**

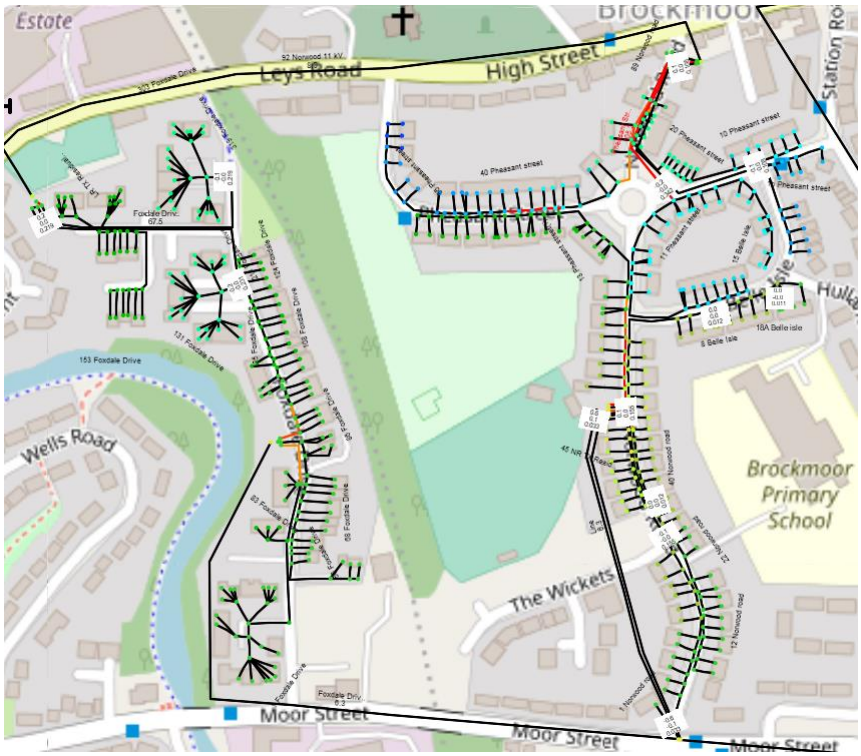


Figure 33 - Scenario 1 output from Power factory

This scenario would require all the substations to be upgraded from their current size and a large proportion of the cabling in the street would need to be overlayed with new cables or new cables installed.

Scenario 2: WPD ADMD, heat pumps 5% of properties

This scenario represents a reduction in the rollout of the EV's but still has a high penetration of heat pumps. The one touch philosophy for the DNO is no longer in place as they may be required to increase capacities again when more EV's come online. It shows an increase in loads on each transformer but less than the maximum load experienced in scenario 1. This is shown in *Table 15* and graphically by red and amber lines for overloading in *Figure 34*.

Table 15 - Scenario 2 transformer loading

Transformer name	Capacity rating kVA	Load %	Load kVA
45 Norwood Road 2-Winding Transformer	315	177.9	560
92 Norwood 2-Winding Transformer	500	114.3	572
Foxdale drive 2-Winding Transformer	315	124.6	393
Leys Road 2-Winding Transformer	300	111.3	334

Figure 34 - Scenario 2 output from Power factory

For this scenario, all the transformers would need to be upgraded or additional substations provided to account for the increased loads on the network.

Scenario 3: Heat pumps at 0.5 and 5% EV's at 0.5

This scenario represents what could be achievable when the DNO reduces their allowable diversity factors for heat pumps to 0.5, which is seen in other DNO ADMD calculation techniques. The reduced diversity factor means that the infrastructure is not as overloaded as the previous scenarios, however reinforcement would be recommended. This is shown below in *Table* 16 and *Figure* 35.

Table 16 - Scenario 3 transformer loading

Transformer name	Capacity rating kVA	Load %	Load kVA
45 Norwood Road 2-Winding Transformer	315	142.1	448
92 Norwood 2-Winding Transformer	500	96.4	482
Foxdale drive 2-Winding Transformer	315	109.3	344
Leys Road 2-Winding Transformer	300	80.1	240

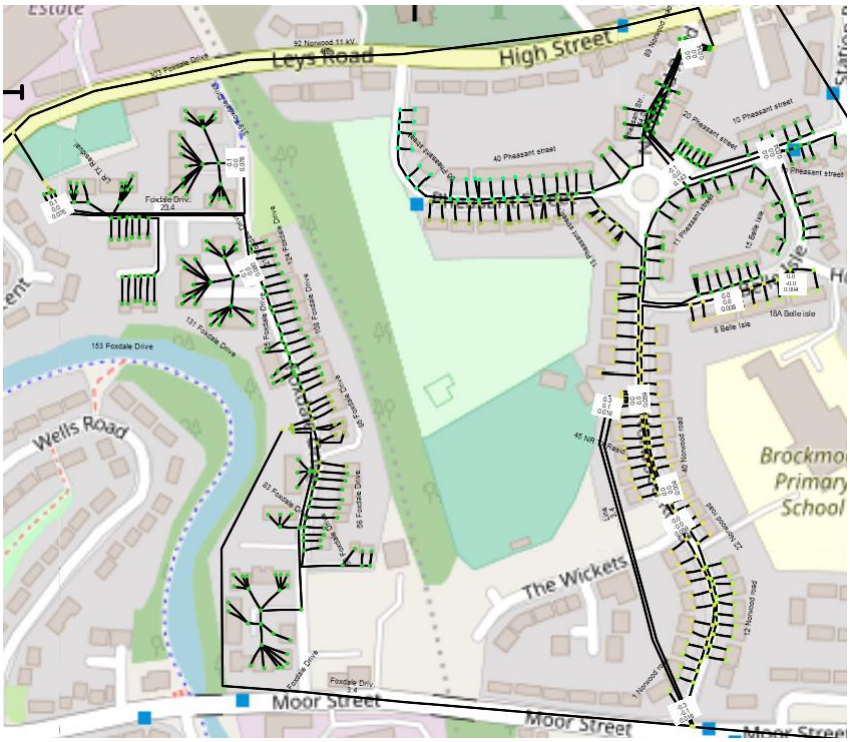


Figure 35 - Scenario 3 output from Power factory

This scenario would still require a large amount of replacement or reinforcement and doesn't account for the future when additional EV chargers could be added to the network.

Scenario 4: Roll out of 33 heat pumps at selected addresses

This scenario presents a very conservative roll out of heat pumps at the site and focusses on properties around the Norwood Road area. As shown in *Table 17* the transformer at 45 Norwood Road is overloaded and will require reinforcement, however the remaining transformers are largely unaffected.

Table 17 - Scenario 4 transformer loading

Transformer name	Capacity rating kVA	Load %	Load kVA
45 Norwood Road 2-Winding Transformer	315	118.1	372
92 Norwood 2-Winding Transformer	500	57.8	289
Foxdale drive 2-Winding Transformer	315	56.9	179
Leys Road 2-Winding Transformer	300	49.9	150

Figure 36 - Scenario 4 output from Power factory

This scenario would be expected to happen within the next 2/3 years in line with Phase 1 of the development and represents the beginning of mass roll out of low carbon technology. Even in this low uptake scenario, the existing infrastructure is shown to be insufficiently sized when using the WPD ADMD calculation techniques. In addition to the 33 ASHP it is expected that households and/or communities would start adopting EVCP in line with the findings that will be explored as part of Phase 1. Stakeholder engagement will be required at an early stage to ensure the deployment of the NZN isn't hampered by this.

3.2 Comparison of scenarios

Figure 37 below shows the percentage loading and kVA requirement of the transformers for the four scenarios discussed.

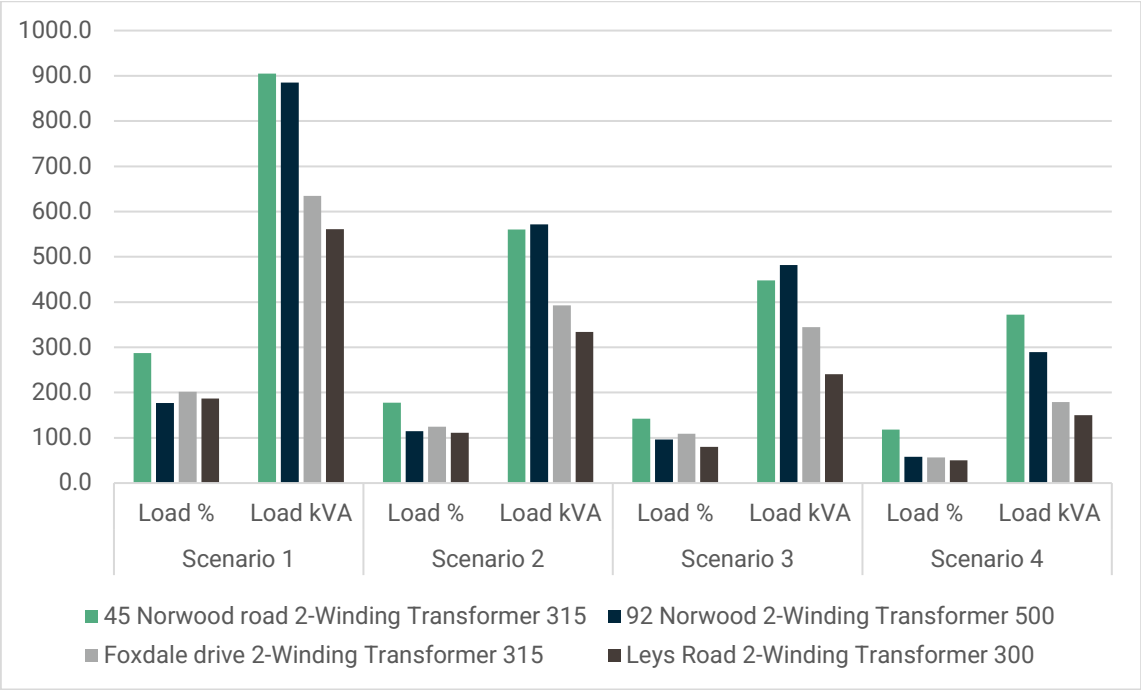


Figure 37 - Scenario loading of transformers

The smaller substations present at the site will represent challenges for the decarbonisation process and with the large roll out of electrified transport and heating systems adding large loads to the sites, these substations will require reinforcement in all but the most conservative schemes.

