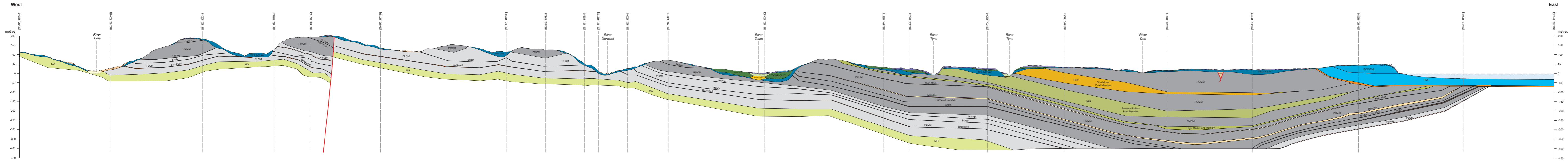
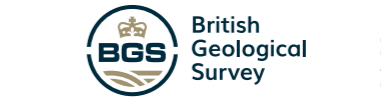


**CROSS SECTIONS SHOWING THE GENERAL RELATIONS OF ROCKS ALONG THE LINE 'HCM\_Overview\_1'**  
 Horizontal scale 1:50 000, vertical exaggeration 5x



**Key to geological colours**

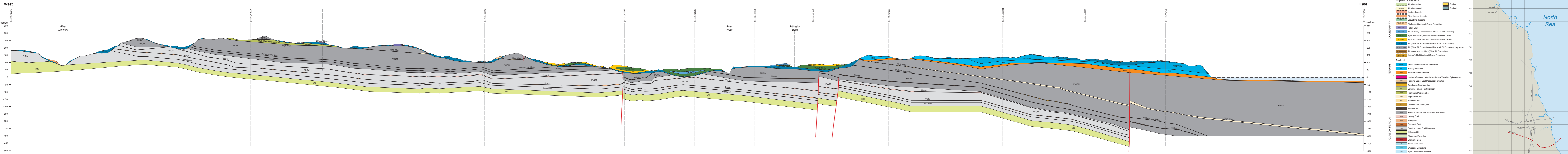
<b>Artificial</b>	Made ground	
<b>Superficial Deposits</b>	Alluvium - clay	Aquifer
	Alluvium - sand	Aquifard
	Marine deposits	
	River terrace deposits	
	Lacustrine deposits	
<b>QUATERNARY</b>	Ebchester Sand and Gravel Formation	
	Pelaw Clay	
	Til (Butterfly Til Member and Horden Til Formation)	
	Tyne and Wear Glaciolacustrine Formation - clay	
	Tyne and Wear Glaciolacustrine Formation - sand	
	Til (Wear Til Formation and Blackhall Til Formation)	
	Til (Wear Til Formation and Blackhall Til Formation) clay lense	
	Til - sand and boulders (Wear Til Formation)	
	Malden's Hall Sand and Gravel Formation	
<b>Bedrock</b>	Roker Formation / Ford Formation	
	Raisby Formation	
	Yellow Sands Formation	
<b>PERMIAN</b>	Northern England Late Carboniferous Tholeitic Dyke-swarm	
	Pennine Upper Coal Measures Formation	
	Grindstone Post Member	
	Seventy Fathom Post Member	
	High Main Post Member	
	High Main Coal	
	Maudlin Coal	
	Durham Low Main Coal	
	Hutton Coal	
	Pennine Middle Coal Measures Formation	
	Harvey Coal	
	Bustly coal	
	Brockwell Coal	
	Pennine Lower Coal Measures	
	Milstone Grit	
	Stainmore Formation	
	Shilbottle Coal	
<b>CARBONIFEROUS</b>	Alston Formation	
	Woodend Limestone	
	Tyne Limestone Formation	
	Dun Limestone Member	
	Scremerston Coal Member	
	Fawcett Coal (Northumberland)	
	Blackhill Coal (Northumberland)	
	Bulman Main Coal (Northumberland)	
	Cooper Eye Coal (Northumberland)	
	Fell Sandstone Formation	



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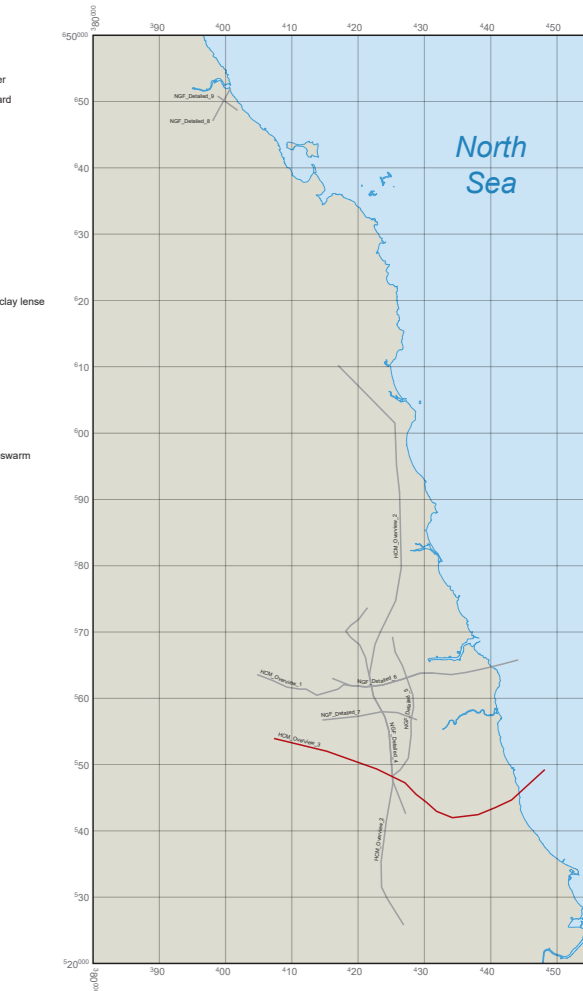


