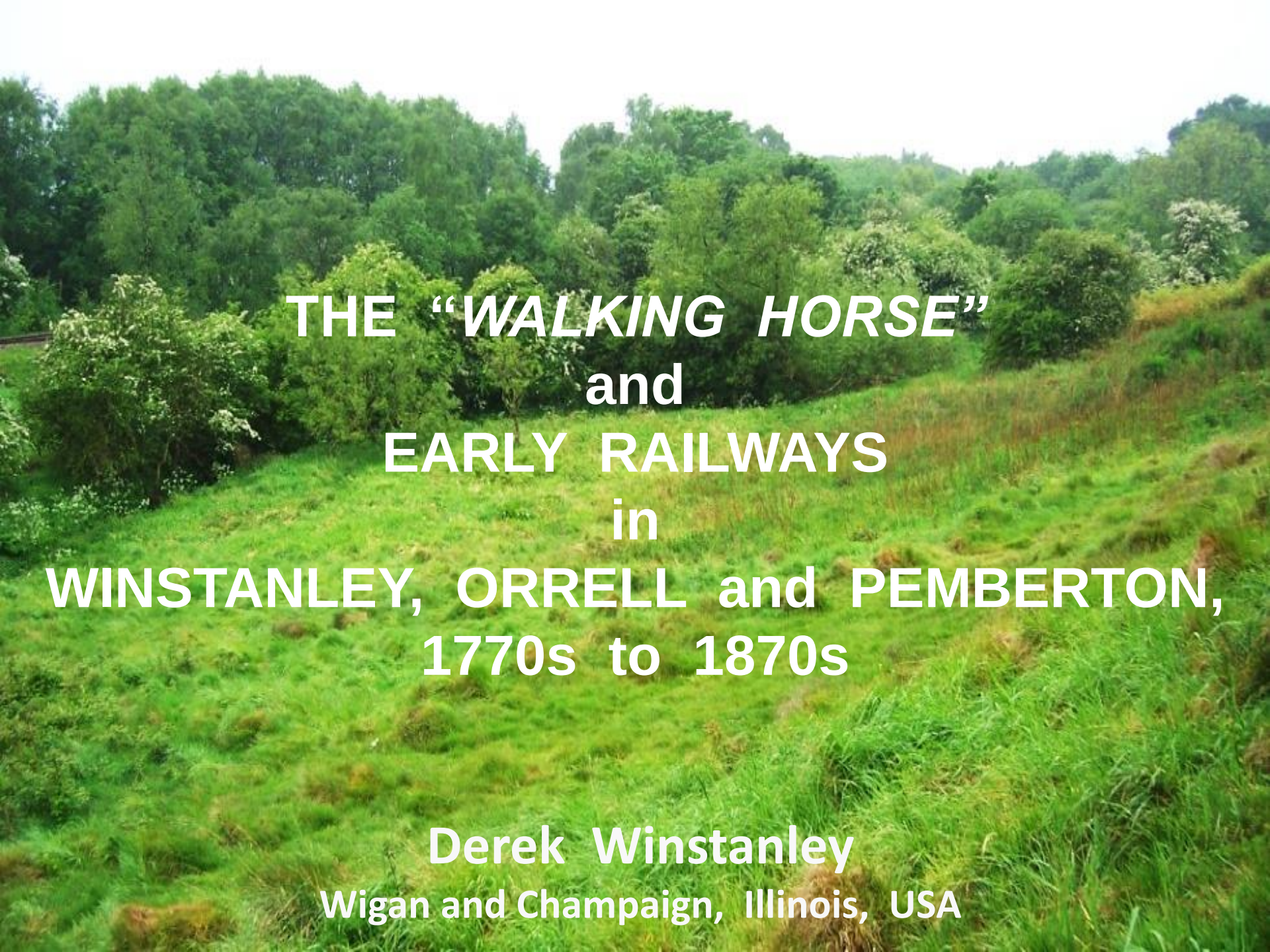
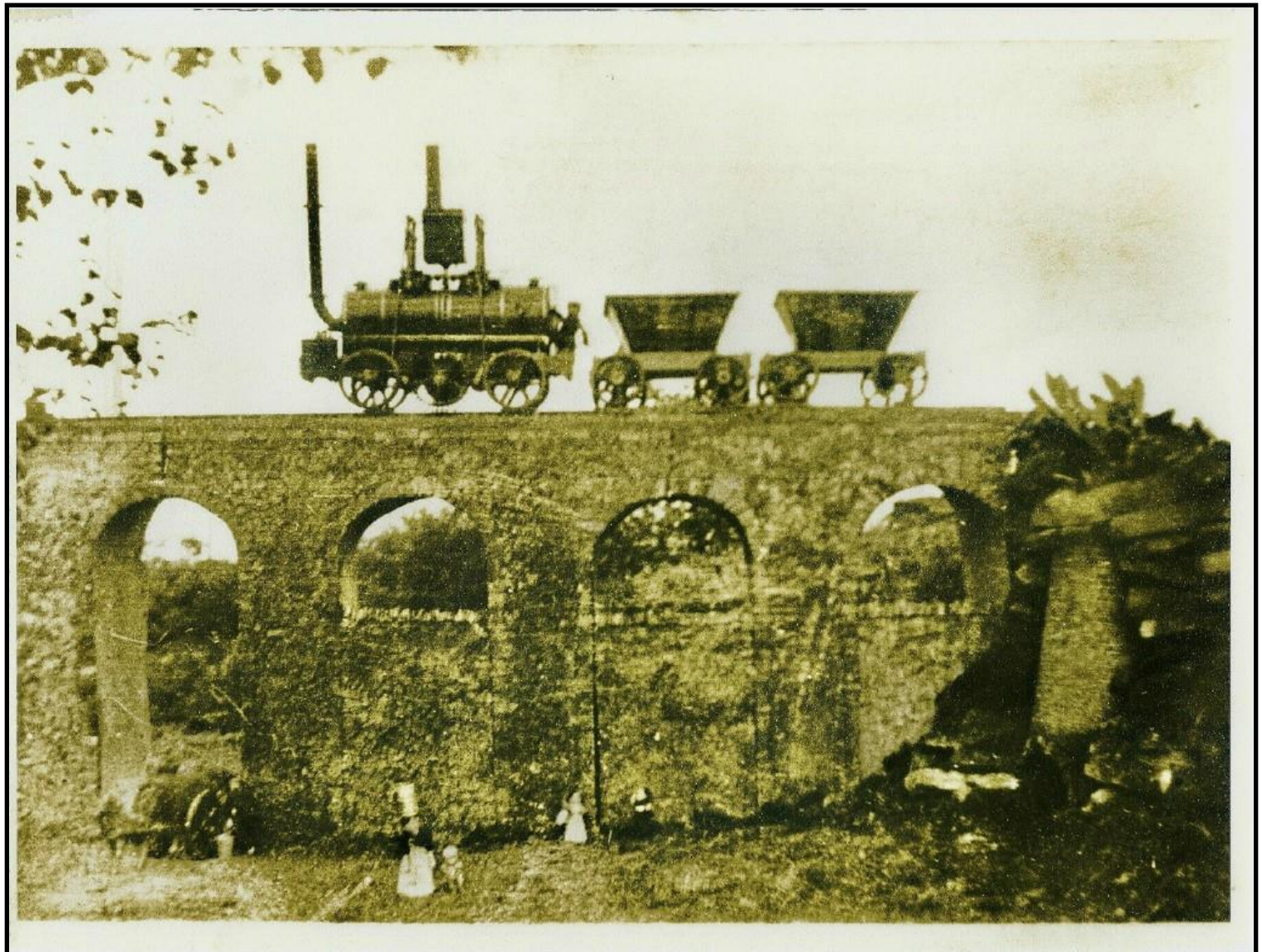