The current ADMD diversity factors for heat pumps are set by WPD based on the potential of cold starts after a long period of power shutdown and do not make allowance of any smart capable technologies within the equipment. While the EV charging diversity is based on natural diversity only.

The DNO's very stringent calculation method that currently does not allow any diversity to be applied to heat pumps and only a factor of 0.5 to be applied to EV charging will mean the DNO's will require larger substations for housing areas such as those under investigation and if this is completed at different Phases could end up costing more money.

If lower diversity factors were allowed in the ADMD calculation technique using smart systems that cycled the start times of heat pumps at randomised times or set the EV chargers to operate based on the current grid loading, then the required infrastructure upgrades could be reduced.

4 Community

The Dudley NZN programme is based on a 'user centric' approach where the community – residents, businesses and other key stakeholders and partners – inform, co-create and facilitate the planning and delivery of the NZN design.

The Zero Carbon Rugeley project, part funded by Innovate UK and led by EQUANS, has been leading nationally innovative approaches developed by Keele University along with the New Vic Theatre. The learnings and success factors of the 'user centric design' approach tested in Zero Carbon Rugeley will be built on for Dudley NZN. Learnings from current Dudley community engagement initiatives and other insights will ensure NZN engagement will be nationally inspirational. Key factors to consider: levels of digital inclusion, need to build trust, learning from Warmer Homes West Midlands that many don't trust 0800 numbers, learning from Warm Homes Save Lives that inability to cope is a key determinant of the impact of other issues such as the cost-of-living crisis on middle income households,

The NZN delivery will benefit from the experience of the EQUANS delivery team, the experience of Dudley in working with its residents on health and energy efficiency investment and the potential support of Warmer Homes West Midlands fuel poverty programme and the services of energy advice organisations contracted to deliver LAD 2 customer journey support.

Figure 38 - Community engagement life cycle in NZN programme

4.1 A NZN ready community

For community members to participate effectively in co-creating and informing the design of a NZN, capacity building activity will be undertaken to develop understanding around components of a NZN and their relevance to individuals' lives. This activity will include:

- A **'NZN Champions' training program** designed and delivered to residents, businesses and other key stakeholders and partners. The training will cover the key elements of a NZN including carbon/energy literacy, domestic generation and control, retrofit and energy efficiency, low carbon transport and green neighbourhood measures.
- **Community visioning** events will include capacity building "designing for real" exercises. These activities will engage residents, businesses and other key stakeholders with project partners in collaborative design workshops to explore the possibilities and limitations of, as well as the constraints on, elements of an NZN.

Curriculum relevant low carbon/net zero energy activities at the Brockmoor Community School, building on curriculum work designed and delivered for Chancel Primary School as part of ZCR.

All the above are designed to catalyse 'low carbon conversations' with residents and increase understanding and engagement with everyday low carbon behaviour and NZN design.

4.2 Community Energy

As part of the Zero Carbon Rugeley project, opportunities for community ownership of SLES assets were explored his included community ownership of renewable energy technology (SPV) for socially rented properties as well as public use buildings. In the first Phase of the Dudley NZN project, these opportunities would be explored in the NZN area, alongside developing participants understanding of community asset ownership and gauging appetite for community ownership as a NZN solution.

Keele University will lead workshop activity to generate insights from the community to inform the design and delivery of potential asset ownership. Workshop topics will include:

- Focus groups on **community ownership of rooftop solar** with local businesses, tenants and landowners of the Moor Street Industrial estate, and/or Brockmoor Primary school governors and senior leaders, and/or Brockmoor Community Centre trustees.
- Focus groups on **Community finance EV charge points** with residents, businesses, and other key stakeholders.

In Phase 2, the appetite for more ambitious projects can be explored both with the community and with project partners.

4.3 Skills gap

There are a number of skills and training opportunities including those provided by manufacturers for their installers, Local Authority and other programmes and initiatives such as the SBC training programme in Shropshire where £9,500 is available for apprenticeships. Partnerships with CITB can develop training packages for supply chain companies signed up to the scheme. Skills and training will be a key focus of the forthcoming Shared Prosperity Fund.

Replenishing the craft and skilled labour force for the construction sector is a key longer term achievable for any Retrofit project, and for the NZN Dudley proposal partnership with Dudley College of Technology offers critical opportunity through its varied apprenticeship schemes. With any successful apprentice expected to have a construction career potentially of 40 years, construction apprenticeships enable long-term transmission of retrofit/low carbon economy sector knowledge and practices. Dudley College has specialist facilities for modern construction apprenticeships, and the latest Ofsted report graded the College outstanding. With a track record of successful budget engagement, apprenticeships offered range from Level 2 up to and including post-graduate Level 7.

Dudley College Apprenticeships	Level
Building Services Design Technician	3
Building Services Engineering Craftsperson	3
Building Services Engineering Installer	2
Building Services Engineering Technician	4
Carpentry & Joinery (Architectural Joinery)	2
Carpentry & Joinery (Site Carpentry)	2
Civil Engineering Technician	3
Construction Design & Build Technician	4
Construction Plant Operative	2
Construction Quantity Surveying Technician	4
Construction Site Engineering Technician	4
Construction Site Supervisor	4
Groundworker	2
Installation/Maintenance Electrician	3
Interior Systems Installer Drylining	2
Painter & Decorator	2
Plastering	2
Plumbing & Domestic Heating	3
Roofer	2
Wall & Floor Tiler	2

Source: Dudley College of Technology

Figure 39 - Dudley Apprenticeships

Given the broad range of construction-sector related apprenticeships, and the quality of the apprenticeships delivered, Dudley College has the potential to create bespoke Retrofit training ideally suited to the Dudley economy. Therefore, in addition to the strong housing and health partnership with the Dudley colleague, the NZN will explore how to include low carbon skills offering.

C - CAPITAL INVESTMENT PLAN

The approach to maximising outcomes from the Net Zero Neighbourhood opportunity in Dudley is to make full use of clear capital sources to deliver Phase 1 measures, utilising this certainty to develop new and innovative commercial approaches to fund future projects in the neighbourhood.

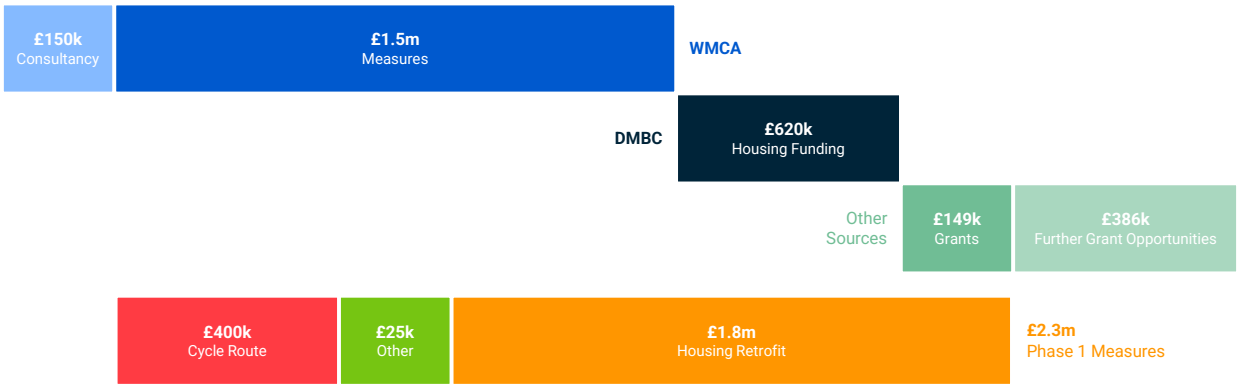


Figure 40 - Funding sources and initial spending

The delivery program is divided into two:

- **Phase 1 (2022-2025)** — corresponds to the first phase of capital funding kick-started through the £1.65m of investment from the WMCA in turn attracting additional fundings from the DMBC housing department, disability funding and the Boiler Upgrade Scheme
- **Phase 2 (2025 onwards) —** corresponds to the remaining investment and work — infrastructure and community — that needs to occur to deliver a fully net zero carbon neighbourhood.