CROSS SECTIONS SHOWING THE GENERAL RELATIONS OF ROCKS ALONG THE LINE 'NGF\_Overview\_3'  
 Horizontal scale 1:50 000, vertical exaggeration 5x



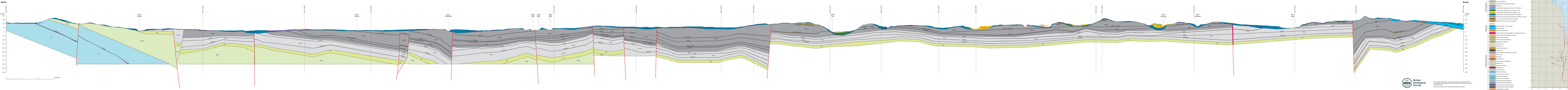
**Key to geological colours**

<b>Artificial</b>	Made ground	<b>Aquifer</b>
<b>QUATERNARY</b>	<ul style="list-style-type: none"> <li>Allevium - clay</li> <li>Allevium - sand</li> <li>Marine deposits</li> <li>River terrace deposits</li> <li>Lacustrine deposits</li> <li>Elcheater Sand and Gravel Formation</li> <li>Til (Butterby Til Member and Horden Til Formation)</li> <li>Palae Clay</li> <li>Til (Wear Til Formation and Blackhall Til Formation)</li> <li>Tyne and Wear Glaciolacustrine Formation - clay</li> <li>Tyne and Wear Glaciolacustrine Formation - sand</li> <li>Til (Wear Til Formation and Blackhall Til Formation)</li> <li>Til (Wear Til Formation and Blackhall Til Formation) clay lense</li> <li>Til - sand and boulders (Wear Til Formation)</li> <li>Maiden's Hall Sand and Gravel Formation</li> </ul>	<b>Aquifer</b>
<b>PERMIAN</b>	<ul style="list-style-type: none"> <li>Roker Formation / Ford Formation</li> <li>Raisby Formation</li> <li>Yellow Sands Formation</li> <li>Northern England Late Carboniferous Tholeiitic Dyke-swarm</li> <li>Pennine Upper Coal Measures Formation</li> <li>Grindstone Post Member</li> <li>Severly Fathom Post Member</li> <li>High Main Post Member</li> <li>Masfild Coal</li> <li>Durham Low Main Coal</li> <li>Hulton Coal</li> <li>Pennine Middle Coal Measures Formation</li> <li>Harvey Coal</li> <li>Bustly coal</li> <li>Brockwell Coal</li> <li>Pennine Lower Coal Measures</li> <li>Stairmore Formation</li> <li>Milstone Grit</li> <li>Shibboleth Coal</li> <li>Alston Formation</li> <li>Woodend Limestone</li> <li>Tyne Limestone Formation</li> <li>Dun Limestone Member</li> <li>Scremerston Coal Member</li> <li>Fawcett Coal (Northumberland)</li> <li>Blackhill Coal (Northumberland)</li> <li>Bulman Main Coal (Northumberland)</li> <li>Cooper Eye Coal (Northumberland)</li> <li>Fell Sandstone Formation</li> </ul>	<b>Aquifer</b>
<b>CARBONIFEROUS</b>		



