



Russell Bayliss – Parsons Brinckerhoff



FABER MAUNSELL

AECOM

NORTHERN GEOTECHNICAL GROUP

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- Overview of the civil engineering
- Ground conditions (geology and geotechnics)
 - published information
 - our findings
 - geological history
- Geotechnical challenges/aspects



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Introduction

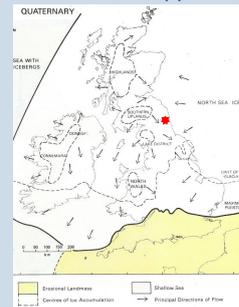


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Location (1)



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Location (2)



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Location (3)



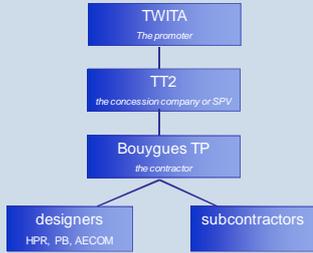
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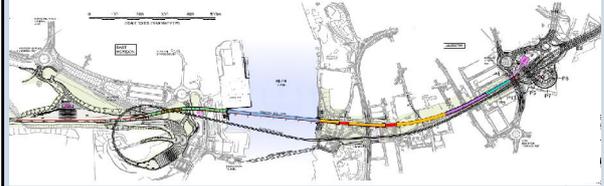
NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Simplified organisation



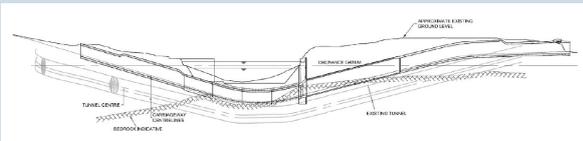
NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

General layout



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Cross section sketch showing existing and new tunnels



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Typical cut and cover construction sequence

STAGE 1
EXCAVATE TO BELOW LEVEL OF INTERMEDIATE PROP AND INSTALL.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Typical cut and cover construction sequence

STAGE 2
EXCAVATE TO BELOW LEVEL OF LOWER PROP AND INSTALL.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Typical cut and cover construction sequence

STAGE 3
EXCAVATE TO BELOW SOFFIT LEVEL OF BASE SLAB AND EXPOSE COUPLERS IN DIAPHRAGM WALLS.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Typical cut and cover construction sequence

STAGE 4
PLACE BLINDING, COMPRESSIBLE VOID FORMER AND CAST BASE SLAB.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Typical cut and cover construction sequence

STAGE 5
REMOVE LOWER PROP, ERECT FALSEWORK AND FORMWORK FOR ROOF SLAB. EXPOSE COUPLERS IN DIAPHRAGM WALLS.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Typical cut and cover construction sequence

STAGE 6
CAST ROOF SLAB.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Typical cut and cover construction sequence

STAGE 2
REMOVE FALSEWORK, FORMWORK,
INTERMEDIATE PROP, PLACE AND
COMPACT FILL ABOVE ROOF SLAB.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Typical cut and cover construction sequence

STAGE 8
REMOVE UPPER PROP, PLACE AND
COMPACT FILL.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Typical cut and cover construction sequence

STAGE 9
PLACE AND COMPACT FILL, BREAK DOWN
DIAPHRAGM WALLS TO CUT-OFF LEVEL.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

basic construction sequence

1.

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Diaphragm wall Cut and cover

guide wall

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL



cable grab excavation



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Diaphragm wall Cut and cover



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Diaphragm wall cut and cover



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Ground conditions
- published information