1 Phase 1 Development

The selection of measures in Phase 1 has been developed and scaled in line with the specific funding available from WMCA, contributions from DMBC budgets and grants available for retrofit measures. The initial carbon savings linked with the built environment only is **68 $tCO_{2,eq}/yr$**. Depending on the conversion rates linked to the educational activities and the utilisation of the cycle lane that value will increase substantially.

Table 18 - Phase 1 measures and associated costs

Measures	Cost
Housing Retrofit 50 properties	£1,843,553
Cycle Route 410m of segregated cycle lane +parking	£400,000
Community Garden	£25,000
Total Requirement	**£2,268,553**

Table 19 - Phase 1 funding sources

Source	Funding
WMCA	£1,500,000
DMBC	£620,000
Other Grants Boiler Upgrade Scheme, Disability funding	£148,553
Total Funding	**£2,268,553**
Further Opportunities	£386,447

On this basis, the total capital investment in Phase 1 will be at least **1.5x** the funding provided by WMCA.

1.1 Identified funding opportunities

Further funding opportunities for the measures have been identified through the desktop exercise based on indicative property and tenure information but will be subject to detailed applications through Phase 1. Accessing these grants could increase the scope of Phase 1 or accelerate progress into Phase 2 through reallocation of budgets. These opportunities include:

- Boiler Upgrade Scheme (BEIS) funding for ASHP installations (up to £180k for Phase 1)
- LAD2 or Home Upgrade Grants (HUG) funding for low-income households to deliver energy efficiency for EPC D and below (up to £85k for Phase 1)
- ECO3 funding for low-income household based on fines applied to large energy suppliers
- SHDF for Social Housing efficiency measures (up to £270k for Phase 1)
- Disability Funding distributed by the local authority to provide a better home and more accessibility, up to £30k per property
- On-Street Residential ChargePoint Scheme guidance for local authorities, up to 7,500k per EVCP
- Electric Vehicle Home charge Scheme, up to 350 for 7kW+ home charger
- Ofgem £20.9bn package to upgrade the grids, includes £2.7bn of upfront funding to boost capacity.
- Levelling up funding for skills and training, specifics for different programs and corresponding capital and/or revenue funding is still expected
- Potential further DMBC Transport funding for Cycle Route, if incorporated into wider delivery plans.

From the currently flagged funding opportunities the following funding has been secured for the built environment.

Table 20 - Funding opportunities and distribution for the built environment

Category	WMCA	DMBC *Housing Department*	Disability Funding	Total
Social Housing	£270,478	£500,000	£60,000	**£909,241**
Owner Occupied	£758,944		£60,000	**£740,180**
Private Rental	£194,131	-		**£194,131**
Total	**£1,223,553**	**£500,000**	**£120,000**	**£1,843,553**

It should be noted that these costs and programme are based on a desktop analysis which will be followed by a property surveys and owner / occupant engagement through the consultancy element of Phase 1.

1.2 Phase 1: Consultancy and Measures Delivery

The funding for consultancy activity provided by WMCA will be utilised to provide a range of activities as can be seen in *Figure 41* in the blue box while the activities in the orange box will provide on the ground deployment. The highlight features being:

- **WP1:** Application for grant funding, assistance in procurement framework, define further business and financial case for NZN, communicate with adjacent development
- **WP2:** Establishing learning from initial as a service model
- **WP3:** Optimise and finalise the detailed programme for Phase 1 and deliver on it
- **WP4:** Feasibility for cycle lanes, opportunities for EVCP and walking
- **WP5:** Data calibration for more detailed NZN design, School net zero pathway creation
- **WP6:** Review network demand and mitigation strategy and management on constraints
- **WP7:** Community Energy exploration of different opportunities with relevant parties raising community fund and contracting delivery partner.

- Delivery of planned projects i.e. consultancy reports turning into effective delivery with an ongoing pipeline

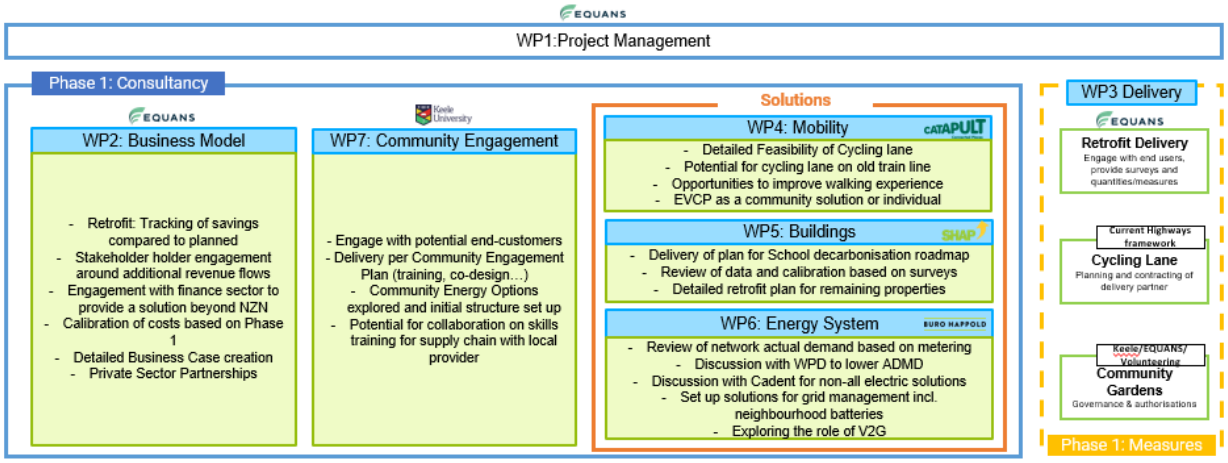


Figure 41 - Phase 1 delivery split consultancy and measures (see details APPENDIX E)

This consultancy and delivery model working hand in hand with the local authority is a key method to enable:

- a level playing field between the traditional actors who understand the complex system and terminology, and new entrants (e.g. local authorities and community organisations) who do not have as much capacity or knowledge to engage on an equal footing.
- A skills gap bridging to enable the wider local energy ecosystem to properly engage in the process
- To create tailored solutions to the locality working with the local supply chain

2 Phase 2 Commercial Approach

Category	Cost	Savings $tCO_{2,e}$ / yr.	Measures
Housing Retrofit 307 properties	£14,000,000	514	Insulation efficiency measures, ASHP, Solar PV and Battery Storage
Commercial	£200,000	*TBD depending on the baseline*	Provide fabric retrofit and technologies to transition both the school and the *Albion Works* industrial premise
Transport	£9,000,000	*TBD depending on uptake*	(1) EVCP for each house with a parkway ~80% (2) Cycle route along the Moor Street (3) Development of cycle route on disused rail track (4) Destination parking spots
Energy System	*TBD based on the level of risk WPD is willing to take*		(1) reinforcement work (2) payment for avoidance of structural work
Total Requirement	**£23,200,000+**	**514+**	

The availability of capital from WMCA and DMBC enables committed action to progress Phase 1 of the Net Zero Neighbourhood in Brockmoor Brierley Hill and creates opportunities to define commercial relationships to support future delivery in the neighbourhood and beyond.

The key challenge of sourcing external, private funding for NZN solutions is in demonstrating and providing confidence in commercial returns from measures to repay investment. With

limited project delivery (due to limited availability of capital) there are few, if any, case studies to meet due diligence requirements and enable leverage.

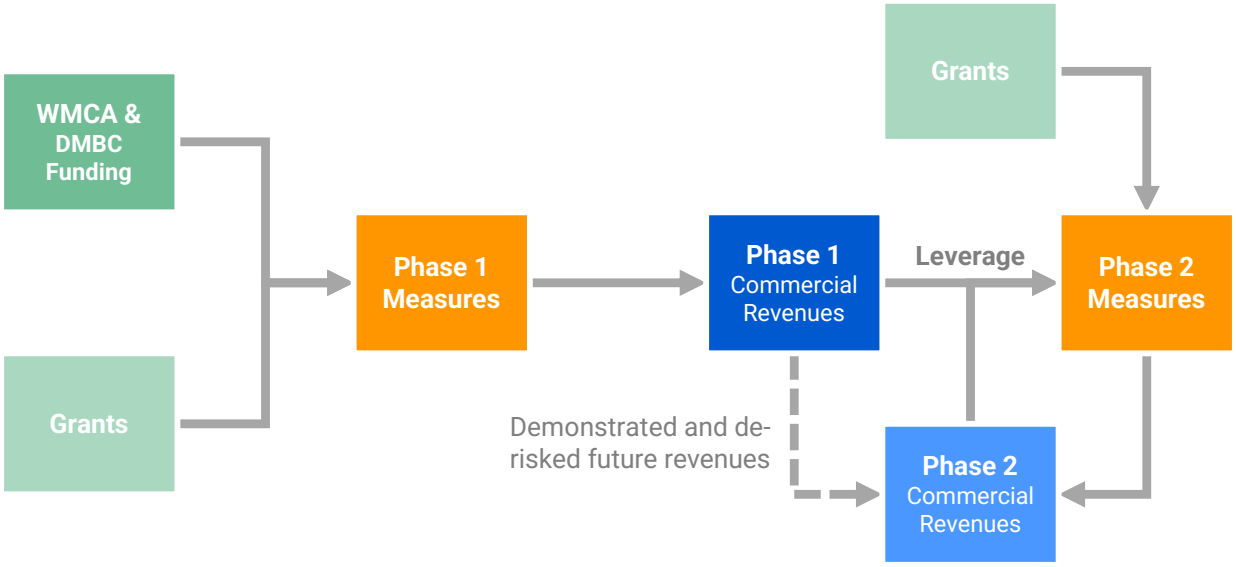


Figure 42 - Interconnection between Phase 1 and Phase 2 consultancy and delivery work

The ability to deliver the Phase 1 programme without initial recourse to private finance enables true engagement with neighbourhood stakeholders (Council, owners, landlords, residents, businesses, DNOs, etc.) to co-design fair and equitable commercial models for contribution to measures. Removing immediate commercial pressures will allow this engagement to be more transparent and should result in pilot arrangements that can be used as demonstrators for future Phases of the project, and potentially across other NZN projects (see *Figure 42*).