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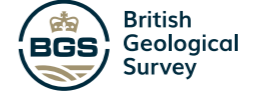
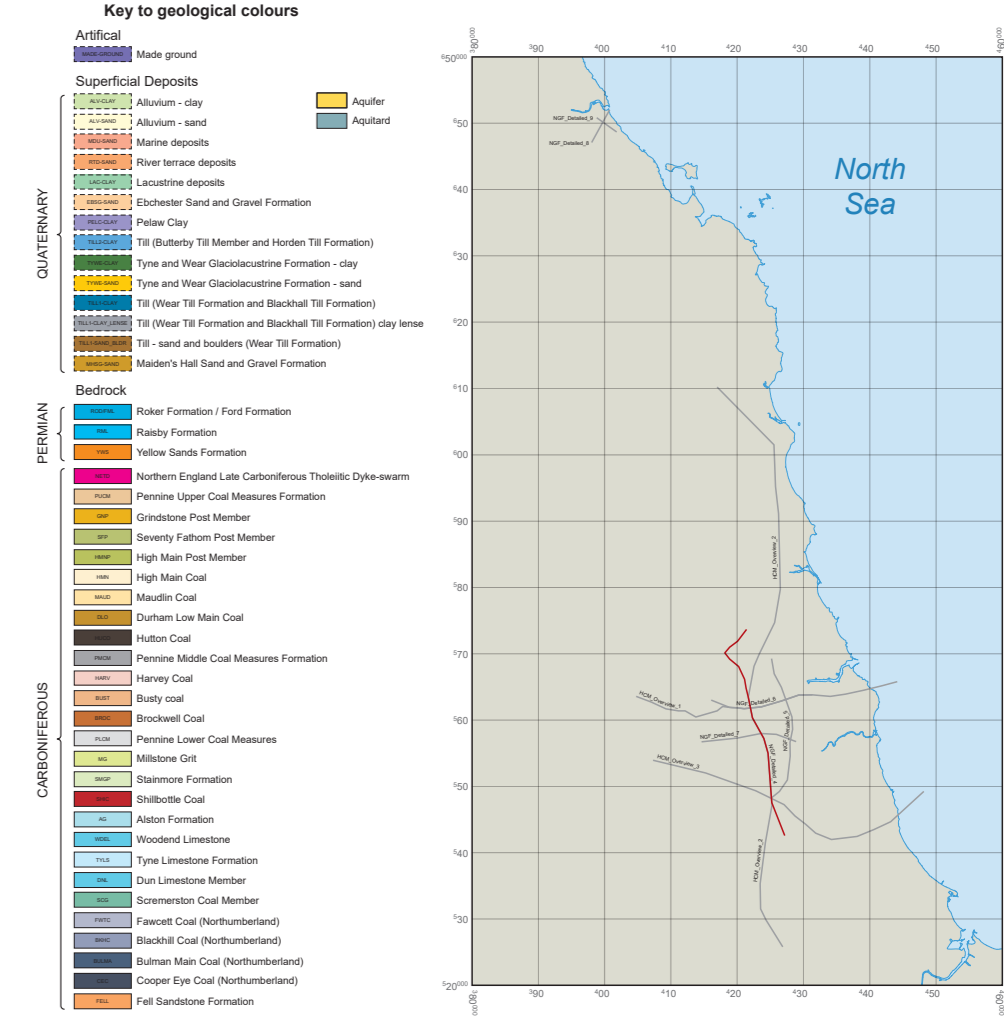
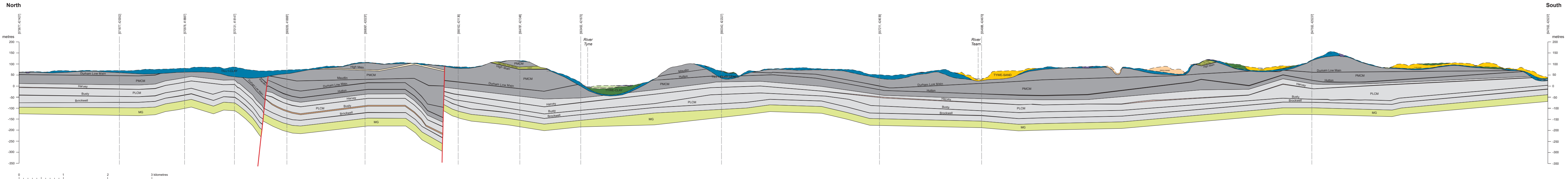
CROSS SECTIONS SHOWING THE GENERAL RELATIONS OF ROCKS ALONG THE LINE 'HCM\_Overview\_2'  
Horizontal scale 1:50 000, vertical exaggeration 5x



**Key to geological colours**

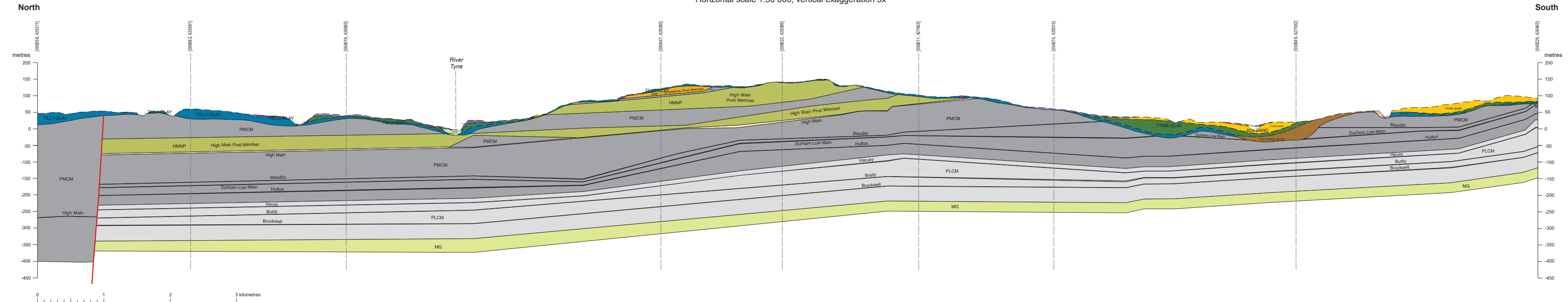
<b>Artificial</b>	Mode ground	Agulter
<b>Superficial Deposits</b>	Alkham - clay	Agulter
	Alkham - sand	
	Marine deposits	
	River terrace deposits	
	Lacustrine deposits	
	Elcheater Sand and Gravel Formation	
	Platze Clay	
	Til (Buttery Till Member and Horden Till Formation)	
	Tyne and Wear Glaciolacustrine Formation - clay	
	Tyne and Wear Glaciolacustrine Formation - sand	
	Til (Wear Till Formation and Blackhall Till Formation)	
	Til - sand and boulders (Wear Till Formation)	
	Meaden's Hall Sand and Gravel Formation	
<b>QUATERNARY</b>	River Formation / Foid Formation	
	Raby Formation	
	Yellow Sands Formation	
	Northern England Late Carboniferous Tholeiitic Dyke-swarm	
<b>PERMIAN</b>	Permian Upper Coal Measures Formation	
	Coniscliffe Post Member	
	Severly Fallow Post Member	
	High Main Coal	
	High Main Post Member	
	Hubton Coal	
	Hubton Post Member	
	Permian Middle Coal Measures Formation	
	Henry Coal	
	Bury coal	
	Permian Lower Coal Measures	
	Blockwell Coal	
	Blockwell Post Member	
	Milstone Grit	
<b>CARBONIFEROUS</b>	Sowerby Formation	
	Shibbottie Coal	
	Ailston Formation	
	Wooden Limestone	
	Dun Limestone Member	
	Scramston Coal Member	
	Fawcett Coal (Northumberland)	
	Blackhall Coal (Northumberland)	
	Sumner Main Coal (Northumberland)	
	Cooper Eye Coal (Northumberland)	
	Fell Sandstone Formation	