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

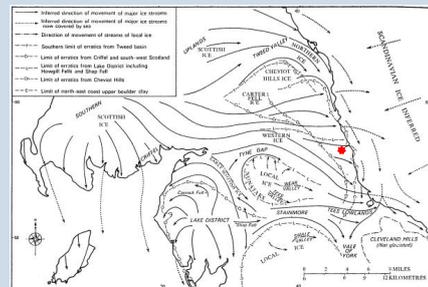
Key published regional information

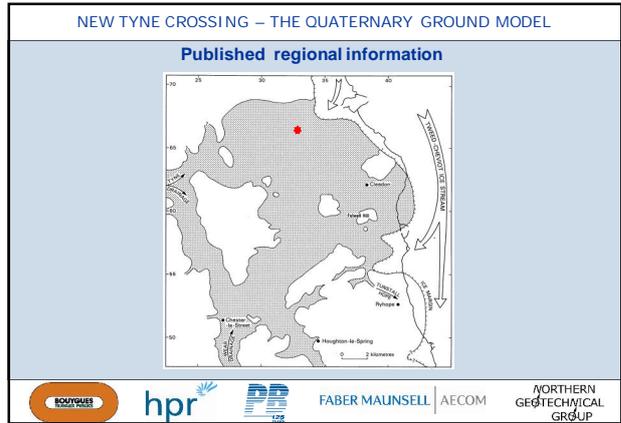
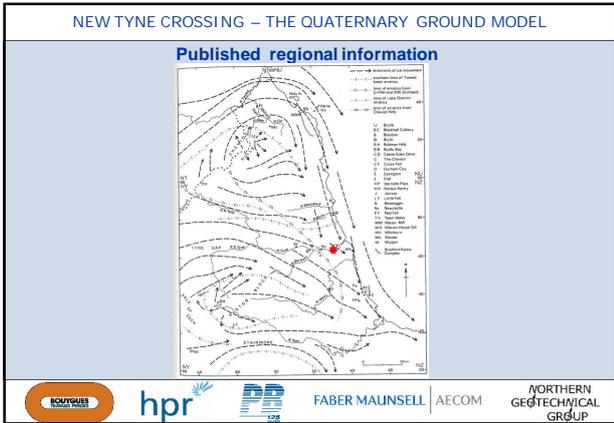
- British Regional Geology Northern England, 1971
- Eyles and Sladen, 1981
- Sladen and Wrigley, 1983
- Classification and Strength of Northumberland Till, Robertson, Clarke and Hughes, 1994
- BGS Sheet Memoir 21, 1994
- Robson's Geology of North East England, 1995
- The glacial succession in lowland Northern England, Hughes, Clarke and Money, 1998
- Ciria C504 Engineering in Glacial Till, 1999



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Published regional information





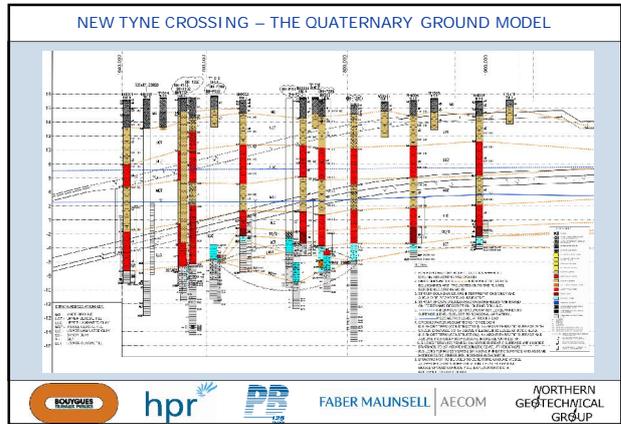
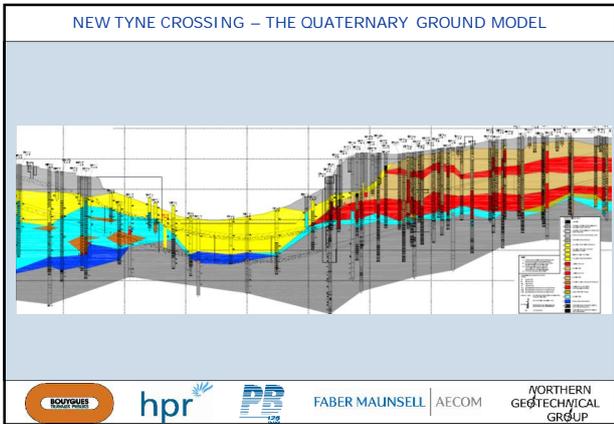
NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Ground conditions

- our findings

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- NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL
- 2007 Ground investigation
- 133 boreholes
 - 58 PCPTs
 - 50 trial pits
 - in situ testing
 - lab testing
 - overwater work
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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

How does our geotechnical data compare?

NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Plasticity – Glacial Till/Stone Clays

NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Plasticity – Glacial Till/Stone Clays

NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

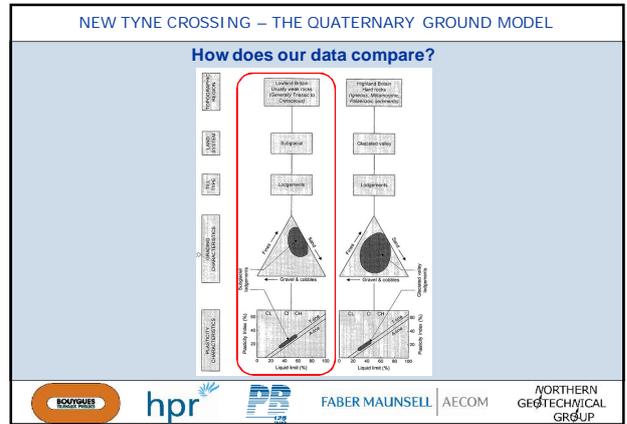
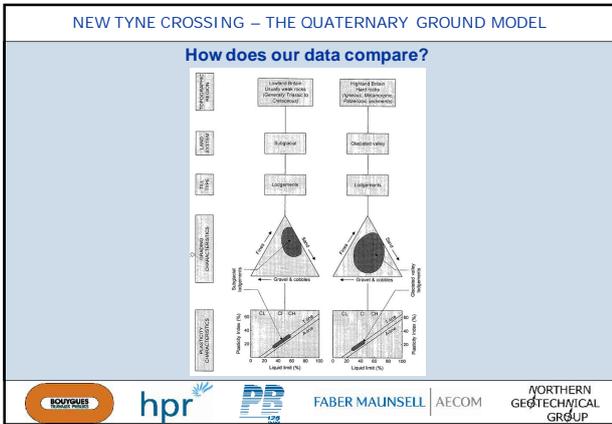
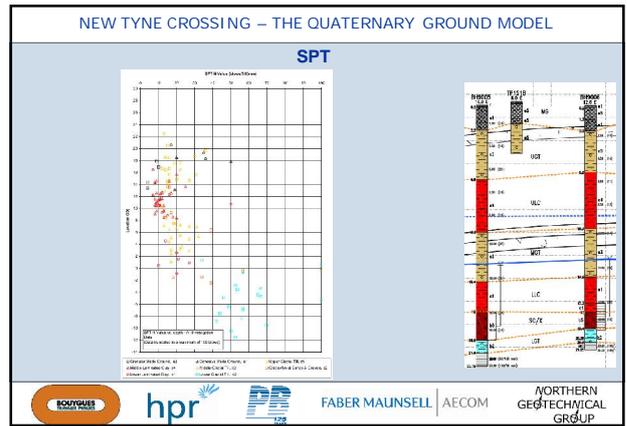
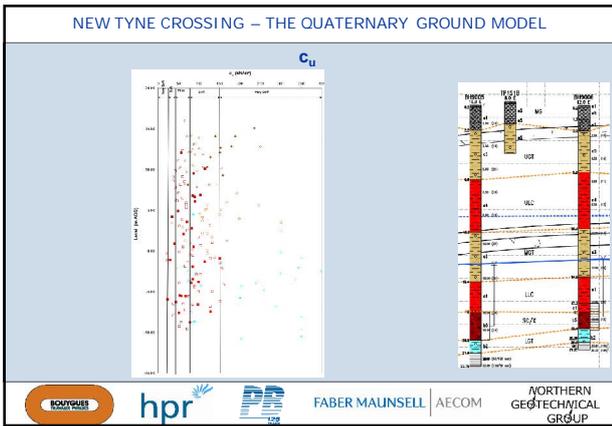
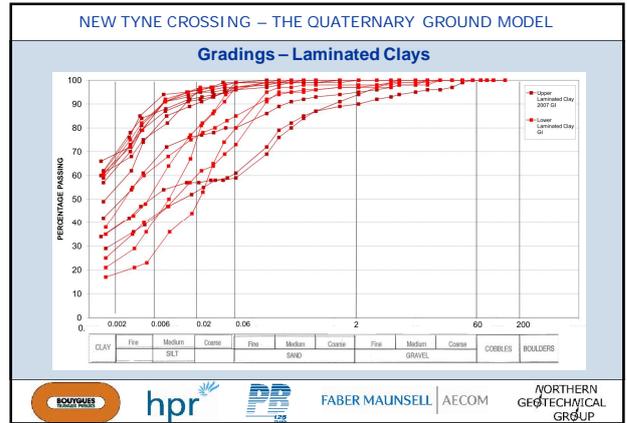
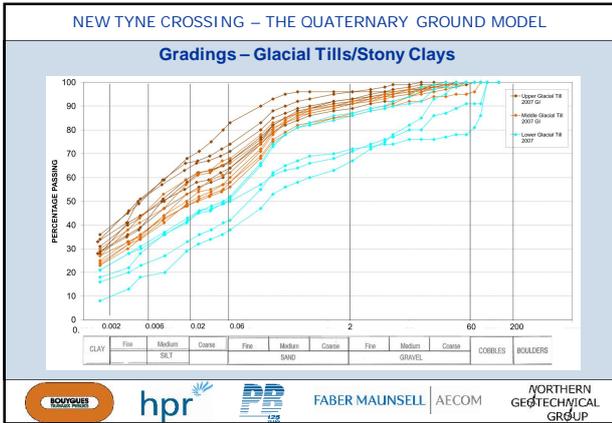
Plasticity – Glacial Till/Stone Clays