Key commercial opportunities to be developed are:

Opportunity	Comments
Energy bill savings	Relationship with occupants or energy suppliers to share financial benefit (est. £265k per annum for all 307 properties) from energy bill savings. Key challenges in ability to pay, avoiding debt, and changes in ownership.
Property lifecycle avoidance	Relationship with owner (potentially council or landlord) to attribute future planned spends on fabric, heating, and maintenance into low carbon efficiency measures. Key challenges in identifying budgets (particularly for homeowners), avoiding debt, and changes in ownership.
Network constraint mitigation	(1) Relationship with DNO to reallocate budgets from system upgrades to efficiency measures and non-asset based solutions, potentially on a capital or ongoing basis. Key challenges in identifying cost avoided, regulatory requirements, and equitable allocation across multiple properties. (2) Creation of data to provide confidence lower diversity factors are acceptable and won't end up breaking the system
Flexibility services	(1) Sale of services into the flexibility markets. Key challenges in implementing required technologies, and equitable allocation across multiple properties. (2) Provide basis and test bed for local market (3) System optimisation to enable more low carbon generation to connect
Social value and impact	Reallocation of local, regional and central budgets based on social improvements through reduced fuel poverty and improved comfort (e.g.

	health, welfare). Key challenges in evidencing impacts, and existing budget tensions.
Active travel	Relationship with local NHS to reallocate budget from chronical sickness treatment to active travel infrastructure
Local supply chain	Create a long-term pipeline for works around retrofit, active travel and clean technology installation to create long term demand to enable the build-up of the supply chain locally.

Phase 1 Consultancy provides the opportunity to engage and monitor pilot projects across a range of tenures to develop commercial solutions, mitigate the challenges and measure impacts.

D - PROJECT DELIVERY PLAN

The project delivery plan is composed of the three physical delivery projects in Phase 1, notably the cycling infrastructure, the community garden, and the retrofit works.

Our management team responsible for delivering this Phase 1 project is shown in the organisation structure below and has within it the core competences required to undertake the initial works and in a safe regulated methodical manner, ensuring full compliance. The consortium is composed of 5 partners:

- EQUANS — Project management, finance structure and delivery expert
- SHAP – innovators and experts in retrofit
- Keele University – Community engagement specialist
- Buro Happold – energy system planning
- Connected Places Catapult – transport planners and innovators.

1 Retrofit Delivery

1.1 Contract Management

Contract delivery management and structure

EQUANS will be delivering this scheme in partnership with DMBC as we have been doing for over 16 years. EQUANS will, where necessary, work with DMBC to engage the right specialist consultants to ensure the realisation of this exciting project for Dudley and the surrounding area.

EQUANS has built a successful relationship with DMBC delivering a range of refurbishment and design and build schemes, during which time we have developed a detailed understanding of DMBC's culture, protocols and expectations whilst adopting a community-oriented approach, helping to improve the life chances of the local community, raise levels of aspiration and develop a sense of purpose, belonging and empowerment.

EQUANS has experience of working in Dudley and in particular on our existing retrofit scheme where EQUANS installed EWI, PV and storage heaters. EQUANS brought in a team of retrofit architects and designers, assessors and coordinators, all of whom are PAS 2030 accredited and have successfully delivered 300 properties. EQUANS's success can be demonstrated by our nomination in the Inside Housing Awards.

EQUANS want to build on this relationship to ensure our growth with DMBC further supports local employment, complemented further by a wider regional resource. The core principles and beliefs are already embedded within the teams which will aid a smooth transition towards the expectations of the contract, its stakeholders and ultimately the DMBC NZN vision.

The EQUANS management team based in Dudley is led operationally by John Boyle and commercially by Chris Walford both based in Dudley. John and Chris have a combined service of 50 years within the housing refurbishment sector and has more recently managed a LAD2 funded programme worth circa £2m in partnership with DMBC.

Key team members appointed to this contract are illustrated in the table below:

Table 21 - Key team members for Retrofit Delivery

Name	Primary Role	Relevant Expertise and Experience
Paul Bingham	Project Director	Primary role: Paul will have ultimate responsibility for the successful mobilisation and delivery of this scheme. Expertise: CMI Level-7 Award in Strategic Management and Leadership, Member Chartered Institute of Purchasing and

		Supply, Chartered Member of CIOB, BSC (Hons), Building and Production Management, CSCS Managers Card Experience – 3 years relationship with DMBC: Paul is a proven and adaptable leader, with the capability to manage large, diverse teams and complex projects including planned maintenance, capital improvement works, responsive, voids, cyclical and major works.
John Boyle	Contracts Manager	Primary role: John will be DMBC's key point of contact with primary responsibility for linking the services and delivering to your expectations. He will have responsibility for all works from conception to completion, supporting our site managers and supervisors. Expertise: NVQ Level-7 Construction Management, Diploma in Site Management, Certificate in Management Studies, CSCS, SMSTS, First-Aid, Scaffold Safety Inspection, Asbestos Awareness, Sharps Training, Gas Safety Awareness. Experience – 15 years' relationship with DMBC: John's key skills are in managing social housing asset management contracts, low and high rise external and internal refurbishment schemes, responsive maintenance, voids, cyclical and roofing contracts and the recent LAD2 Funding programme.
Mark Bate	Site Manager	Primary role: Our Site Manager's primary function will be overseeing and supporting all aspects of our activities onsite, alongside our Site Supervisor and RLO. Expertise: NVQ Level 2 Bricklaying, SMSTS, UKATA, CAT Scan, First Aid qualified, CSCS Black Manager's Card, PASMA, Working at Height Qualified, Abrasive Wheels Trained, TWC, NEBOSH, Scaffold Awareness, Ringlok Appreciation and Inspection, Control of Gas. Experience – 3 years' with DMBC: Mark, who lives in Dudley, has been working on the DMBC contract for the past 3 years and has gained extensive experience on a variety of different schemes, including external and internal refurbishment, high-rise and voids schemes and will provide invaluable knowledge in managing their respective workstreams.
Christopher Walford	Senior Quantity Surveyor	Primary role: Chris will act as commercial lead, managing all aspects of commercial and contractual performance and supported by our team of Quantity Surveyors based at Dudley operation. Expertise: Member of the institute of Directors, Institute of leadership and management level-5, IOSH Managing Safety, CSCS, Construction skills training. Experience - 3 years' with DMBC: Since Joining EQUANS in 2019 Chris has been heavily involved in the Dudley Contract. Chris will continue to oversee the capture of commercial data on our shared platforms, accurately manage and forecast costs against programme, ensuring our financial operations are aligned to the project and achieve your value for money objectives. He also has recent experience with the LAD2 Funding programme.

Scott Postin	Quantity Surveyor	Primary role: Scott will act as commercial lead, managing all aspects of commercial and contractual performance and supported by our team of Quantity Surveyors based at Dudley operation. Expertise: HNC in Construction and the Built Environment, NVQ Level 2 Painting and Decorating, CSCS Card, Experience - 7 years' with DMBC: Since Joining EQUANS Scott has been heavily involved in the Dudley Contract. Scott will continue to oversee the capture of commercial data on our shared platforms, accurately manage and forecast costs against programme, ensuring our financial operations are aligned to the project and achieve your value for money objectives. He also has recent experience with the LAD2 Funding programme
Jackie Frost	Resident Liaison Officer (RLO)	Primary role: Providing daily and ongoing support for customers to ensure a first-class customer experience throughout the works. Expertise: NVQ Level-3 Customer Care, CSCS, First Aid and Mental Health First Aid Qualified, Safe-Guarding, Diversity and Inclusion Trained, GDPR Trained, Asbestos Awareness, Code of Conduct ambassador. Experience - 10 years' with DMBC: Jackie is conscientious, reliable, and hardworking and fully understands the importance of relationships and communications. Her professionalism is regularly praised from clients as being the filter of the compliments and complaints register and the priorities, she puts to any resolutions in her service to them.
Alice Greenaway-Mintoft	Site Administrator	Primary role: Providing daily and support for customers and colleagues, Alice ensures a first-class customer experience by providing and obtaining the right information when required. She also monitors all documentation including drawings and inputs the drawing revisions onto our web-based system. Expertise: BA Business (Hons) with Placement, CSCS Card Experience: Alice, who was recruited after a Kickstart placement, lives in Dudley. She has proven herself to be reliable, hardworking and fully understands the importance of relationships and communication. Alice's professionalism and efficiency skills receives regular praise from her colleagues.