**CROSS SECTIONS SHOWING THE GENERAL RELATIONS OF ROCKS ALONG THE LINE 'NGF\_Detailed\_4'**  
Horizontal scale 1:50 000, vertical exaggeration 5x

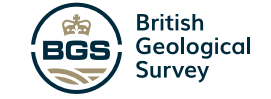
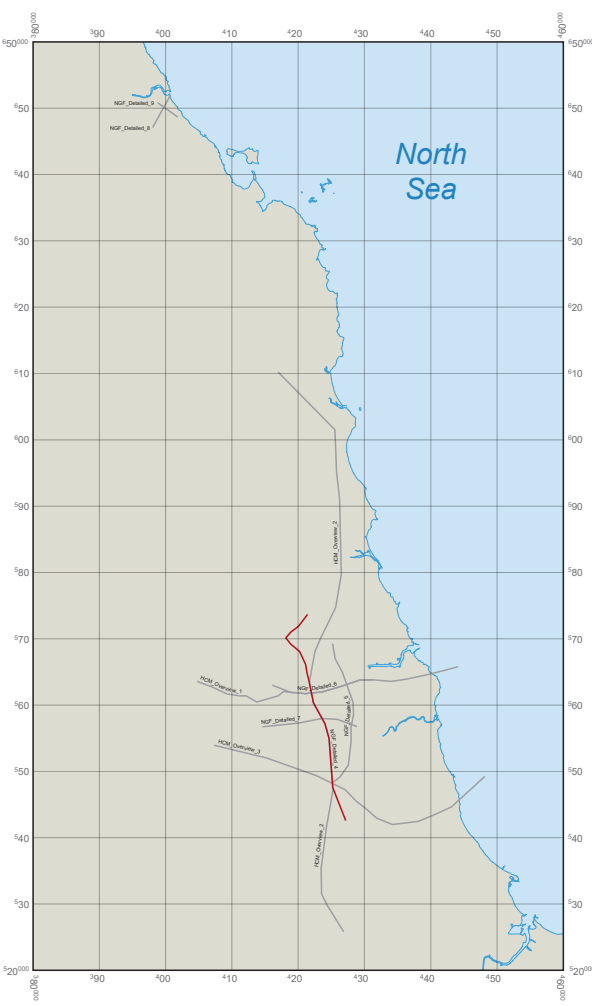


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**CROSS SECTIONS SHOWING THE GENERAL RELATIONS OF ROCKS ALONG THE LINE 'NGF\_Detailed\_4'**  
Horizontal scale 1:50 000, vertical exaggeration 5x