THE "*WALKING HORSE*" and EARLY RAILWAYS in WINSTANLEY, ORRELL and PEMBERTON, 1770s to 1870s

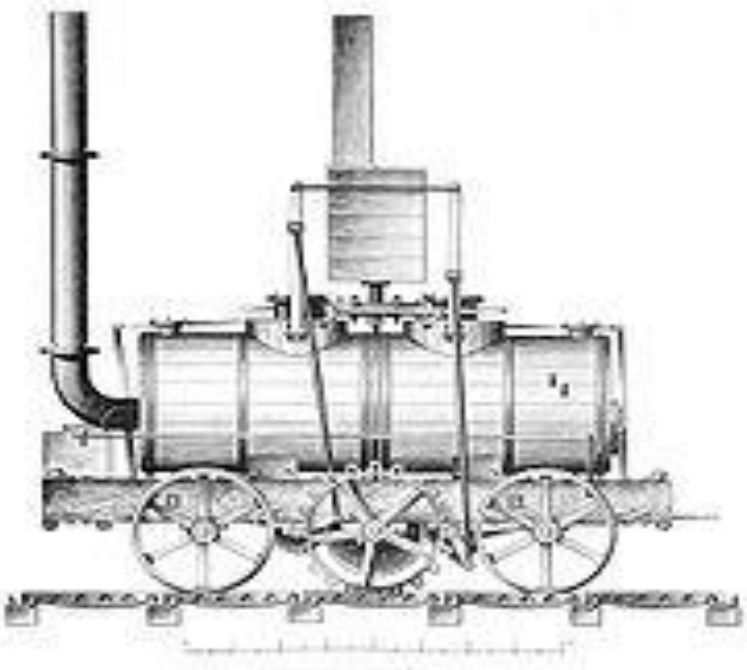
Derek Winstanley
Wigan and Champaign, Illinois, USA