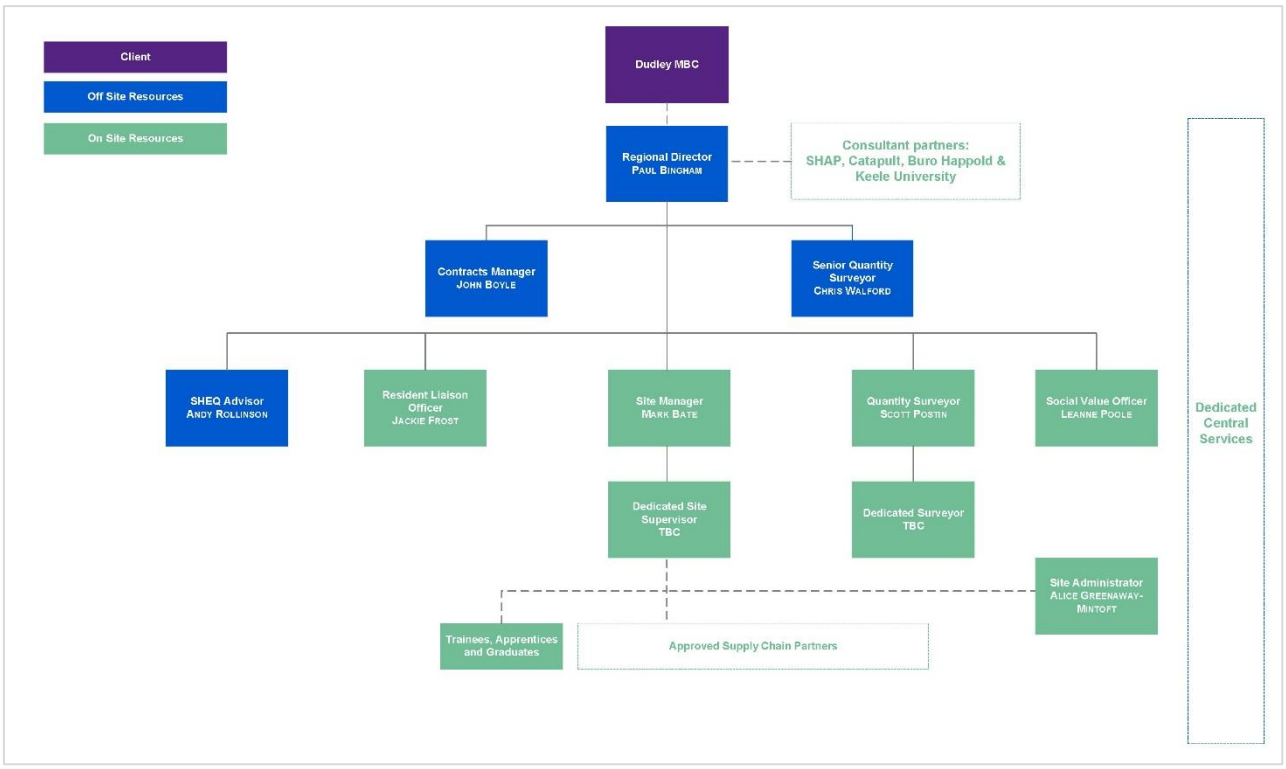


Figure 43 - EQUANS delivery management structure

1.2 Programme management

Our proposed management team (*Figure 43*) has the knowledge, excellent leadership skills and a wealth of experience in delivering an efficient and accessible customer-focused programme delivery to Dudley.

Programme summary

Please find attached as Appendix D our outline construction programme showing the following key milestones:

- Purchase Order for Mobilisation Costs received from the Client
- Resident induction letters delivered
- Surveys commenced
- Completion of design and specification
- Target cost agreed with DMBC
- Works commence on site.

Local supply chain

EQUANS is currently working with Dudley on a similar scheme, where all the main subcontractors are based in Dudley:

- Scaffold – LandS Scaffold
- Plumbing and heating – Versa and BEI
- Windows and doors – Excel
- Roofing – Roofstyle.

EQUANS is determined to continue using local suppliers and workforce. Should EQUANS be successful, a team of locally based general operatives will be responsible for the enabling works package providing employment today while enabling a longer-term view of works upcoming through the NZN.

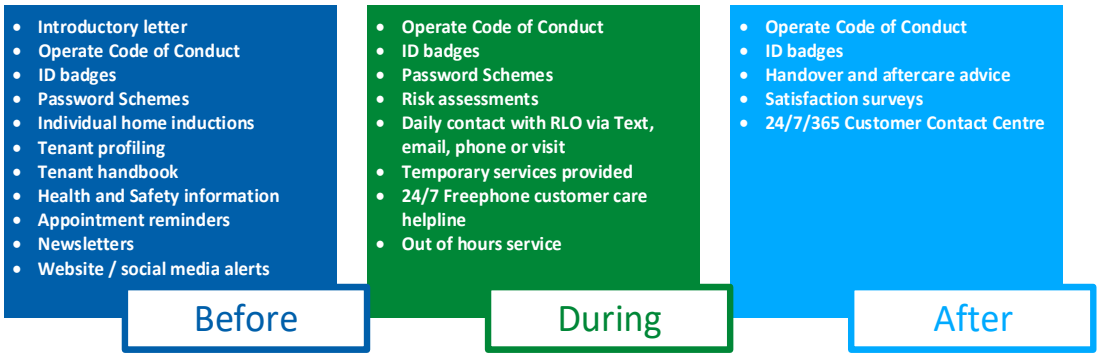
Resident Liaison

Through EQUANS experience of working in occupied homes a robust liaison procedure to ensure customers are supported and informed throughout their journey with us.

Our dedicated project RLO Jackie Frost will organise consultation events for residents and the local community and provide comprehensive face to face / digital communication (resident preference / Covid-19 dependent) to support residents throughout the works, enabling them to access all facets of our service. Our RLOs are the link to our Delivery Team, following up any actions or enquiries made from residents.

Dedicated RLO, Jackie Frost is a Trusted Assessor and Dementia Friendly advisor.

The diagram below details the key elements of our liaison service and how we keep residents informed before, during and after the works.



Through the existing contracts with DMBC Jackie is fully conversant with DMBC's customer liaison protocols and expectations. It is Jackie's primary role to ensure all communication is timely, clear, precise, and relevant and to ensure residents receive an incomparable service. Jackie will also complete resident profiling and will support vulnerable residents and or those who require help with moving items such as garden furniture, precious plants, reposition of satellite dishes and aerials., clearing loft space, etc.

Jackie will also organise demonstrations of all new heating systems, ensuring the residents have a clear understanding of the benefits of the new measures, including the **Switchee smart thermostat system while provide metering data as well**, which we believe DMBC intend installing in advance of the works commencing and will save residents money on their energy bills.

All compliments/complaints will be recorded and reviewed by the Project Management Team to ensure closure of actions are within KPI timescales, and best practice is shared with the team.

While past schemes have shown to be successful, it is important to introduce the new service and set expectations. We will launch the new scheme by:

- Producing joint introductory letters, welcoming customers to the new service
- Holding meet the contractor events, introducing the EQUANS team and Keele University
- Hosing consultation events including coffee mornings and open surgeries
- Arranging a series of customer events across the Dudley area.

EQUANS will continue to employ a dedicated team to engage and communicate with customers to ensure excellent customer service.

- Customer services manager and customer liaison officers – responsible for consulting customers and the proposed works and keeping them informed throughout, hosting resident engagement days inviting feedback, acting as customers first point of contact throughout the customer journey
- Delivery team – delivering front line services in accordance with our code of conduct
- Social value team – delivering training, employment and health and wellbeing initiatives.

Initial surveying

To ensure all associated works and access arrangements are identified prior to works commencing EQUANS will conduct a pre-works survey. The pre-works survey will be conducted within one-visit to minimise disruption and to ascertain the full scope of works to each property, including:

- Arranging asbestos surveys; ensure information is available and communicated to operatives
- Identifying and sorting party-wall agreements with adjoining property owners well in advance
- Access arrangements including working from height and temporary works requirements
- Identifying and managing satellite dishes and aerials, we will have our on-call aerial technician to minimise disruption to satellite service
- Ecology surveys to prevent bats and birds' nests being discovered during the works
- Photographs
- EQUANS will also note any other items that may need moving/protecting during the works such as out-houses, car ports/porches, hanging baskets, flowers, bushes, and trees. EQUANS will assist residents if heavy items of garden furniture need re-locating during the works.

Waste management and environmental impacts

EQUANS places great importance on waste management and environmental impact. OurFuture Plan is a strategy framework to support our commitment to manage and operate places and spaces that create a lasting environmental and social strategy. There are three key themes:

Figure 44 - Our Future Plan

EQUANS site manager, Chris Smith will have day to day responsibility for managing the works onsite, ensuring our operatives have received the appropriate training and adhere to the agreed Safety, Health, Environmental and Quality (SHEQ) standards.

EQUANS will deliver the contract in line with ISO 14001:2015 accredited EQUANS Management System and DMBC's environmental objectives to address the climate emergency.