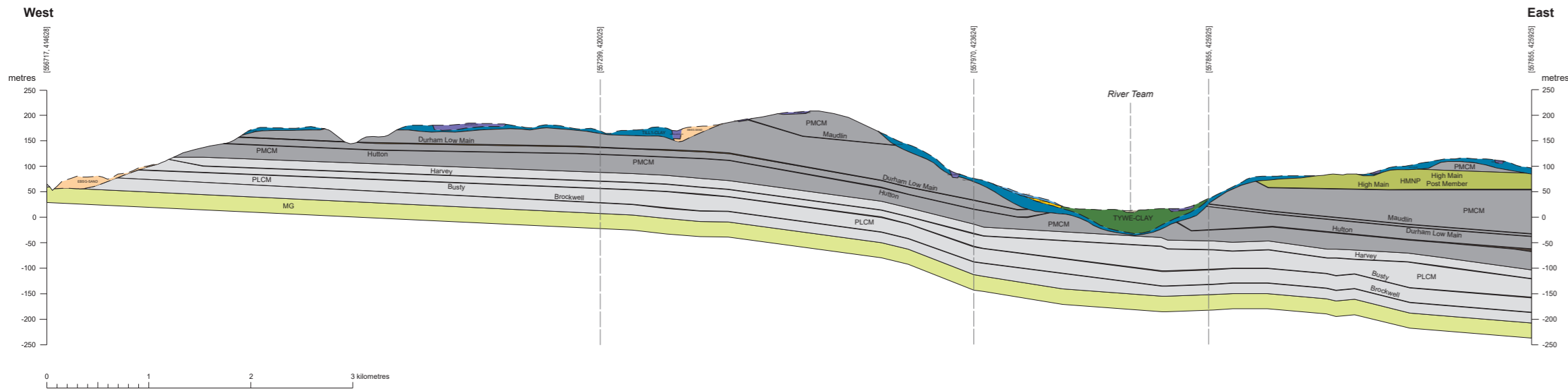


- Key to geological colours**
- Artificial:** Made ground
  - Superficial Deposits:**
    - Alluvium - clay
    - Alluvium - sand
    - Marine deposits
    - River terrace deposits
    - Lacustrine deposits
    - Elchester Sand and Gravel Formation
    - Pelaw Clay
    - Till (Butterby Till Member and Horden Till Formation)
    - Tyne and Wear Glaciolacustrine Formation - clay
    - Tyne and Wear Glaciolacustrine Formation - sand
    - Till (Wear Till Formation and Blackhall Till Formation)
    - Till (Wear Till Formation and Blackhall Till Formation) clay lense
    - Till - sand and boulders (Wear Till Formation)
    - Maiden's Hall Sand and Gravel Formation
  - Bedrock:**
    - Roker Formation / Ford Formation
    - Raisby Formation
    - Yellow Sands Formation
    - Northern England Late Carboniferous Tholeiitic Dyke-swarm
    - Pennine Upper Coal Measures Formation
    - Grindstone Post Member
    - Seventy Fathom Post Member
    - High Main Post Member
    - High Main Coal
    - Maudlin Coal
    - Durham Low Main Coal
    - Hutton Coal
    - Pennine Middle Coal Measures Formation
    - Harvey Coal
    - Busty coal
    - Brockwell Coal
    - Pennine Lower Coal Measures
    - Millstone Grit
    - Stainmore Formation
    - Shillbottle Coal
    - Alston Formation
    - Woodend Limestone
    - Tyne Limestone Formation
    - Dun Limestone Member
    - Scremerston Coal Member
    - Fawcett Coal (Northumberland)
    - Blackhall Coal (Northumberland)
    - Bulman Main Coal (Northumberland)
    - Cooper Eye Coal (Northumberland)
    - Fell Sandstone Formation
- Legend:** Yellow box = Aquifer, Blue box = Aquitard



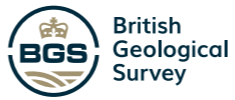
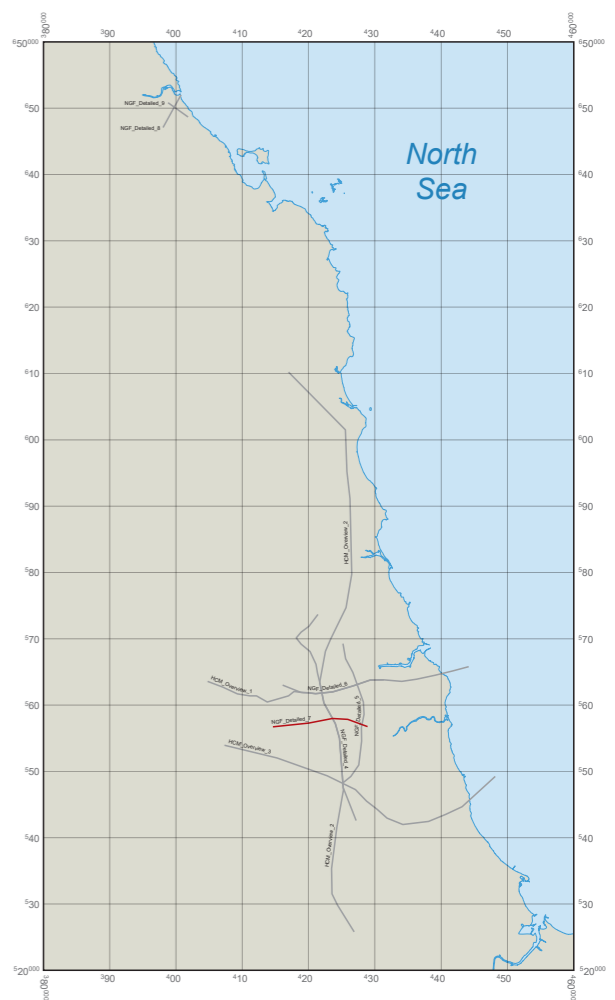
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**CROSS SECTIONS SHOWING THE GENERAL RELATIONS OF ROCKS ALONG THE LINE 'NGF\_Detailed\_7'**  
Horizontal scale 1:50 000, vertical exaggeration 5x