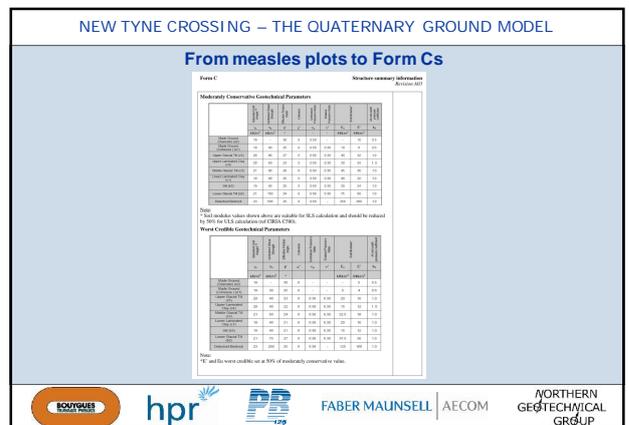
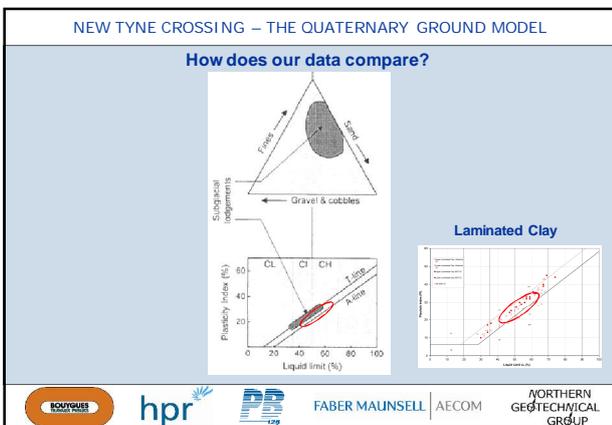
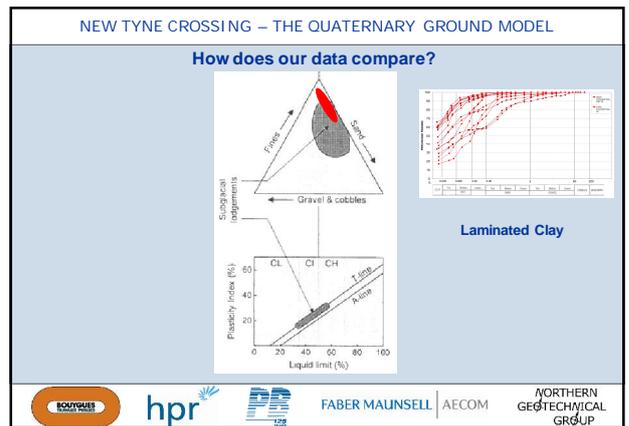
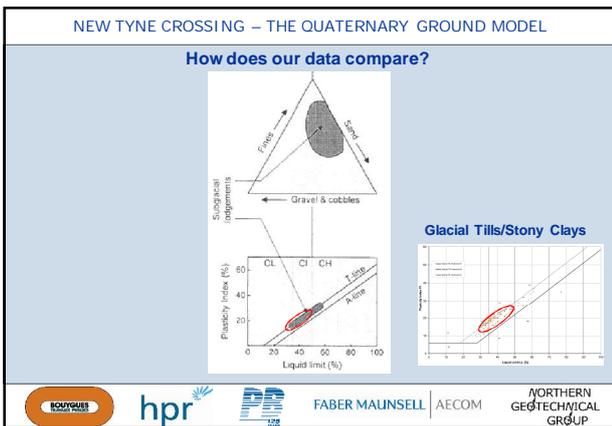
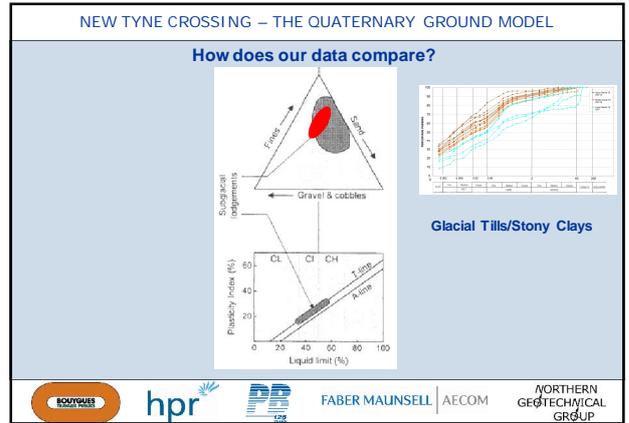
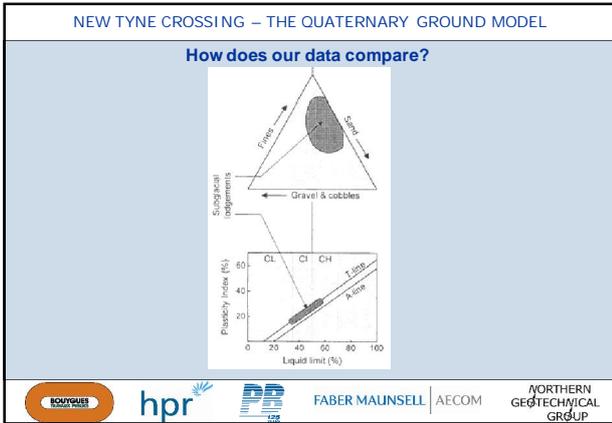
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Plasticity – Laminated Clays

NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Plasticity – Laminated Clays



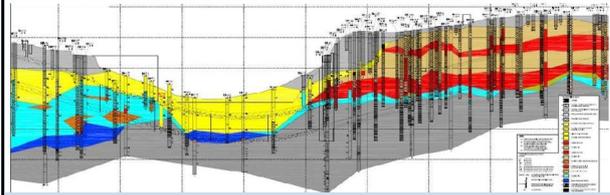


Ground conditions - geological history



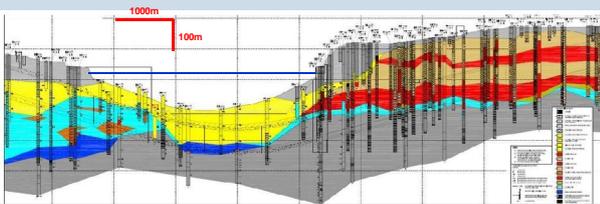
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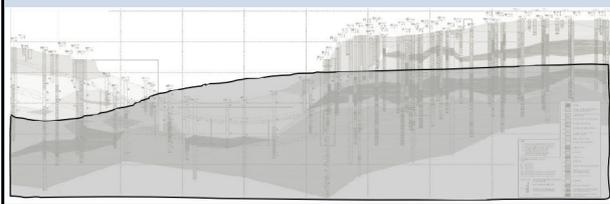
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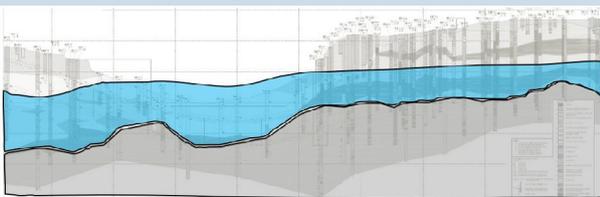


Diagrammatic only
Tertiary pre-glacial rockhead surface



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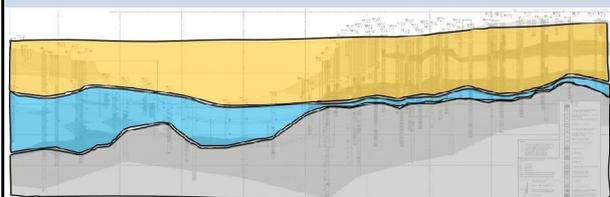


Diagrammatic only
Eroded rockhead and deposition of the tripartite till sequence of the region