Eli Banks' Model (c.1930s) of *Yorkshire Horse* on Arches Viaduct



MURRAY-BLENKINSOP RACK LOCOMOTIVE ENGRAVING and MODEL

Salamanca (1812);
1829 engraving

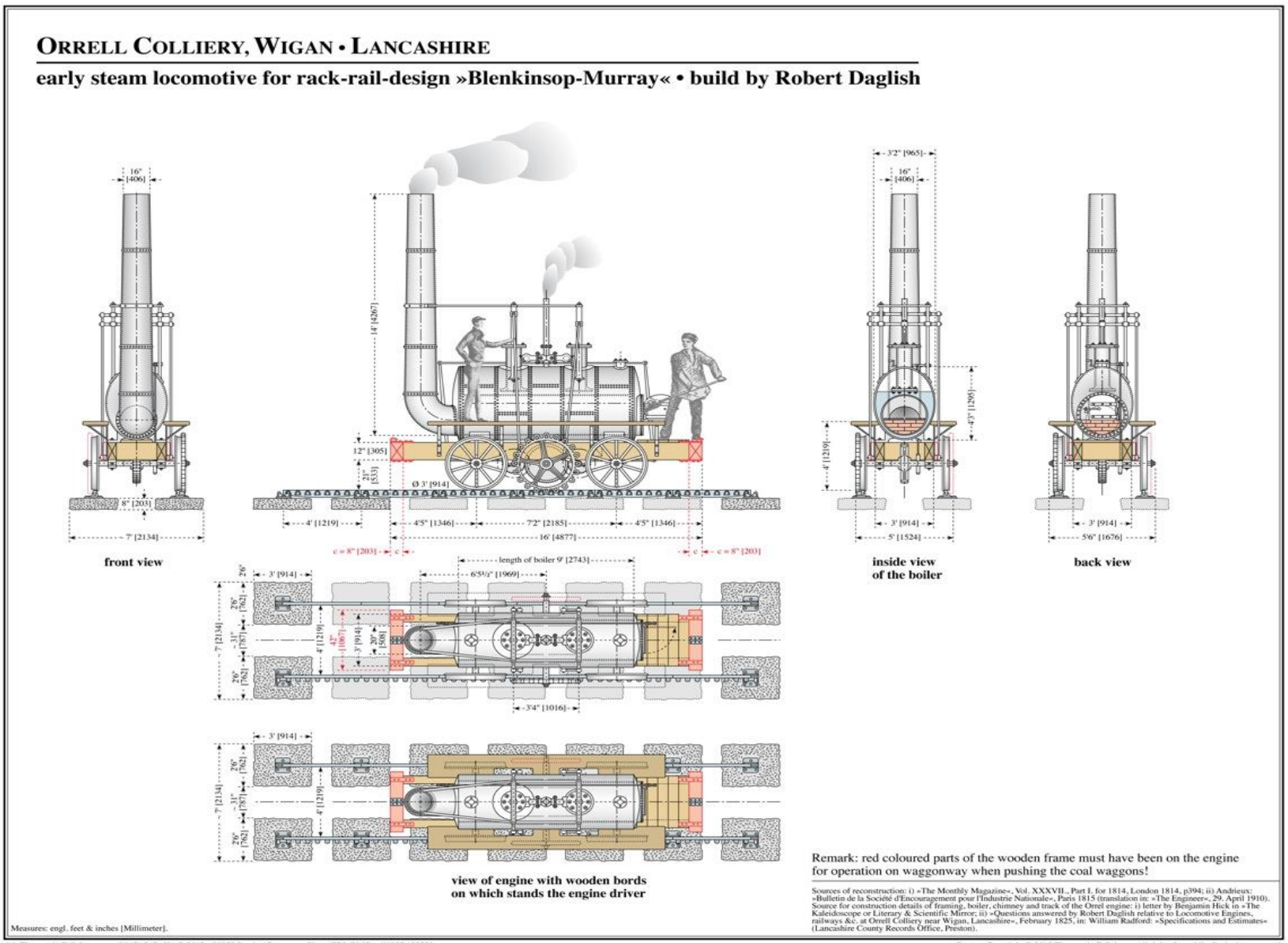


Eli Banks' (c1930s) model of *Yorkshire Horse* in Beamish Museum

Model made to drawings supplied by South Kensington Museum

BLENKINSOP-MURRAY STEAM LOCOMOTIVE

(copy right Thomas Scherer, Germany)



Sources of reconstruction: i) »The Monthly Magazine«, Vol. XXXVII., Part I, for 1814, London 1814, p394; ii) Andrieux: »Bulletin de la Société d'Encouragement pour l'Industrie Nationale«, Paris 1815 (translation in: »The Engineer«, 29. April 1910). Source for construction details of framing, boiler, chimney and track of the Orrel engine: i) letter by Benjamin Hick in »The Kaleidoscope or Literary & Scientific Mirror; ii) »Questions answered by Robert Daglish relative to Locomotive Engines, railways &c. at Orrell Colliery near Wigan, Lancashire«, February 1825, in: William Radford: »Specifications and Estimates« (Lancashire County Records Office, Preston).

- **Daglish's steam locomotive is very much neglected in world early-railway history.**
- **Banks made a model of the Murray/Blenkinsop *Yorkshire Horse*.**
- **Erroneous description of Daglish's loco by Banks, Anderson and others as a Blenkinsop locomotive.**
- **Daglish's locomotive called *The Walking Horse*.**
- ***The Walking Horse* was different from *The Yourkshire Horse.***
- **Belittling and misleading to call it *The Yorkshire Horse*.**

Mathew Murray and Robert Daglish

- **Fenton, Murray and Woods Engineers, Leeds:**
  - first steam loco working Middleton Colliery June 1812
  - second loco working by December 1812
  - must have started to build 1810
- **Daglish – Manager Winstanley/Orrell Colliery:**
  - first steam loco working January 1813
  - must have started to build 1810/1811
  - no evidence of collaboration Daglish and Murray
  - Daglish's loco more advanced than Murray's

WINSTANLEY/ORRELL COALFIELD

- **JOHN CLARKE:**

  Liverpool banker

  Invested in Orrell & Winstanley coalfield and railways starting 1789 at Crooke

  Hired Robert Daglish as colliery manager c.1810

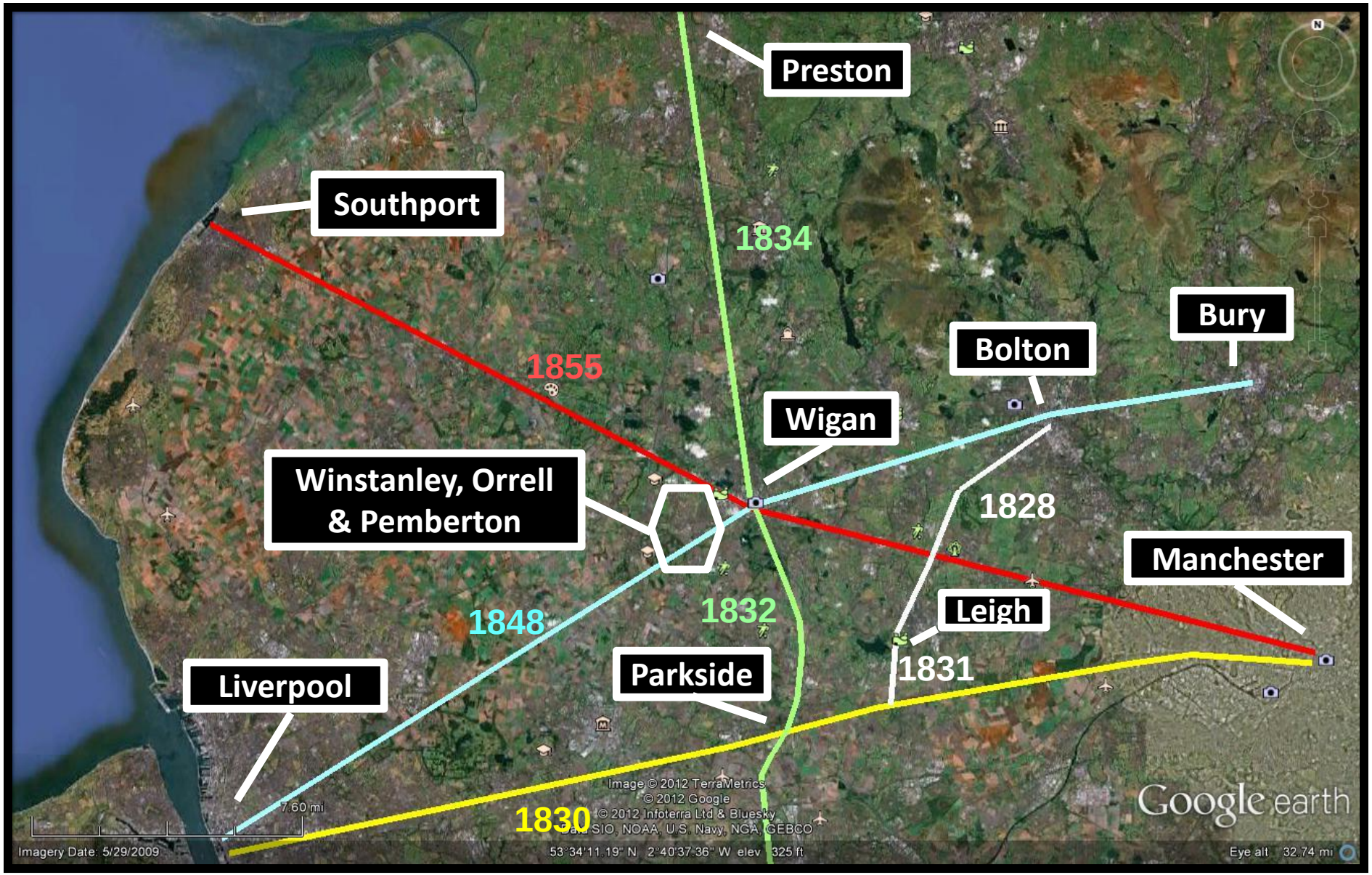
- **ROBERT DAGLISH:**

  Born Northumberland 1779

  Engineer and manager Haigh Foundry 1804

  Colliery manager Orrell and Winstanley c.1810

PUBLIC RAILWAYS 1828-1855



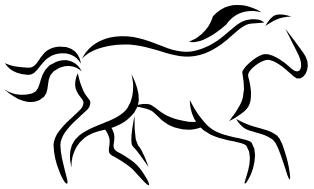
SPATIAL and TEMPORAL EVOLUTION of RAILWAYS

