

Construction Sector Toolkit Teacher Briefing Guide

Construction - Infrastructure

Introduction

The resources have been designed to be used as starter/plenary sessions for subject lessons, connecting to relevant topics within the scheme of work or related subject specific skills. There are links to additional resources or optional extension activities which could support a full careers lesson if desired.

Learning Objectives

- Learn about the construction sector and why it is important to the North East economy.
- Gain an awareness of the different job roles available in different industries within the North East construction sector and how these may be appealing as a future career.
- Gain an understanding of the relevance of the curriculum to careers in the North East labour market and what skills and academic subjects are required for these roles.

Construction in the North East – Background information

The construction sector is important to the North East and enables the growth of other key sectors the North East economy, creating jobs in our region.

In 2020 there were over 50,000* people employed in 8,125 businesses in our region and more skilled people are needed in this sector. The [CITB Construction Skills Network NE LMI report 2021-2025](#) estimates a further 7,000 new workers are needed between the end of 2020 and 2025 to meet the recruitment needs of the industry in the North East.

Infrastructure underpins the economy. Transport, digital, energy and utility networks are vital for jobs, businesses, and economic growth. In November 2020 the UK government published the [National Infrastructure Strategy](#) presenting an ambition to “deliver an infrastructure revolution: a radical improvement in the quality of the UK’s infrastructure to help level up the country, strengthen the Union, and put the UK on the path to net zero emissions by 2050.”

Investment into large infrastructure projects in the North East - for example, the road and rail networks, broadband networks and infrastructure associated with the transition to renewable energy - provides an opportunity to create jobs and grow the economy of our region.

*For the most recent economic and employment data please visit [North East Evidence Hub](#)

Video activities

Students answer questions using information provided in the videos.

Careers in construction in the North East (5:13)

<https://www.youtube.com/watch?app=desktop&v=xTiqFF9MjLA>

Good overview of different careers paths available in the construction sector and the rewards of working in the industry.

The following videos show people working in the sector and highlight some of the skills and qualifications which could help with a career. You do not need to show all the video clips but can select those which are most relevant to your students.

NEUPC – Women in Construction – interview with a trainee Quantity Surveyor (5:48)

<https://www.youtube.com/watch?v=br9uxMVEoA>

Trainee Quantity Surveyor, Danielle, shares her experience and highlights benefits of degree apprenticeships as a route into this career.

(can skip first 1.18 mins if preferred as generic intro for all NEUPC videos)

Costain – interview with a BIM Coordinator (4:18)

<https://www.youtube.com/watch?v=TERR4tBBJl&feature=youtu.be>

Ben, a graduate Building Information Modelling (BIM) Coordinator talks about his route into the industry and share insights into his work and the skills needed.

J Murphy and Sons – interview with a Drainage Engineer (1:26)

<https://www.thewowshow.org/day-in-the-life-jessica/>

Apprentice Drainage Engineer, Jessica, takes you through a typical day at work and shares her career story.

NEUPC – Women in construction – interview with a Structural Engineer (4:16)

<https://www.youtube.com/watch?v=Vs9APrPZ0y8>

Caitlin, a structural engineer talks about her route into a career as a structural engineer via an apprenticeship and addresses gender stereotypes around engineering.

(can skip first 1.18 mins if preferred as generic intro for all NEUPC videos)

Go Construct – Construction careers – interview with a ground worker (2:31)

<https://www.youtube.com/watch?v=jBnwjtW9mSw>

Sean, an apprentice ground worker tells us about his role, achievements and plans for the future.

Curriculum links

These toolkit resources could be used to introduce a new topic, subject content or to make general links between your subject and how the skills and knowledge acquired can support a future career.

Select the links relevant to your subject from the table below and insert into slide 8 of the lesson PowerPoint template, to highlight the connections between the subject/topic taught and careers in the North East labour market.

Science curriculum links		
Key stage and subject	Curriculum link	These skills and knowledge are important to this industry because
KS3 Science	Ecosystems	Understanding the impact of infrastructure development on ecosystems, the interdependence of organisms within those ecosystems, and how to mitigate any negative impact of developments is a key part of the planning and design stage of construction. E.g. analysing the impact of road developments on bat populations or assessing sites for endangered species such as water voles.
	Energy	Domestic heat pumps and district heating networks use the principles of heating and thermal equilibrium in their systems to heat up homes and buildings. Engineers designing the development of this infrastructure apply these principles in their daily work.
	Forces	Calculating the contact and non-contact forces a structure must withstand is essential in the design and planning stage of construction of infrastructure. Balance of forces on-site during construction is also important e.g. calculating lifting equipment required and managing risk during this phase.
	Materials	Understanding the properties of materials is important to civil engineers, so they can select the most appropriate materials in their construction designs. e.g. materials for bridges which can withstand the forces and weather conditions to which they are exposed over the planned lifespan.
	Electricity	Electricity and power systems, and telecommunications are an important part of our infrastructure. Understanding electric circuits, current and potential difference enables engineers to design, build and operate systems to keep our homes and schools powered and internet and mobile phones working.
KS4 Biology	Ecology	Development of sites for infrastructure projects can impact habitats and affect ecosystems. Assessment of this impact and effective planning to reduce any negative impact requires an understanding of ecosystems and the interdependence of organisms. The ability to extract and interpret data from charts, graphs, and tables relating to these assessments is essential to enable sustainable planning and to meet the environmental commitments required for these infrastructure projects.