In 2020 EQUANS was awarded the prestigious Carbon Trust Triple Standard for Carbon, Waste and Water, which only includes organisation that have successfully reduced the environmental impact of their operations and supply chain across all three areas, which reaffirms our commitment to shaping the future of responsible business.

Monitoring our environmental impact

EQUANS dedicated carbon and waste management portal AIMS (Audit and Incident Management System) ensures data from across our operations is captured, this will include tracking all waste movement produced on-site. During the mobilisation Phase of this scheme, contracts manager, John Boyle and SHEQ Advisor, Andy Rollinson, will complete a Contract Specific Environmental Aspects and Impacts Assessment which will mean all onsite activities have appropriate control measures in place to mitigate any environmental risks associated with the works.

Quality

EQUANs commitment to delivering exceptional quality, on-time, to budget and defect-free is evidenced by our ISO 9001, 45001 and 14001, accredited Business Management System, The EQUANS Way, which supports our culture of right first time. All retrofit works will be PAS 2030/2035/2038 compliant.

Through the EQUANS Way we will manage the project providing:

- Dedicated, experienced and knowledgeable team
- Project Quality Plan approved by DMBC
- Comprehensive Construction Phase Health and Safety Plan (CPHSP)
- Fully considered programme allowing for contingencies and priority response times
- Transparent cost and risk management solution
- Pre-approved supply chain, from the Dudley area where possible
- Robust site management team with key focus on health, safety and quality
- Defined progress reporting protocols
- Customer focussed approach to handover and aftercare.

Delivering a high level of workmanship

EQUANS will monitor and manage the work as it progresses to ensure 'right first time', with any issues identified and rectified. EQUANS will provide residents with our response times and details of how to contact our call centre and RLO on a freephone number, should any issues arise. EQUANS call centre will then notify our engineers and local staff and record the status and progress.

PQP and CPHSP are live documents and detail our Inspection and Testing Schedule for the project, including:

- Internal SHEQ Audit
- Material checking regime
- Work in progress inspections
- Inspection and testing
- Pre-handover joint inspections
- Joint Inspection.

Cost Control

EQUANS Senior Quantity Surveyor will utilise our project cost control system Evision to provide DMBC with a detailed breakdown of costs against programme, ensuring budget and cost certainty for DMBC.

Document management and retention

All documents are uploaded to Castleton Maintain Integration Systems and stored for a minimum of 6 years including Governing Bodies registrations, Accreditations and Certifications. EQUANS are aware of the need for our records and reports to link with DMBC's asset management software, KEYSTONE, and our administration systems are all Microsoft Excel based allowing for their efficient passage.

Data collection via the smart web-control system (Switchee) will allow managers and users access to dashboard metrics, reports and enquiries formatted to DMBC's wishes.

Figure 45 - Switchee data view

Handover and aftercare

Our handover process will involve a series of tasks to ensure a smooth transition to ensure the commission of the new system is fully operable, installed to the required standards and operation explained to the resident. Handover will also include:

- Notification period that work has been completed
- Handover Pack including inspections, certification and information
- Training to repairs teams on the systems installed
- 24/7 freephone customer care support line to report defects
- Agreed timescales for defects to be resolved
- Continued commitment from site management and subcontractors
- Post project review.

Our approach has delivered 99.8% customer satisfaction with DMBC.

Social value in the Dudley area

EQUANS aim on all schemes, is to enable positive change and measurable outputs for our customers, stakeholders and communities. During the past 16 years EQUANS has fully integrated ourselves within the DMBC community by working closely with residents, businesses, schools, service providers and community groups. On this scheme EQUANS will review the number of opportunities based on the contract spend and shifting local priorities.

EQUANS social value officer, Leanne Poole, will be the programme lead, having already mobilised other DMBC contracts locally. Leanne has experience in the employment and skills fields and amongst others is a STEM ambassador, CITB Construction Ambassador and Enterprise Advisor through the Careers and Enterprise Company to local schools including Pedmore High, Crestwood, Ellowes and Leasowes. Employment opportunities will be targeted at DMBC residents and their families.

Whilst working in the DMBC area the consortium has existing relationships with the Black Country LEP, Dudley College and Nova Training. We will also target hard to reach groups through open collaboration with Black Country Impact, EDAC and the Care Leavers Covenant delivery arm Spectra First. We will ensure all Care Leavers applying for roles are guaranteed interviews and feedback as part of our signatory pledge.

We have established relationships with Dudley College construction division and The Black Country Careers Hubs to form links with local schools and ensure all are aware of pathways and available opportunities.

1.3 EQUANS' experience in delivering similar projects

EQUANS have had great success in developing and delivering energy efficiency schemes across the Midlands and nationally over the last 15 years. Under the ECO obligation, EQUANS successfully delivered over £120m of ECO, CERT and CESP funded measures for both social landlord and private homeowners. EQUANS has also secured £15m of Social Housing Decarbonisation Fund (SHDF) and have a dedicated in-house Sustainability Team who oversee all PAS 2030:2019 delivery compliance with directly employed PAS 2035 verified Retrofit Coordinators and Assessors, guaranteeing design and risk pathway success on funded domestic retrofit schemes.

EQUANS have formed great partnerships with our customers and local communities to offer a flexible and innovative service. EQUANS are specialists at working in occupied properties and our teams are extensively trained in customer care. EQUANS approach to service delivery focuses on minimising disruption to our customers. EQUANS have an approved list of locally based subcontractors who work to our strict ISO 9001 quality standards and have a proven record of delivering high quality work, on time, in a safe manner and with high levels of customer satisfaction.

EQUANS have also gained extensive experience of delivering non-housing schemes including:

- Heritage works including condition surveys and producing repair specifications
- Specialist repairs and maintenance to historical buildings including liaison with English Heritage and conservation planners
- Public open spaces and landscaping
- Town Halls
- Libraries
- Community buildings and schools
- Sports facilities
- Performing arts
- Bus stations
- Demolition of public buildings for redevelopment.

For more detailed information, please find case studies of our experience in Appendix A

2 Cycling infrastructure

As outlined above the cycling infrastructure will be delivered by a third party, the consortium will assist DMBC to contract a party within a current highways framework or will assist in sourcing a new local provider boosting the supply chain where possible. The detailed techno-economics behind the initial scheme will be delivered by Connect places Catapult at the outset of Phase 1. To ensure delivery according to the plan the consortium will project manage the third party across its activities alongside the Local Authority.

As the delivery partner has yet to be selected the specific delivery program for the £400k worth of infrastructure work will be built up at the beginning of the program.

3 The Community Garden

The community garden delivery will be led by Keele University that will work hand in hand with the local stakeholders and residents to deliver upon the ambition to create a green space with a sense of ownership and repurposing poorly used green space.

The delivery will look to use the local supply chain and skills set while providing an opportunity for skills development through the community garden program – e.g. gardening/landscaping apprentice. The boots on the ground will also be assisted by local and corporate volunteers that are present in the area.

E -COMMUNITY ENGAGEMENT PLAN

1 Objectives

The Community Engagement plan for Dudley NZN has several objectives. These are not discrete Phases and different objectives may be achieved through a single engagement approach or activity whereas others will be achieved more broadly over the course of the project. The key objectives of the project are:

1. To raise awareness and understanding of the NZN project and its goals (including the breadth of the elements of a NZN and the project), and generate positive interest and develop positive relationships between project and the community
2. To generate insights from the Brockmoor and Brierley Hill community to inform the design of different elements of the NZN
3. To increase understanding of the components of the NZN, and the implications of a NZN to themselves, as well as to wider society and the environment, including low carbon behaviour change
4. To test with different community audiences and sub-groups, NZN component designs, leading to co-design development.

In addition to the key objectives, further desirable outcomes emerging from the community engagement process and activities with the Brockmoor and Brierley Hill community include:

i. Catalysing activity in the community beyond the scope of the project, such as enhancing networks, running independent events, development of community 'NZN champions'
ii. Enhancing a 'user' (or community) focussed approach to energy systems design throughout the project team beyond the scope of the project
iii. Contributing to the academic research community around transdisciplinary and user-centred design processes and user insights in relation to NZN and their components
iv. Contributing to future policy and practice of user-centred design in NZN.

2 Approach to community engagement before, during, and after the project

While there is a place for traditional methods of community engagement in the Dudley NZN project, the community engagement approach from the start will be rooted in **participatory methods**. Many traditional methods such as focus groups can be critiqued in terms of creating hierarchical power relationship between the project and the community, a one-way 'data harvesting' approach to the community, and typically excluding particular socio-economic groups within communities. The engagement approach for the Dudley NZN project has been developed as an iteration of the community engagement strategy deployed by Keele University as part of the innovative user-centric design work package for the Zero Carbon Rugeley project. **Participatory community engagement approaches** I) aim to build deeper relationships and trust between project teams and communities, ii) emphasise co-production throughout a longer process of engagement, iii) are designed to maximise inclusivity within the community, and iv) have an ethos of 'doing *with*' rather than 'doing *to*' the community.

The Dudley NZN Community Engagement Strategy starts from acknowledging the role of existing networks and groups within the community, and past and existing related dialogues (for example the Dudley Energy Advice Line, the Connect Project, the Brierley Hill Project etc.) and building on these, as well as trying to bring new voices into these dialogues on the future of energy systems and green transition in Brockmoor and Brierley Hill.

