

# TUNNELWORKS

## BTEC LEVEL 3

### TEACHERS' NOTES

#### About this activity

This activity helps students consider a realistic scenario for visitors to a busy engineering construction site and maintenance workshop and complete a risk assessment for a site visit using an industry standard approach.

#### Learning outcomes

##### Students can:

- Identify and rate some hazards to visitors to a busy engineering construction site and workshop.
- Complete a risk assessment template.
- Write down and justify the control measures they would take to minimise risks.

#### Curriculum links

**BTEC Level 3 Certificate, BTEC Level 3 Subsidiary Diploma, BTEC Level 3 90-credit Diploma, BTEC Level 3 Diploma and BTEC Level 3 Extended Diploma in Engineering (QCF)**

- Unit 1 Health and safety in the engineering workplace
- The materials are also relevant to BTEC Construction courses.

*Note: this activity is not intended to provide complete evidence for assessment and should be used to complement other activities and assignments.*

#### What you will need

- BTEC presentation slides BTEC 1-6, 8
- Student scenario sheet
- Level 3 Student sheet (you may also want your preferred risk assessment template if you have one)

*You may want example copies of relevant statutory guidance eg booklet INDG163 from HSE.  
[www.hse.gov.uk/pubns/indg163.pdf](http://www.hse.gov.uk/pubns/indg163.pdf)*

*The HSE website offers exemplar risk assessments and templates at <http://www.hse.gov.uk/risk/index.htm>*

*These follow a more complex format (which you could use with more able students) but offer a wealth of detail to draw on in your teaching.*

*Please allow time to show the introductory video at the start of the presentation.*

.....

## Preparation

Watch the introductory video if you are not familiar with the Thames Tideway Tunnel. Review the delivery plan for the activity (below) and the student sheets and presentation, and consider appropriate differentiation for your class. Add timings to suit your session length.

You may want to show additional images of engineering workshops, or make use of students' experiences of real engineering environments to date.

Time (60mins)	Teaching activity	Learning activity
5 mins	<p><b>Starter:</b> Review students' ideas of safety, hazards, risks and control measures, of the roles and responsibilities that employers and employees may have towards visitors.</p>	<p>Contribute to discussion. Name key legislation or regulations. Identify some key roles and responsibilities eg of Thames Tideway Tunnel, the site manager, an employee or contractor, and a visitor to a site. Explain how a control measure reduces risk.</p>
10 mins	<p><b>Whole group:</b> Screen BTEC 1-2: Introduce the scenario and discuss hazards on large heavy engineering or construction sites, drawing on students' experiences etc.</p> <p>Screen BTEC 3: Review the task.</p> <p>Screen BTEC 4-6: Watch the video (NB no sound) and slides, and lead a discussion to identify key information students need to know, eg:</p> <p>Key activities or equipment that might be in a heavy engineering workshop Hazards (to staff and visitors) Visitor familiarity with the environment</p>	<p>Share ideas about what life on the site will be like and some key hazards.</p> <p>Share ideas to confirm understanding. Observe video and identify key information that will help them, sharing ideas.</p> <p>Contribute to discussion.</p>
20 mins	<p><b>Pairs or individuals:</b> Screen BTEC 7: Lead students as they review the Student Sheet and Scenario Sheet. Review the sample risk assessment on Screen BTEC 8: and how risk is calculated. Guide students to add ideas to the template and calculate the risk value of each one.</p>	<p>Share ideas on how likelihood and severity might be estimated, and who would be competent to do this and what information they could make use of. Populate table with ideas and calculate risk severity from 1-25.</p>
5 mins	<p><b>Whole group:</b> Share ideas, asking students to justify their calculations.</p>	<p>Share ideas, explaining how they decided on the values given to likelihood and severity. Justify their decisions verbally to group. Suggest sources of more accurate information or data to guide a real calculation.</p>

<b>5 mins</b>	Discuss control measures in the context of a visit and how this process can inform the content of a visit (eg which areas) as well as how it's managed.	Suggest different uses of control measures in the context of a visit, eg 'designing out' by changing plans, assessments, PPE, briefings and training for visitors.
<b>10 mins</b>	<p><b>Pairs or individuals:</b> Ask students to write down control measures for two or more of their risks. Help students share ideas and suggest improvements. Screen BTEC 9.</p> <p>Discuss how this 5x5 matrix helps understand risk values and appropriate responses.</p>	For two or more identified hazards, suggest control measures and justify their decisions.
<b>5 mins</b>	<p><b>Plenary:</b> Discuss how risk assessments should be stored, communicated and updated, especially as conditions or personnel can quickly change on a project or site.</p>	Contribute to discussion. Identify implications (safety, legal) of not providing, following or updating risk assessments.

### Differentiation

<b>Easier</b>	<b>Harder</b>
<p>Add detail and further suggestions to help students imagine hazards at the site or workshops, drawing on other images you have available.</p> <p>Ask for 1 – 3 hazards in the risk assessment.</p>	<p>Challenge students to think of more than three hazards in their risk assessment, to present it professionally and provide control measures in writing.</p> <p>Drawing on INGD163, ask students to put control measures in order (step 3, p4).</p> <p>Ask students to identify ways to store and communicate this risk assessment to site colleagues and visitors.</p>

### Follow-up ideas

Challenge students to apply their ideas and complete a risk assessment for an upcoming visit to a real engineering environment, using information about that location, and what they will do, to help them.