KS4 Chemistry	Bonding, structure, and properties of materials	Understanding the properties of materials is important to civil engineers, so they can select the most appropriate materials in their construction designs. e.g. materials for bridges which can withstand the forces and weather conditions to which they are exposed over the planned lifespan.
	Life cycle assessment	Each of the materials used in construction of infrastructure must undergo a life cycle assessment. This is so planners and developers can understand the impact on the environment of the materials and methods used for construction, and disposal at the end of useful life e.g. concrete. These life cycle assessments can be used to make construction more sustainable and support decisions on which materials and methods to use.
KS4 Physics	Forces	Calculating the contact and non-contact forces a structure must withstand is essential in the design and planning stage of construction of infrastructure. Understanding Newton's Laws of motion and calculating work done, energy transfer and resultant forces on-site during construction is also important e.g. calculating lifting equipment required and managing risk during this phase.
	Electricity	Electricity and power systems, and telecommunications are an important part of our infrastructure. Calculation of current, resistance, and potential difference enables engineers to design, build and operate power grids and telecommunication systems to keep our homes and schools powered and internet and mobile phones working.
Additional subject related skills		Development of skills such as scientific thinking, analysis, and evaluation of data and risks, and an understanding of scientific vocabulary, units and nomenclature is essential across all aspects of the construction industry. These skills are needed to design and build our infrastructure and develop new technologies and materials to reduce the impact of construction on the environment.

Maths Curriculum links

Key stage	Curriculum link	These skills and knowledge are important to this industry because
KS3	Number	Being able to understand standard units of mass, length, time, money and other measures to ensure that projects are appropriately managed
	Ratio, proportion and rates of change	Being able to create scale diagrams to ensure buildings are planned correctly and can be replicated.
	Geometry and measures	Being able to draw and measure angles, calculate area and interpret scale drawings. Using Pythagoras to work out measurements that aren't able to be taken physically.
KS4	Number	Understanding standard units of measurements and being able to apply them in a variety of different ways to ensure the accuracy of drawings and when calculating the materials needed for a project. Understanding the limits of accuracy with rounded measurements is also important in this aspect of construction.

Ratio, proportion and rates of change	Being able to use ratio notation or scale factors to ensure that plans can be constructed correctly, safely, and efficiently.
Geometry and measures	Being able to identify and apply circle definitions and properties such as when an architect is drawing up building plans. Being able to calculate surface area and volume.
Additional subject related skills	Development of skills such as critical thinking, problem solving, time management and independent working are essential across the construction industry. The application of these skills helps to ensure that infrastructure construction projects are designed and developed effectively with a reduced impact on the environment, and project timelines and budget are managed.

English Curriculum links

Key stage	Curriculum link	These skills and knowledge are important to this industry because
KS3 & KS4	Spoken language	Communicating with a variety of people is a key skill needed while working in infrastructure. Being able to communicate instructions clearly and effectively to your co-workers to ensure effective teamworking. Being able to communicate in meetings with external stakeholders. Being able to negotiate with suppliers and subcontractors.
KS3 & KS4	Reading and writing	Many job roles in the construction of sustainable housing require some level of administrative work and so it is important to have good reading and writing skills. Being able to write reports, produce meeting minutes, write fee/funding bids are also important, as is the ability to read tender documents, client specifications and instructions.
Additional information	Skills developed through English are important for a variety of roles in infrastructure. Being able to understand and use industry specific vocabulary, both written and spoken, ensures good levels of communication across a project which reduces the risk of mistakes.	



Additional activities and further information

There is an optional research task on slides 6 and 7 of the PowerPoint presentation if you would like to expand this activity into a full lesson. There is also an optional plenary which could be used as a reflection activity following a subject lesson. These could also be set as home learning tasks.

You can access more resources relating to careers in the curriculum on the [North East Ambition website](#) and on the [Careers and Enterprise Company website](#).

If students are interested in finding out more about the industry in the North East and the varied career routes and opportunities available, there are some links on the plenary activity on the final slide which may be of interest.

Careers in the Curriculum CPD resources

Useful links for teachers to develop skills and knowledge to connect careers to the curriculum:

- Careers in the curriculum online CPD course delivered in partnership with NU:STEM
 - Careers in initial teacher education 1 – Unconscious bias
<https://www.youtube.com/watch?v=DLSVltC8oNE>
 - Careers in initial teacher education 2 – Aspirations and gender
<https://www.youtube.com/watch?v=fucKEq4MvN8>
 - Careers in initial teacher education 3 – Employability characteristics and role models
<https://www.youtube.com/watch?v=l3jryc1s87M>
- Teacher Industry insights session – Construction (May 2022)
<https://www.youtube.com/watch?v=wHOfuXYT7SA>
- Online CPD course available from STEM learning
<https://www.stem.org.uk/cpd/ondemand/443955/linking-stem-curriculum-learning-careers>