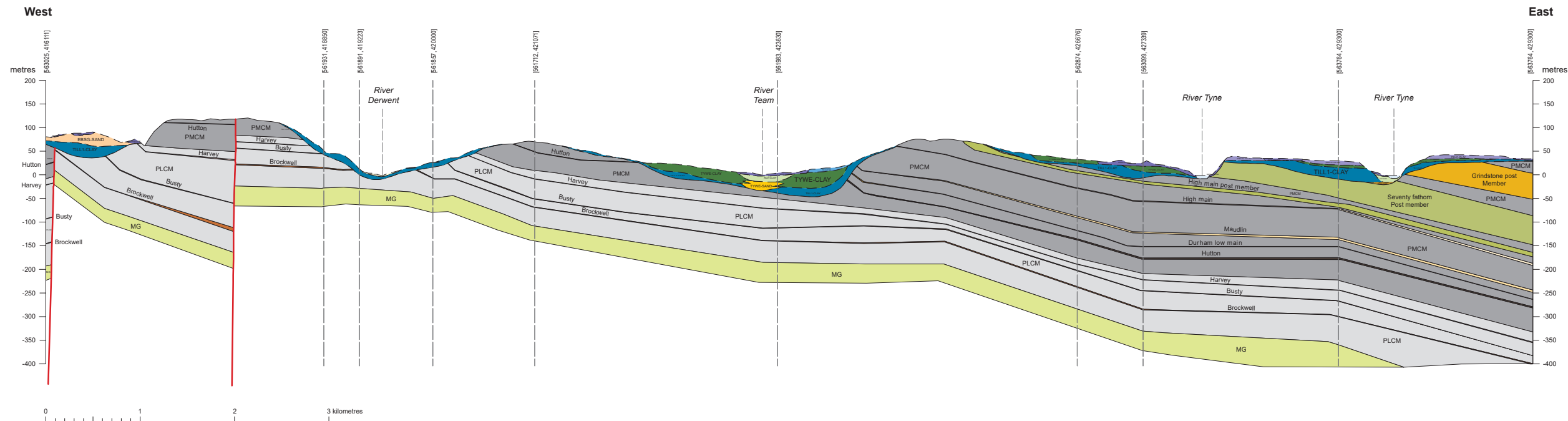
**Key to geological colours**

Geological Group	Formation	Colour	Notes	
QUATERNARY	Artificial	Blue	Made ground	
	Superficial Deposits	ALUCLAY	Light Green	Alluvium - clay
		ALUSAND	Light Yellow	Alluvium - sand
		MDLSAND	Light Blue	Marine deposits
		RTSD	Orange	River terrace deposits
		LACSD	Light Green	Lacustrine deposits
		ESGSD	Light Green	Ebchester Sand and Gravel Formation
		PELCLAY	Purple	Pelaw Clay
		BTM	Blue	Till (Butterby Till Member and Horden Till Formation)
		TWCLAY	Dark Green	Tyne and Wear Glaciolacustrine Formation - clay
		TWTSAND	Yellow	Tyne and Wear Glaciolacustrine Formation - sand
	WTTM	Blue	Till (Wear Till Formation and Blackhall Till Formation)	
WTTMCLAY	Light Blue	Till (Wear Till Formation and Blackhall Till Formation) clay lense		
WTTMBSAND	Light Yellow	Till - sand and boulders (Wear Till Formation)		
MHS	Light Yellow	Maiden's Hall Sand and Gravel Formation		
PERMIAN	ROK	Blue	Roker Formation / Ford Formation	
	RAIS	Light Blue	Raisby Formation	
	YSD	Orange	Yellow Sands Formation	
	NEC	Pink	Northern England Late Carboniferous Tholeiitic Dyke-swarm	
	PUUM	Light Yellow	Pennine Upper Coal Measures Formation	
	GRM	Light Yellow	Grindstone Post Member	
	SFM	Light Green	Seventy Fathom Post Member	
	HMP	Light Green	High Main Post Member	
	HMC	Light Yellow	High Main Coal	
	MDC	Light Yellow	Maudlin Coal	
	DLMC	Dark Yellow	Durham Low Main Coal	
	HUT	Dark Yellow	Hutton Coal	
	PMC	Light Yellow	Pennine Middle Coal Measures Formation	
	HRC	Light Yellow	Harvey Coal	
	BUS	Light Yellow	Busty coal	
	BRC	Light Yellow	Brockwell Coal	
	PLC	Light Yellow	Pennine Lower Coal Measures	
	CARBONIFEROUS	MG	Light Green	Millstone Grit
STN		Light Green	Stainmore Formation	
SHB		Dark Red	Shillbottle Coal	
AL		Light Blue	Alston Formation	
WLD		Light Blue	Woodend Limestone	
TYL		Light Blue	Tyne Limestone Formation	
DUN		Light Blue	Dun Limestone Member	
SCC		Light Green	Scremerston Coal Member	
FWC		Light Green	Fawcett Coal (Northumberland)	
BLK		Light Green	Blackhill Coal (Northumberland)	
BUL		Light Green	Bulman Main Coal (Northumberland)	
CEC		Light Green	Cooper Eye Coal (Northumberland)	
FSS	Light Green	Fell Sandstone Formation		

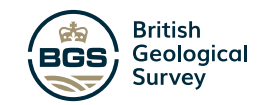
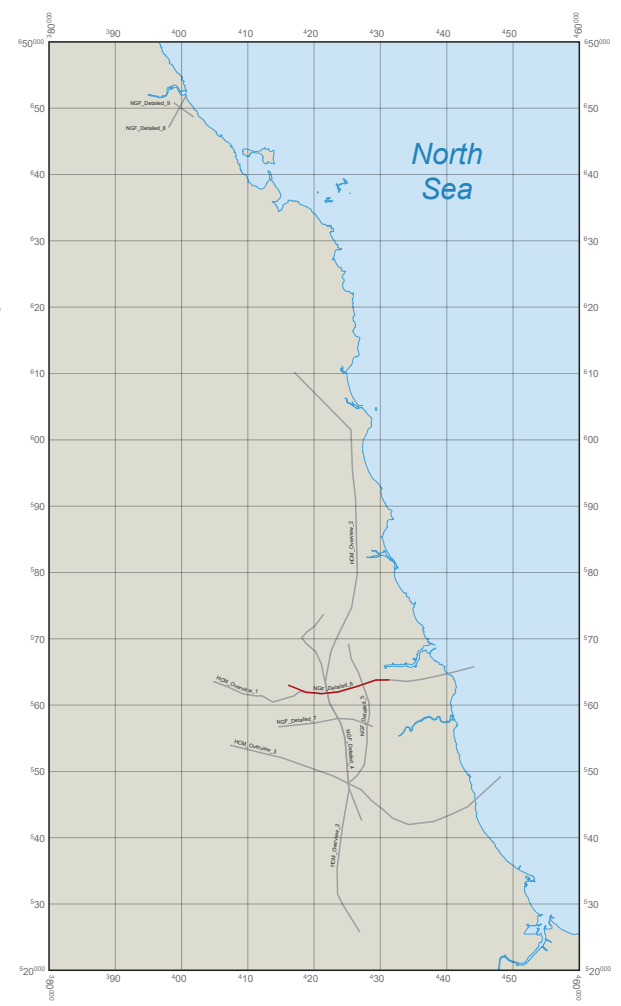