[WITH 2013 HINDSIGHT]

1770 1870

INDUSTRIAL REVOLUTION

Gravity +



steam locos

coal, iron & steel

JANUARY
1813

'W'er wi edin, lads?'

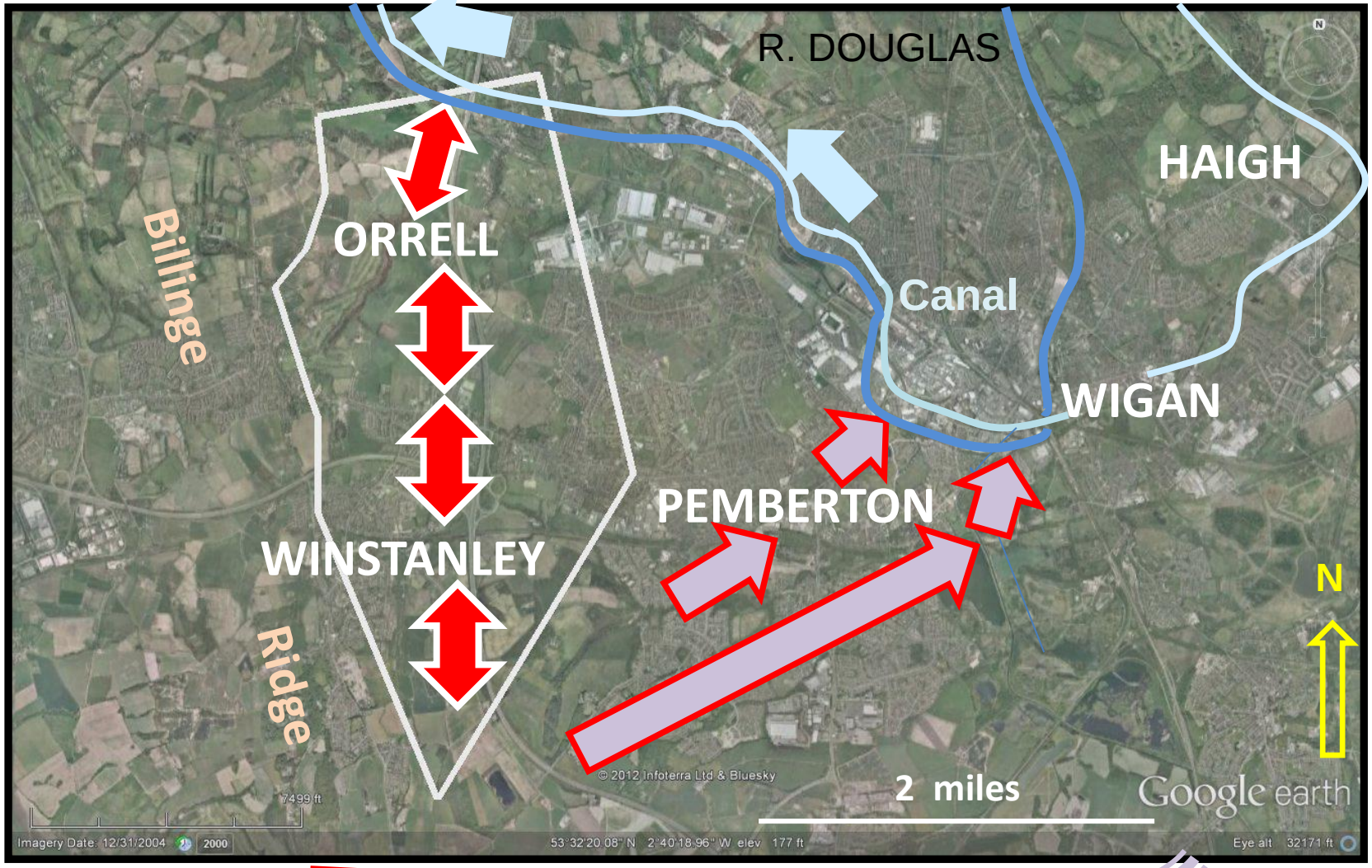
"Steam locomotion is a pure waste of time."
James Watt, 1800

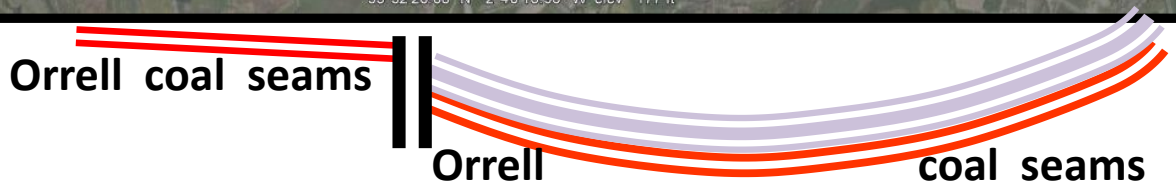
"I think there is a world market for maybe five computers."
Thomas Watson, chairman of IBM, 1943