During your visit, ask students to be aware of their suggested hazards and control measures and compare these to those identified in the location's real risk assessment.

Bring copies back with you and compare students' with the real thing, identifying differences and ideas for good practice students can apply elsewhere.

**Appendix**
**Table A1: Risk ranking tables - Impact rating guidance**

Score	Descriptor	Indicative outcome (health/ safety related incident)
1	<b>Very Low</b>	<ul style="list-style-type: none"> <li>Minor injuries/inconveniences (no long-term effects)</li> <li>Operatives can continue to work</li> </ul>
2	<b>Low</b>	<ul style="list-style-type: none"> <li>Minor injuries/inconveniences (not long-term)</li> <li>Operative requires first aid treatment</li> <li>Operative stops work</li> </ul>
3	<b>Medium</b>	<ul style="list-style-type: none"> <li>Injury or illness incurred which results in a reportable/ lost time absence from work</li> </ul>
4	<b>High</b>	<ul style="list-style-type: none"> <li>Major injury/illness with long-term effects</li> <li>Long absence from work</li> </ul>
4	<b>Very High</b>	<ul style="list-style-type: none"> <li>Multiple reportable injuries</li> <li>Fatality</li> </ul>

**Probability rating guidance**

Score	Descriptor	Indicative outcome (health/ safety related incident)
1	<b>Very Unlikely</b>	<ul style="list-style-type: none"> <li>Highly unlikely to occur and would be an extreme event</li> </ul>
2	<b>Unlikely</b>	<ul style="list-style-type: none"> <li>Unlikely to happen but not impossible and would be an unusual event</li> </ul>
3	<b>Possible</b>	<ul style="list-style-type: none"> <li>It would be a surprise occurrence or an unusual event it would not be common though</li> </ul>
4	<b>Low</b>	<ul style="list-style-type: none"> <li>More likely to happen than not, it would be a common occurrence</li> </ul>
4	<b>Very Likely</b>	<ul style="list-style-type: none"> <li>Expect it to happen, will occur often and with some certainty</li> </ul>

## Tunnelworks BTEC Scenario Sheet

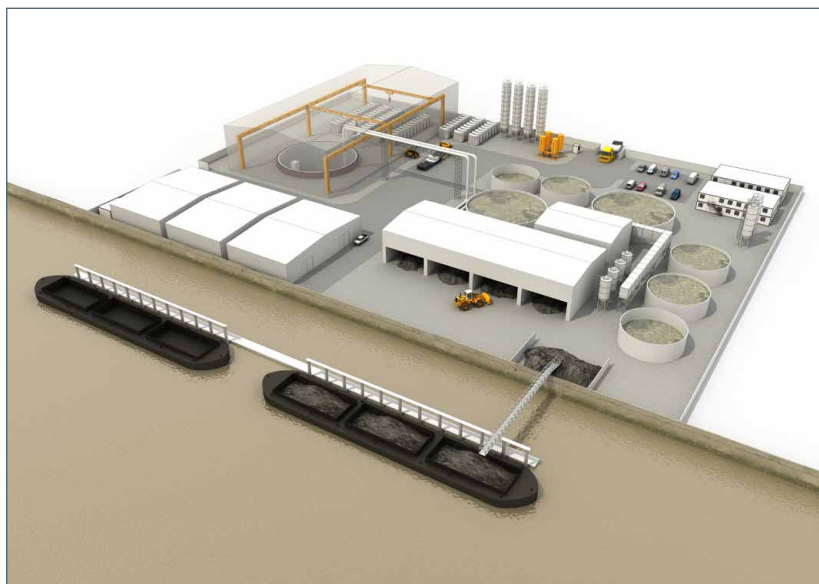
### What will happen at a Thames Tideway Tunnel main construction site?

The Thames Tideway Tunnel is a major new sewer that will help tackle the problem of overflows from the capital's Victorian sewers. It will protect the River Thames from increasing pollution for at least the next 100 years.

The Tunnel will control the 34 most polluting combined sewer overflows (CSOs), as identified by the Environment Agency, which currently discharge untreated sewage directly into the River Thames after it rains.

A construction site will be needed at numerous CSO sites and at the three sites from which the main Tunnel will be excavated.

This image shows what one of the three main Tunnel construction sites may look like:



### Key activities at a main Tunnel construction site\*

- Below ground, a Tunnel Boring Machine (TBM) will excavate the main Tunnel
- Soil and/or rock slurry will be transported to ground level
- Heavy machinery will transport this to storage silos and from there onto the loading conveyor for barges to remove via the river
- Heavy goods vehicles will deliver concrete tunnel segments, concrete and other materials to the site
- TBM parts, equipment and the tools to maintain and repair them will be stored and used in busy workshop buildings
- There will be an area for parking, and office / rest buildings
- Staff and contractor vehicles will enter and leave the site

*\*Sites at each CSO would include some similar activities, but would not have a TBM or Tunnel segments on site.*