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**CROSS SECTIONS SHOWING THE GENERAL RELATIONS OF ROCKS ALONG THE LINE 'NGF\_Detailed\_6'**  
Horizontal scale 1:50 000, vertical exaggeration 5x



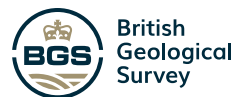
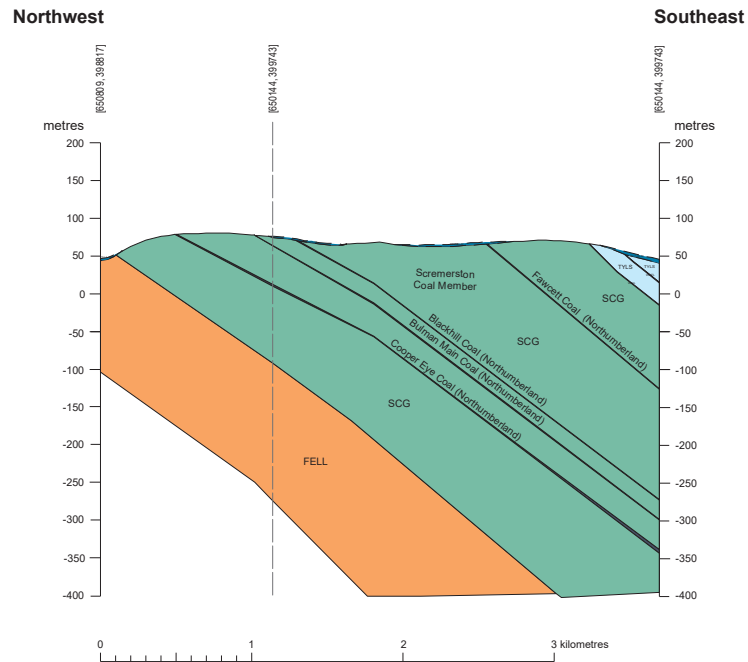
- Key to geological colours**
- Artificial**
    - Made ground
  - Superficial Deposits**
    - Alluvium - clay
    - Alluvium - sand
    - Marine deposits
    - River terrace deposits
    - Lacustrine deposits
    - Ebchester Sand and Gravel Formation
    - Pelaw Clay
    - Till (Butterby Till Member and Horden Till Formation)
    - Tyne and Wear Glaciolacustrine Formation - clay
    - Tyne and Wear Glaciolacustrine Formation - sand
    - Till (Wear Till Formation and Blackhall Till Formation)
    - Till (Wear Till Formation and Blackhall Till Formation) clay lense
    - Till - sand and boulders (Wear Till Formation)
    - Maiden's Hall Sand and Gravel Formation
  - QUATERNARY**
    - Aquifer
    - Aquicard
  - Permian**
    - Roker Formation / Ford Formation
    - Raisby Formation
    - Yellow Sands Formation
    - Northern England Late Carboniferous Tholeiitic Dyke-swarm
    - Pennine Upper Coal Measures Formation
    - Grindstone Post Member
    - Seventy Fathom Post Member
    - High Main Post Member
    - High Main Coal
    - Maudlin Coal
    - Durham Low Main Coal
    - Hutton Coal
    - Pennine Middle Coal Measures Formation
    - Harvey Coal
    - Busty coal
    - Brockwell Coal
    - Pennine Lower Coal Measures
    - Millstone Grit
    - Stainmore Formation
    - Shillbottle Coal
    - Alston Formation
    - Woodend Limestone
    - Tyne Limestone Formation
    - Dun Limestone Member
    - Scremerston Coal Member
    - Fawcett Coal (Northumberland)
    - Blackhill Coal (Northumberland)
    - Bulman Main Coal (Northumberland)
    - Cooper Eye Coal (Northumberland)
    - Fell Sandstone Formation
  - CARBONIFEROUS**