GROWTH of LIVERPOOL

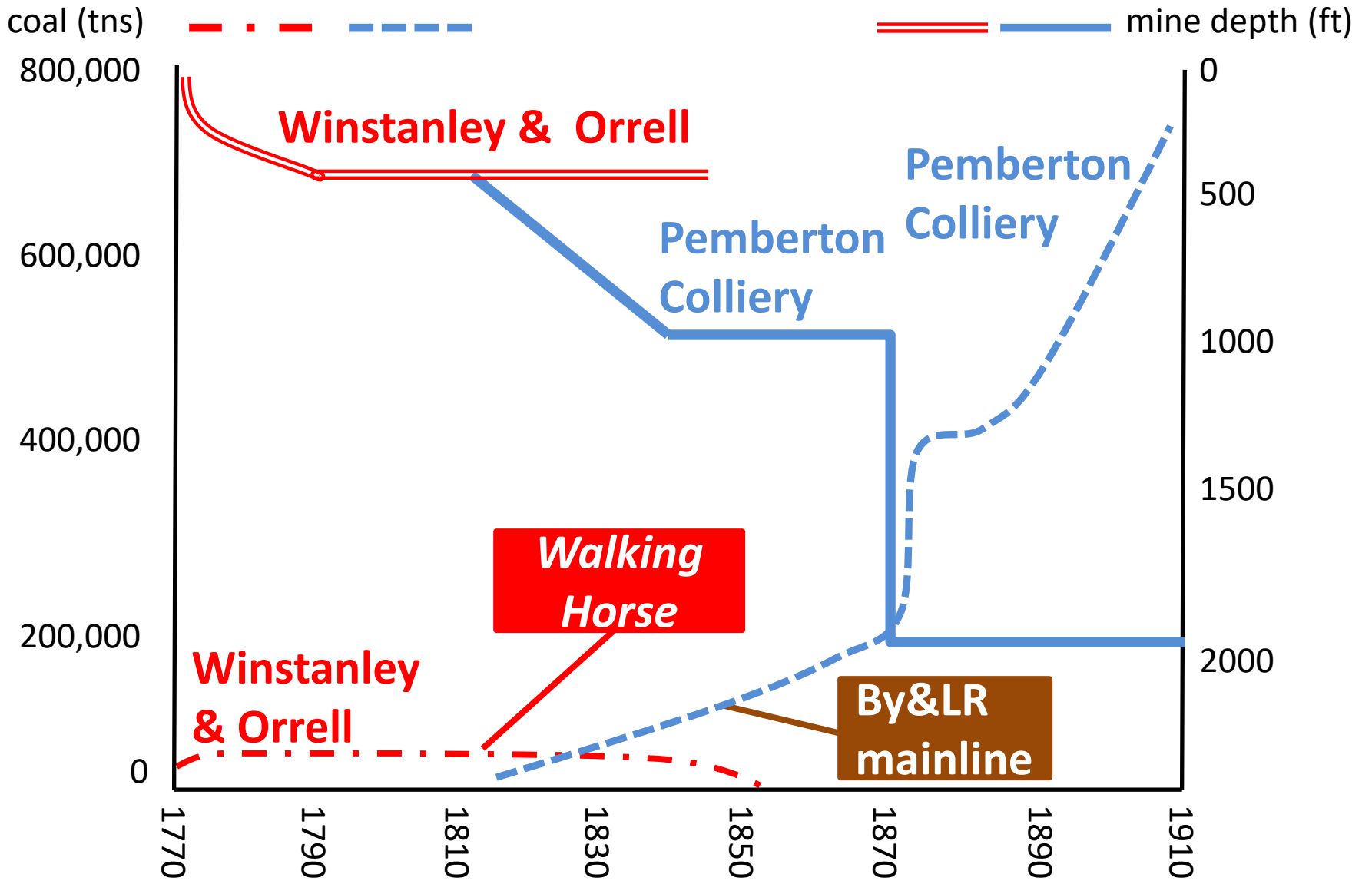
	1700	*1821*
POPULATION	6,000	150,000
SHIPPING TONNAGE	9,000	840,000