The information below details the proposed approach to achieve the community engagement objectives outlined above. Development of this detail is iterative based on continual evaluation and reflection as the project develops. Detailed, ongoing dialogue is needed with each relevant project partner in the design of each engagement activity to ensure the usability of results and

appropriate communication of NZN elements, which will also be a key part of the governance structures outlined below. This will be supported by the existing relationships and track record of successful work between project partners from the Zero Carbon Rugeley project.

2.1 Engagement objective 1: Project awareness and relationship building

Key messages to be communicated as part of Objective 1 are:

- What the Dudley NZN project aims to do (and what it will not do) and over what timescale; What a NZN is and the potential relevance to the audience
- The 'user-centred' ethos and current and future ways to get involved
- Processes for getting involved, getting in touch, and asking questions
- The project team are people, and friendly
- Community action as a process of becoming NZN ready
- Managing expectations
- Additional messaging as determined by different project partners.

The community engagement activities include:

- Initial leafletting of the 307 residences identified in the NZN area. The leaflet will include a "contact us" card, allowing community members to volunteer participation, ask questions, and have an ongoing point of contact for the project
- Door-to-door participant recruitment with each of the 307 residences identified in the NZN area
- Recruitment of highly engaged residents to a community ambassadors' group (through door-to-door engagement) and snowballing through engaged residents' personal networks. Email Newsletter (mailing list established through door-to-door engagement).

The Community Ambassadors group (along with the Community Gatekeepers group covered below) will be invited to regular meetings with the project team as part of relationship building and to provide feedback and guidance on community engagement plans and proposals for NZN offerings from project partners. This activity will form a central component of engagement toward understanding what questions community members would like to be answered, as well as interpreting key messaging from project partners in accessible language for a broad section of the Brockmoor and Brierley Hill community.

The community engagement approaches for achieving Objective 1 are approached by consideration of each audience, as outlined in the appended Community Engagement Strategy (*Appendix B - Table 2*).

2.2 Engagement objective 2: Generating insights for design elements

Initial discussions with each project partner have identified the key areas which the project need to gain insights from the community. These are outlined in the appended Community Engagement Strategy (*Appendix B - Table 3*). Based on these discussions, initial ideas for community engagement activities are made utilising both face-to-face and online options. Ongoing detailed dialogue will be carried out with project partners regarding the design of each engagement activity to ensure the usefulness of results to the design teams.

The community engagement approaches in *Tables 2-4* of the appended Community Engagement Strategy include reference to 'cultural animation approaches. These are innovative arts-based methods of participatory research pioneered by Keele University in partnership with the New Vic theatre, for public engagement. These methods have been utilised extensively throughout the Zero Carbon Rugeley project, online and in-person, as a method of user-centric design for smart local energy systems and will be adapted for the residents of the proposed NZN. A list of indicative activities both in a face-to-face and online format are given below.

Indicative face-to-face activities include:

- ***Community participatory workshops*** generating insights into different aspects of a NZN (community attitudes/impressions), including: ***'Who is Brockmoor and Brierly Hill?'*** using art-based methods to explore community identity and generate on the ground knowledge about the neighbourhood; ***'Getting out and about in the neighbourhood'*** linking closely with project work on the Wombourne Railway line, this work shop distils experiential knowledge about transport and mobility in the NZN area from community members to inform design of mobility solutions; 'Pathways to net-zero homes' using narrative structure to develop community members understanding of retrofit processes and gauge appetite for low carbon housing solutions. Further areas to be covered by workshop activity will be developed iteratively with project partners and with community leaders.
- ***'Pop-up events'*** in the proposed NZN area. These will include ***Picnic in the park*** events on council owned green space to engage passers-by with interactive activity on different aspects of NZN including buildings, transport and green neighbourhood measures. This activity will collect impressions and on the ground insights into NZN solutions; ***EV Roadshow*** showcasing electric vehicles and engaging community members in focus group activity around their perceived strengths and weaknesses of EV alternatives for their area.
- ***Away days*** to other low-carbon communities in order to see things in action and hear experiences from real people. This will include visiting community ambassadors from Zero Carbon Rugeley and attending an event at Keele University to showcase renewable energy technologies and low carbon solutions. There is additional potential for "school twinning" activity between Brockmoor Primary School and the Chancel Primary School in Rugeley where project partners have already designed and delivered curriculum work around net-zero transitions.
- ***Community exhibitions*** of ideas for an NZN. These events will be hosted at the Brockmoor Community Centre and exhibit work produced by community members as part of cultural animation approaches and will include talks from project partners and community ambassadors.
- ***Community asset mapping,*** using art-based methods to engage community members in thinking about shared community spaces and how these could be used/reused. This will be undertaken in close collaboration with project work on the Wombourne Railway line, asking residents to consider how the disused railway could be re-used and catalysing thinking around other potential community assets.
- ***Community vision making and designing.*** A daylong event engaging community members and project partners collaboratively in creating a vision for a future NZN in Brockmoor and Brierly Hill, including exploratory activities around different aspects of NZN (buildings, transport, green space etc.).

Indicative online activities include:

- Social media, predominantly Facebook and LinkedIn (for small businesses) as an interactive platform will be employed, using the pioneering methods from Zero Carbon Rugeley to create two-way dialogue around smart local energy system issues using social media.

The activities that could be developed through these platforms include:

- Short videos for introductions to 'faces' of the project; introduction to project and elements of NZN
- Invitations to upload photos in response to questions on energy/mobility behaviors/issues/challenges
- Completion of a series of poll questions on attitudes to different elements of NZN
- NZN acronym competition
- 'Question time' with project leads and community members (Facebook live event and/or durational typed discussion)

- Posing of questions and comments on all posts and ensuring replied to all contributions (this was a principle of Zero Carbon Rugeley engagement, that all comments received a reply).

Because of the likely importance of an online platform for this project significant initial energy will be put into developing a follower base on these platforms prior to substantial 'data collection' activities (Objective 2) using this platform.

2.3 Engagement objective 3: Increasing understanding of the components of NZN and their relevance

Engagement Objective 3 is interwoven into Objectives 1 and 2 strategies above as increasing understanding can be a key precursor to gaining insights. However, additional capacity building activity will be undertaken around understanding the components of a NZN and their relevance to individuals' lives. A 'NZN Champions' training program will be designed and delivered to community ambassadors and gatekeepers, in conjunction with project partners. The training will cover the key elements of a NZN including carbon/energy literacy, domestic generation, and control, retrofit and energy efficiency, low carbon transport and green neighbourhood measures. Community members can choose to undertake this training and become a NZN Champion, in a position to support others in their community, during and beyond the project's lifespan. Following training, NZN champions will be encouraged to take part in peer-to-peer door knocking activity engaging with their friends and neighbours about the NZN project.

Community visioning events will include capacity building "designing for real" exercises. These activities will engage community ambassadors and gatekeepers with project partners in collaborative design workshops to explore the possibilities and limitations of, as well as the constraints on elements of an NZN. This activity will be central in developing community members capacity to set realistic and achievable ambitions for the neighbourhood as part of any net-zero transition, providing the opportunity to work collaboratively with experts in different elements of an NZN.

In addition to activity designing NZN elements in the abstract, practical community infrastructure activities will be undertaken. This will include **community litter picking** activity in partnership with local business Moor Street Waste Cycling Company, using a "walking focus group" approach to addressing fly tipping issues (in particular along Foxdale Drive) by situating materials and waste in the context of green neighbourhood measures and net-zero transition.

The Dudley NZN project also proposes the development of **community food growing initiatives** on small plots of green space along Foxdale Drive (*Figure 46*). As well as building relationships between community members and the project, food growing will be used as part of educational activity to develop community members understanding of carbon intense food production processes and the importance of locally sourced food as part of net-zero transitions.

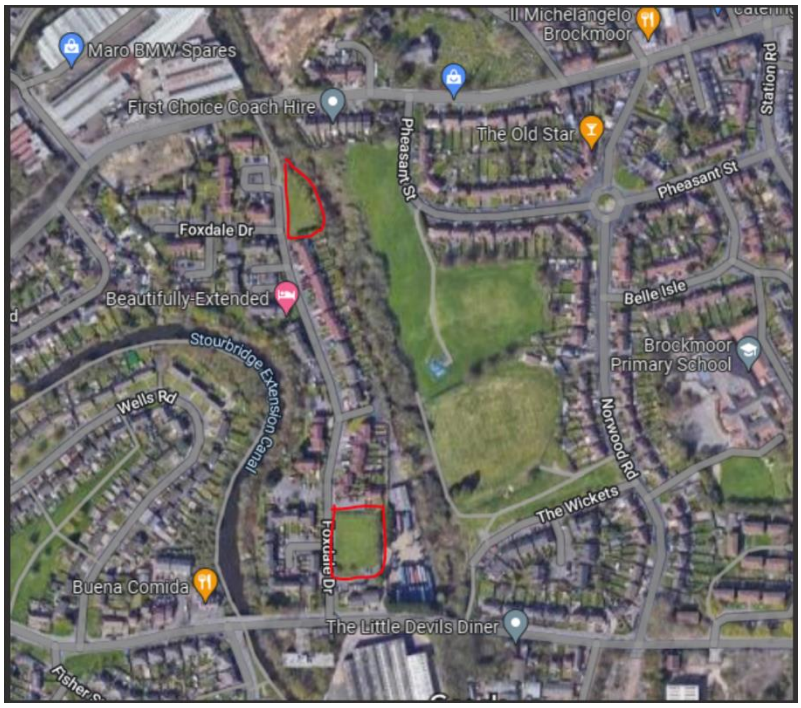


Figure 46 - Green Spaces for community food growing

Details of community engagement approaches for engagement objective 3 can be found in the appended Community Engagement Strategy (*Appendix B - Table 4*).