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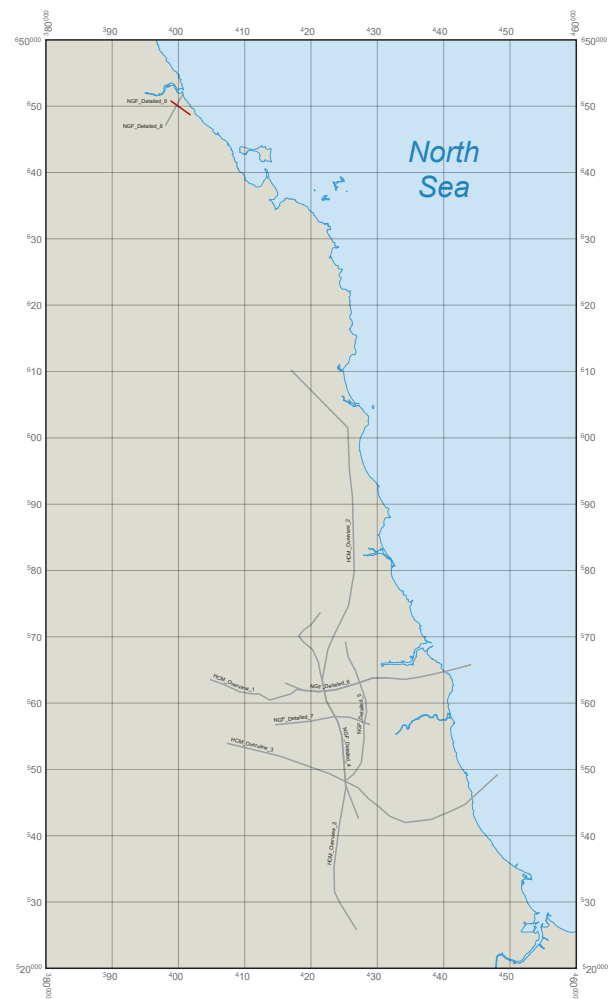
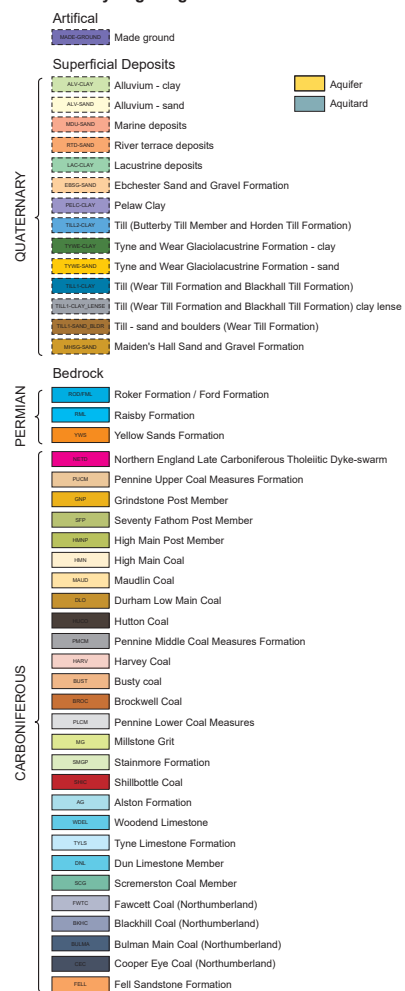
# CROSS SECTIONS SHOWING THE GENERAL RELATIONS OF ROCKS ALONG THE LINE 'NGF\_Detailed\_9'

Horizontal scale 1:50 000, vertical exaggeration 5x



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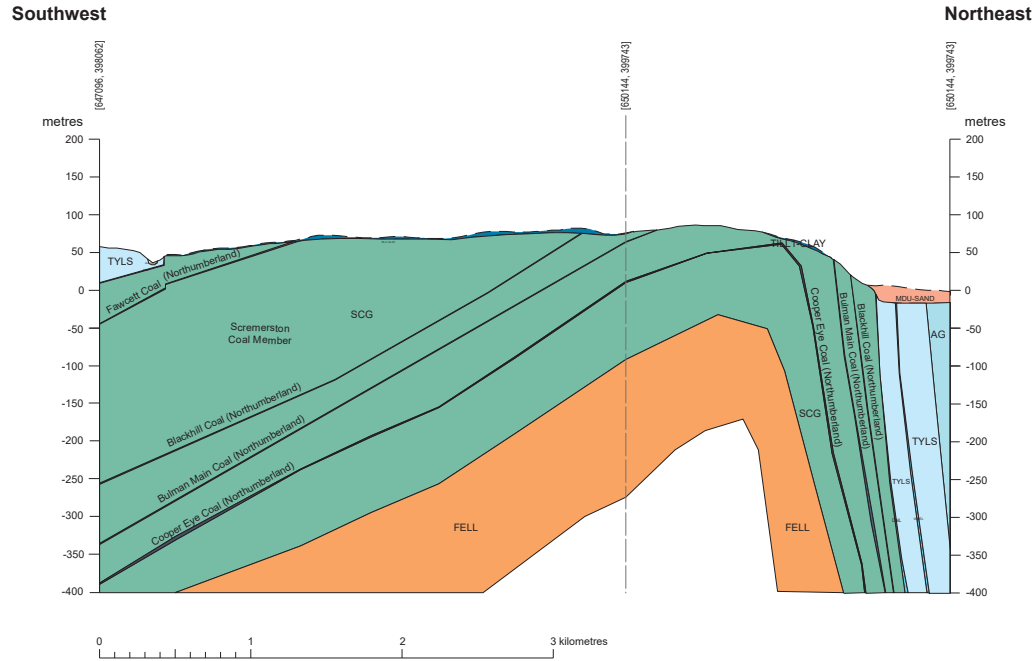
## Key to geological colours





# CROSS SECTIONS SHOWING THE GENERAL RELATIONS OF ROCKS ALONG THE LINE 'NGF\_Detailed\_8'

Horizontal scale 1:50 000, vertical exaggeration 5x



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## Key to geological colours