MINING AND TRANSPORT OF COAL PRIOR TO MAINLINE RAILWAYS

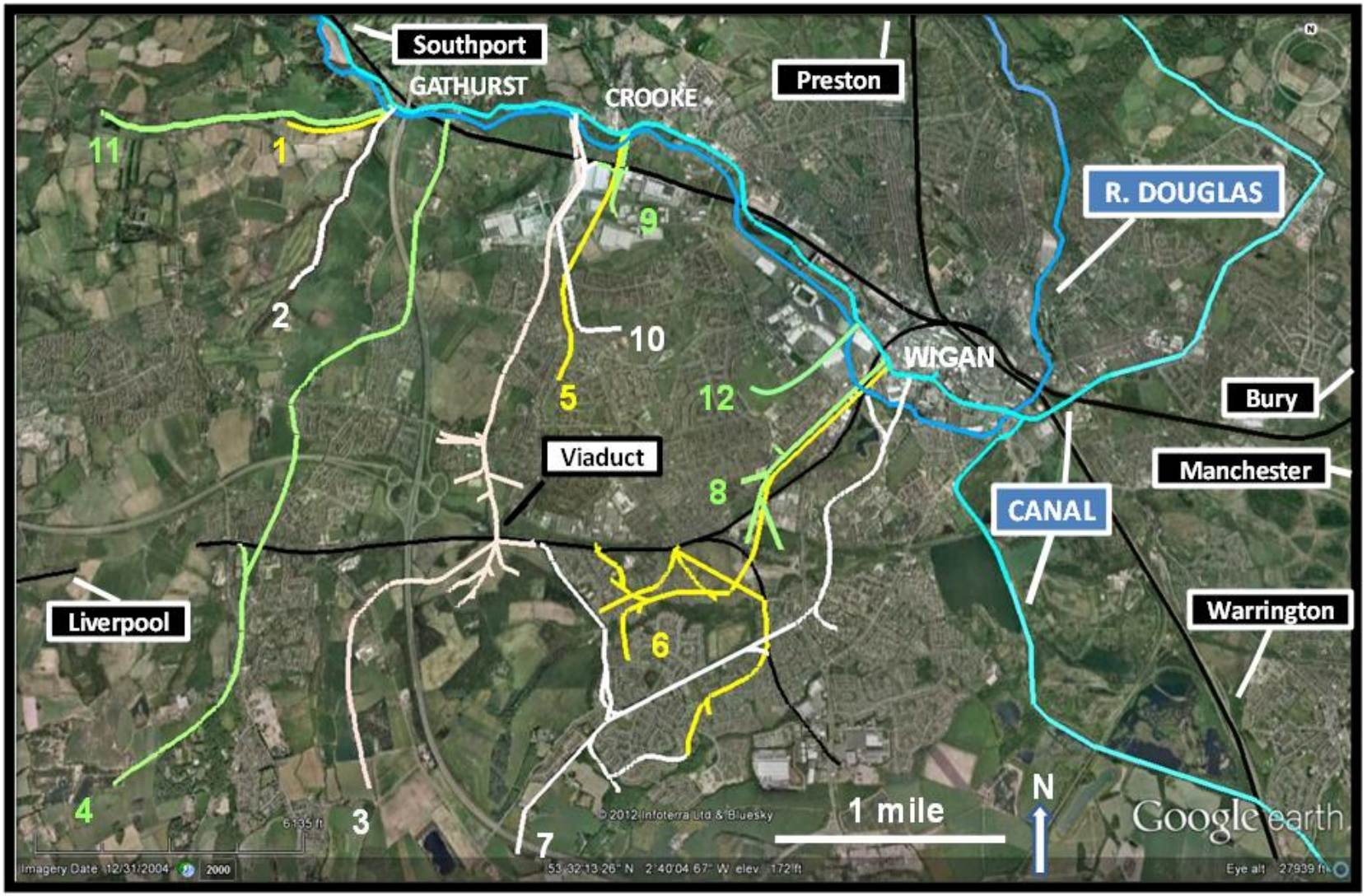




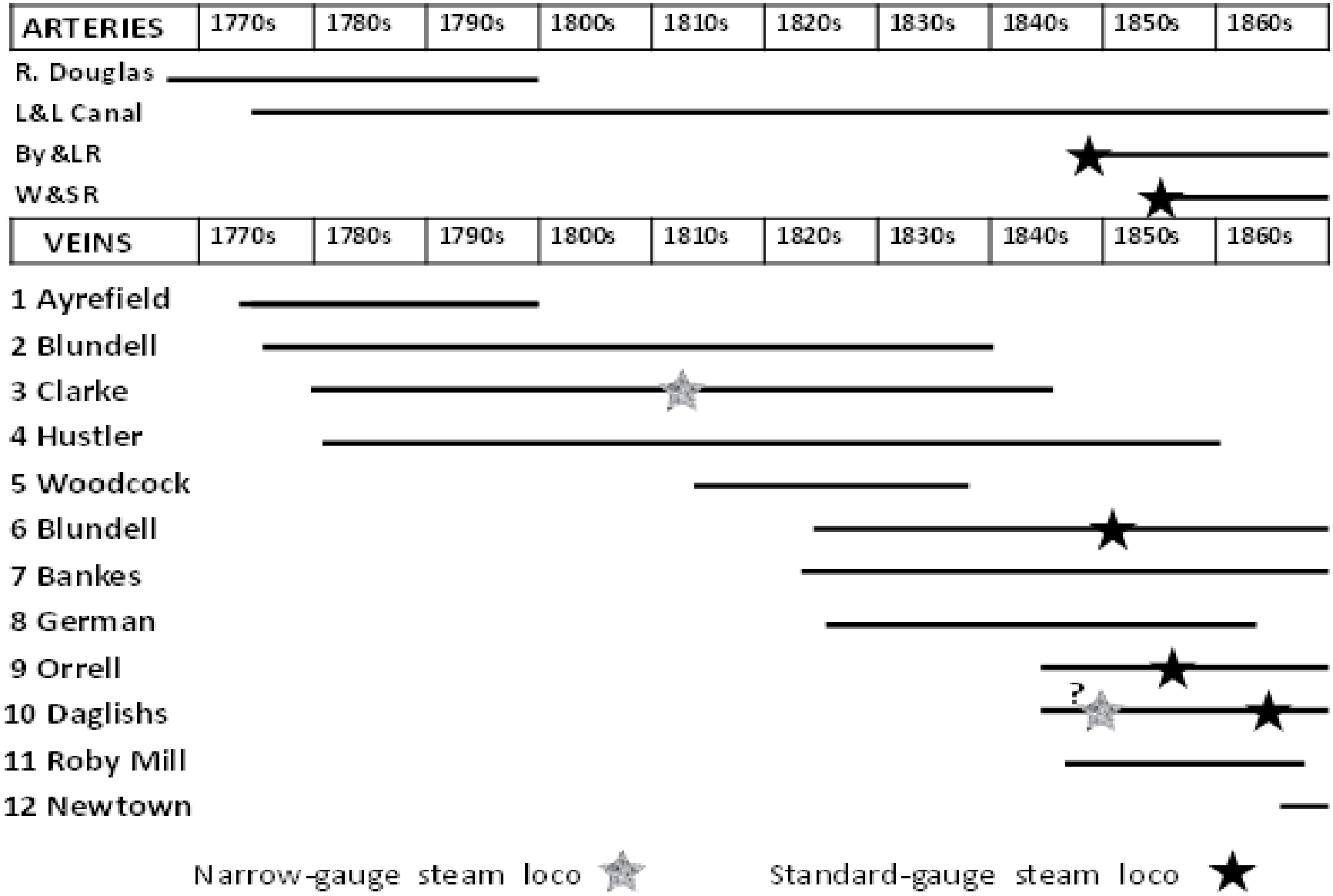
Mine depths and coal production at large collieries on the Winstanly & Orrell Coalfield and at Blundell's Pemberton Colliery