2.4 Engagement objective 4: Testing different NZN components with the community

As project offerings are developed by design teams an important Phase in the delivery will be the testing of NZN components with community members. This objective will be ongoing throughout the project as design solutions and offerings emerge. This activity will be central to understanding community members attitudes to NZN components and the appetite to take up project offerings once available. This activity will be undertaken in close collaboration with relevant project partners as NZN components become available to test with community participants.

Indicative testing activities include:

- Interactive focus group activity on retrofit pathways. These activities will gather participants initial impressions of retrofit solutions and gauge appetite to take up retrofit offerings once available.
- Trial of mobility solutions. This activity will involve putting test mobility solutions in place in the NZN area for a designated trial period. As well as broader use by the general public, targeted focus group activity will be facilitated to gather participants initial impressions of mobility solutions and gauge the likelihood that proposed solutions would change travel habits long term.
- Door-to-door survey activity. Surveys would gather data across NZN components - including buildings, transport and green neighbourhood measures – from each of the residences in the NZN area.

Insights gathered from testing activity will be fed back into design teams as part of a second design cycle of NZN components.

Evaluation

Quantitative and qualitative evaluation of the community engagement activities will be carried out throughout, both to contribute to the iterative development of the community engagement strategy and to evaluate the overall impact of the user-centric design in meeting both the community engagement objectives and overall project objectives. Key questions to be addressed by evaluation activities are:

- Who is being included/excluded (compare where appropriate against a proportionate breakdown of categories in the community)?
- Are appropriate engagement methods being used in relation to the groups engaged and the community engagement goals?
- What is the impact on those engaged? Are the community engagement goals being met?
- Is the community engagement contributing to the user-centric design objectives?
- Are community insights being incorporated into design? What is the impact of the community engagement activity on the broader NZN design process? Is the ethos of 'user-centric design' being met?

There are three discrete evaluation stages:

1. **Event/activity evaluation:** Each discrete event or activity will be evaluated drawing on the key evaluation questions above (including the numbers of people engaged and who is being engaged, including socio-demographic, geographic information, and the impacts of engagement). Appropriate evaluation mechanisms will be developed for the relevant activity and target audience.
2. **Ongoing evaluation:** will be considered through the community engagement governance groups covering the questions above.
3. **Project end evaluation:** will be carried out through interviews with project leads, and community gatekeepers and advisors; and a survey of the whole consortium, and as part of the online communication channels.

3 Role of residents, community organisations, landlords and local authority

With the aspiration of a NZN, every individual who lives in, works in, or travels through or to Brockmoor and Brierly Hill will be impacted by a future NZN, and has a role to play in contributing to its design. There are many ways that these different individual actors could be grouped. It is proposed that the following groups are used as distinct audiences:

1. Brockmoor and Brierley Hill residents
2. Landlords (social housing; private)
3. Small business owners
4. Large energy use organisations, public buildings, and commercial buildings
5. Community hubs/services (i.e., schools; community-centres)

It should be noted that although the NZN is focused on specific streets and houses, people's lives move beyond these boundaries. Likewise, where spaces within the community are used for engagement activities (such as Brockmoor Primary School) more than just the NZN residents will inevitably be involved. This is seen as an advantage, for the nation's net-zero targets, creating 'spillover effects' of increased knowledge and understanding and engagement into neighbouring areas. All messaging will be targeted appropriately as to whether the audience is the NZN residents only or may include residents outside the area.

Key segmentation attributes (i.e., socio-demographics; housing tenure) will be collected as part of engagement activities and regularly reviewed and compared to assess whether the proportion of those engaged through the activities are representative of proportions in Brockmoor and Brierley Hill (based ward level data until further analysis is carried out as part of the project);

geographic representativeness of engagement will be reviewed, and specific geographically-focused recruitment activities put in place where necessary.

Through the User Centric Design process, we will open different communicative spaces utilising existing spaces, networks and communities, as well as establishing new forums for communication and knowledge exchange. These will include:

- Community Ambassadors – a group of engaged residents from the target properties in Brockmoor and Brierley Hill
- Community Gatekeepers – this group will be comprised of community members in positions of leadership or influence in key community structures. This includes ward councillors, housing officers and other relevant council officers, tenants' organisations (e.g. Dudley Federation of Tenants), representatives of key community infrastructure (e.g. Brockmoor Community Centre), school governors (e.g. Brockmoor primary school), representatives of community groups (e.g. Hawbush Community Garden), local business owners (The Old Star pub), local faith group leaders (St Johns, Bank Street and South Street), and local private landlords (National Residential Landlord's Association)
- Local Business Network – developing the model deployed in ZCR, the network will build on existing business forum membership with an interest in diversification into the net zero economy and wider supply chain and services provision.

This structure has been utilised successfully in the Zero Carbon Rugeley project allowing deep insights into the community and social networks and spaces, and a network of engaged residents and businesses with whom to test the appropriateness of community engagement materials and approaches. Once constituted, each community forum will provide key on-the-ground insight for community mapping activity at the project start stage.

4 Plans for community asset ownership

As part of the Zero Carbon Rugeley project, opportunities for community ownership of NZN assets were explored in collaboration with existing community benefit societies. This included community ownership of renewable energy technology (SPV) for socially rented properties as well as public use buildings such as local hospitals and community centres. In the first Phase of the Dudley NZN project, these opportunities would be explored in the NZN area, alongside developing participants understanding of community asset ownership and gauging appetite for community ownership as a NZN solution.

Potential sites for exploration of community asset ownership in the NZN area are:

1. **Brockmoor Community Centre.** As the centre is valuable as a community asset and already the focus for potential renovation by the local authority it is potentially a key component of the Dudley NZN project in general. The centre will be used by the project to host events and could act as a showcase for the retrofit works planned more widely.
2. **Brockmoor Primary School.** The primary school is a key community hub. The potential for the delivery of community owned rooftop solar would complement curricular and extra-curricular undertaken by the project.
3. Local businesses in the **Moor Street Industrial Estate.** As above, the potential for community owned rooftop solar would be explored in Phase 1 of the project, as an initiative to support local business by reducing energy costs.

The exploration of opportunities for community asset ownership will be undertaken in close collaboration with project partners, with Keele University leading workshop activity to generate insights from the community to inform the design and delivery of potential asset ownership.

Workshop topics will include:

- Focus groups on **community ownership of rooftop solar** with local businesses, tenants and landowners of the Moor Street Industrial estate, and/or Brockmoor Primary school governors and senior leaders, and/or Brockmoor Community Centre trustees. The workshop will gather impressions and gauge appetite towards community organising, raising community capital, the role of the community organisation as "prosumers" and potential uses of a community benefit fund in the NZN area.
- Focus groups on **Community finance EV charge points** with community ambassadors, gathering impressions and gauging appetite for community ownership of on street/off street/private driveway charging points, raising community capital, models for charging infrastructure reimbursing the cost of assets, and potential uses of a community benefit fund in the NZN area.

In Phase 2, the appetite for more ambitious projects can be explored both with the community and with project partners. This could include: community benefit society as retrofit service provider; community owned battery storage to alleviate grid constraint in the NZN area; larger project beyond the NZN area (i.e. solar canopees on Brierley Hill Shopping Centre car park).

5 Low carbon behaviour change and engagement initiatives

Low carbon behaviour change is fundamental to the success of NZNs. Low carbon behaviour change will be entwined throughout the community engagement activities in the context of I) reducing energy demand in current day-to-day activity, and ii) behaviour changes associated with NZN innovations. Low carbon behaviour change is relevant to those who are not within the NZN household area, hence geographic 'spillover' of engagement will benefit the wider population as well as those in the NZN area.

The ways in which low-carbon behaviour change will be included in engagement initiatives include:

- Delivery of 'Net Zero Neighbourhood' training, including significant information to develop basic carbon and energy literacy and the link to everyday behaviour
- Information of simple carbon reduction activities through social media and the project newsletter
- Workshops to explore understanding of carbon and energy literacy of everyday activities (and the potential reductions from NZN components)
- Carbon literacy focused activities, for example the use of the 'How Bad are Bananas' carbon footprint game and pedal powered video at community events
- Curriculum relevant low carbon/net zero energy activities at the Brockmoor Community School, building on curriculum work designed and delivered for Chancel Primary School as part of ZCR
- Working closely alongside project partners on Wombourne Railway line to facilitate events on active travel.

All the above are designed to catalyse 'low carbon conversations' with residents and increase understanding and engagement with everyday low carbon behaviour.

Behaviour changes associated with NZN innovations will form part of workshop activity related to specific innovations. For example, the 'net zero' training will include behaviour change relating to smart energy control of domestic energy use and low carbon mobility options. These activities will bring in individuals with experience of these innovations to enable confidence building around new technologies.