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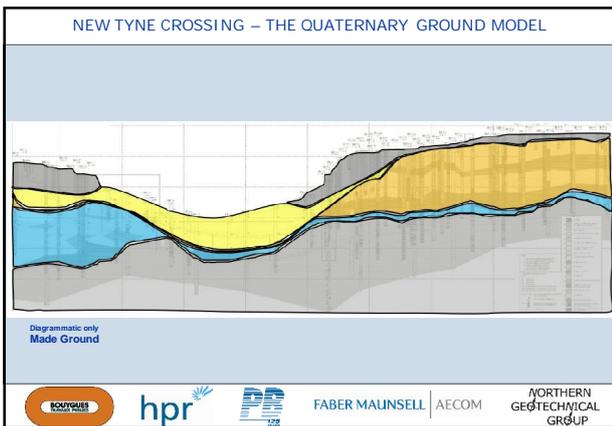
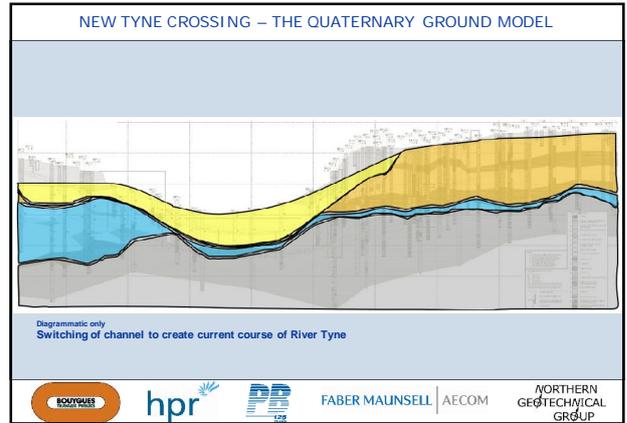
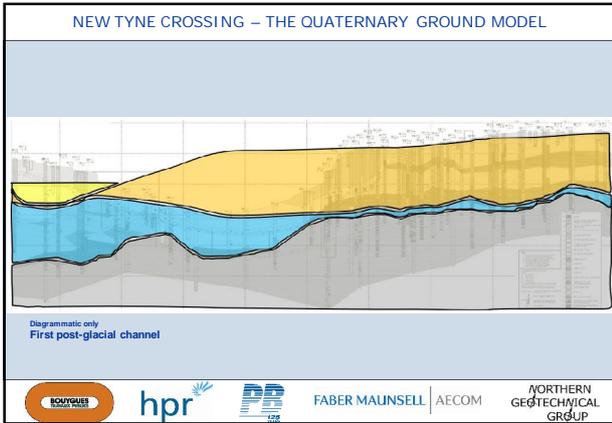


Diagrammatic only
Erosion of upper parts of tripartite till sequence and deposition of Tyne and Wear Complex



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Geotechnical challenges/aspects



NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Diaphragm wall Cut and cover



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Diaphragm wall Cut and cover



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Diaphragm wall Cut and cover

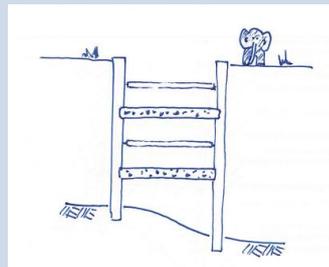


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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Diaphragm wall Cut and cover



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Pile and box Cut and cover



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Pile and box Cut and cover



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Pile and box Cut and cover



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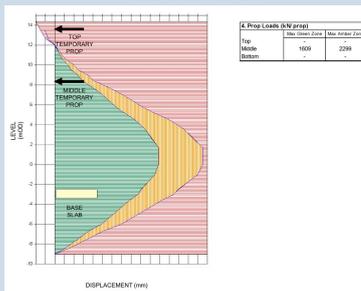
Pile and box Cut and cover



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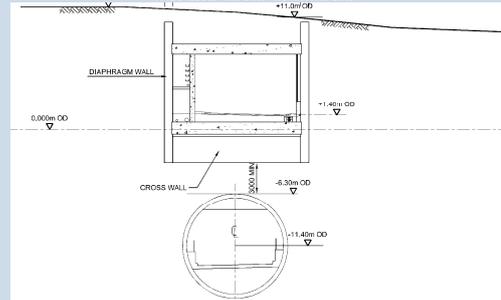
Wall deflections



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Cut and cover crossover



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Constructed cross wall panels



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Sprayed concrete lined sections



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Sprayed concrete lined sections



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Open cut box



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

Open cut box



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NEW TYNE CROSSING – THE QUATERNARY GROUND MODEL

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