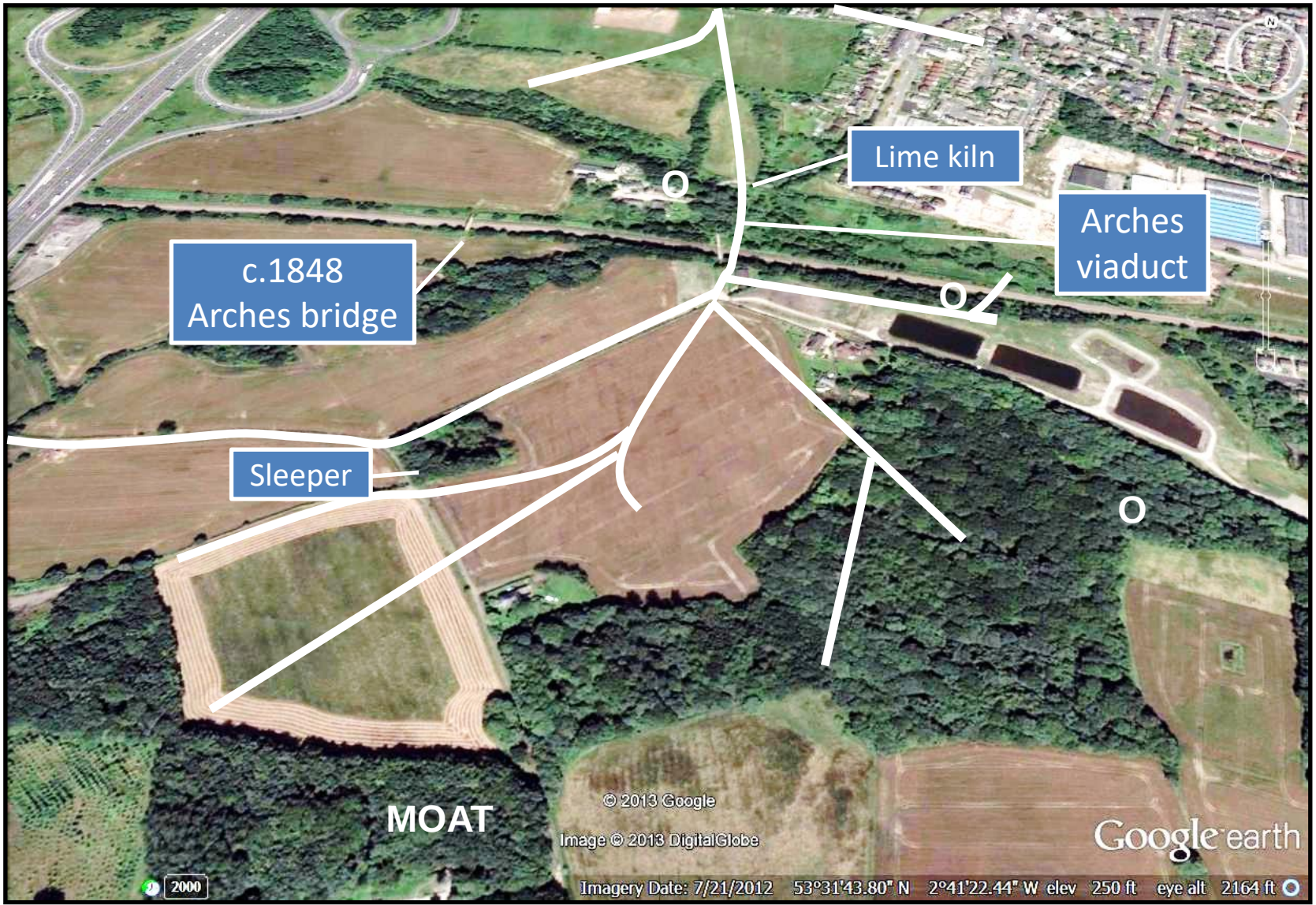
WATERWAYS and RAILWAYS 1770-1870



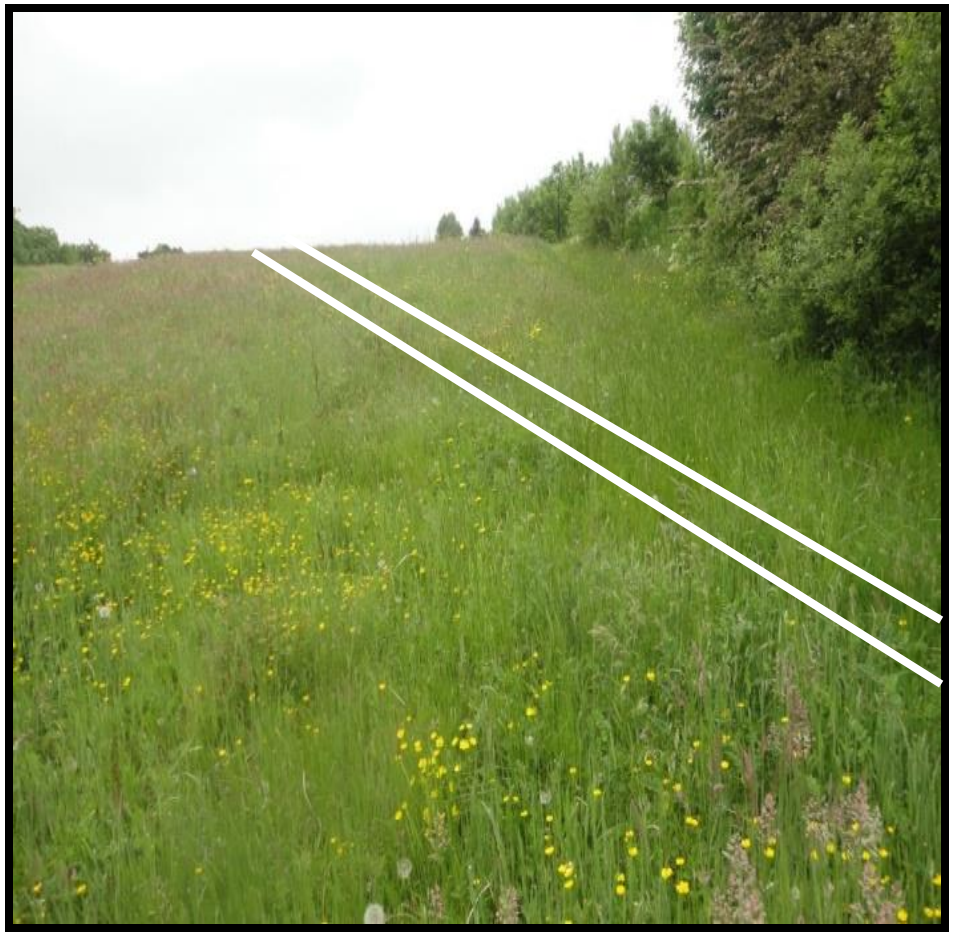
WATERWAYS and RAILWAYS



PINGOT AREA

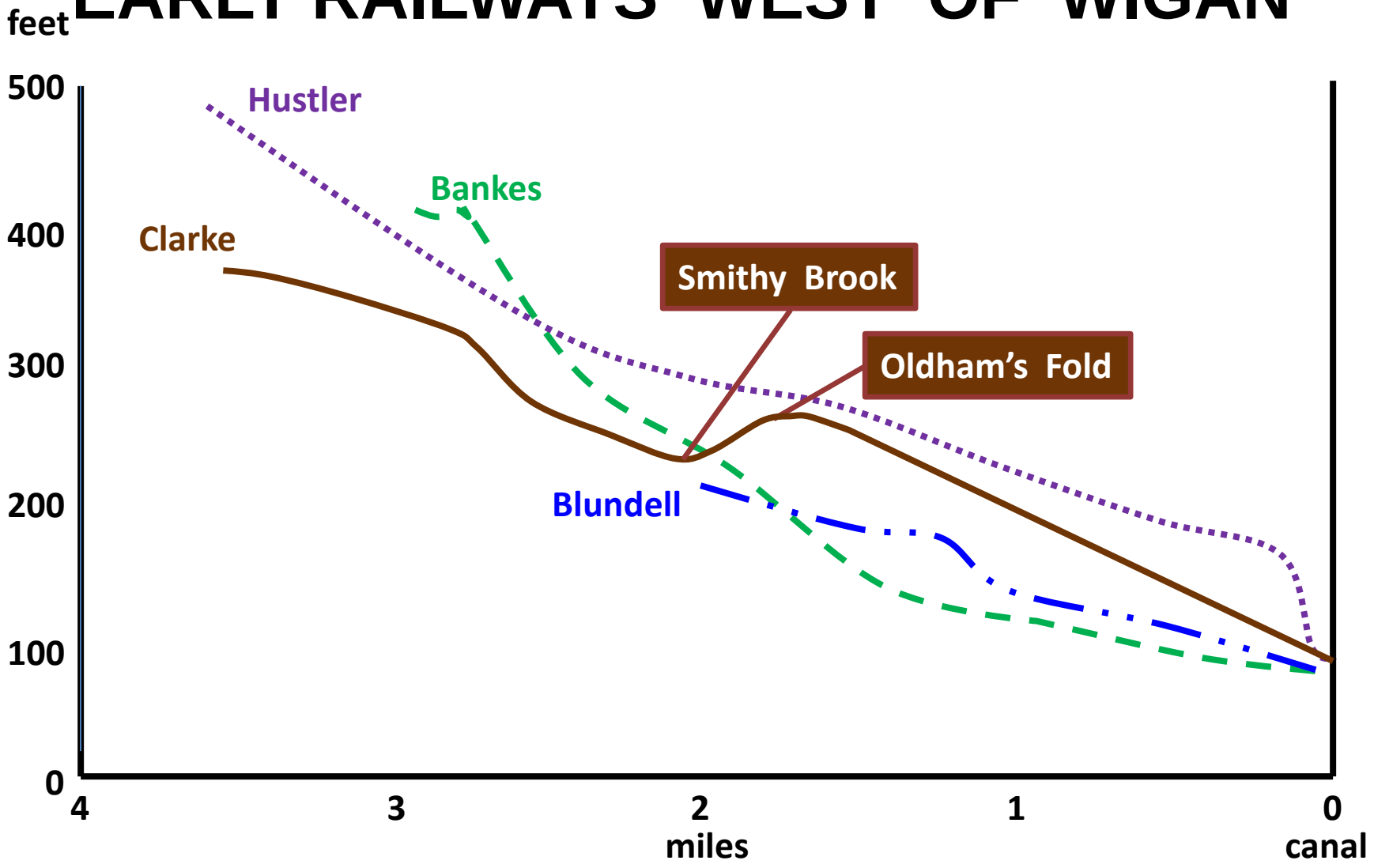

Lime kiln
Arches viaduct
c.1848 Arches bridge
Sleeper
MOAT
© 2013 Google
Image © 2013 DigitalGlobe
Google earth
2000
Imagery Date: 7/21/2012 53°31'43.80" N 2°41'22.44" W elev 250 ft eye alt 2164 ft

SMITHY BROOK VALLEY

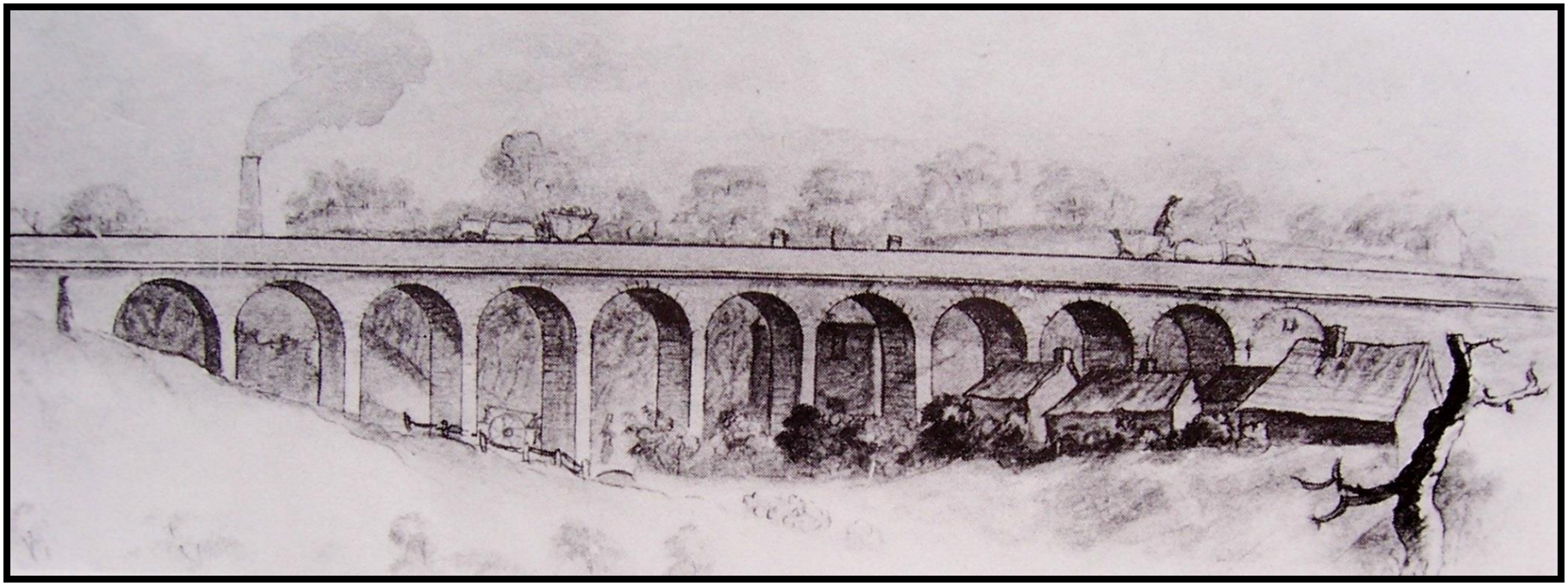


Route of Clarke's railway up the north side of Smithy Brook Valley: >4 per cent incline.

ELEVATION PROFILES FOR FOUR EARLY RAILWAYS WEST OF WIGAN



THE ARCHES VIADUCT (c.1790s – c.1890)
Smithy Brook Valley



Wigan Public Library etching in Anderson 1975, p. 116
[Publisher, Moorland Publishing, out of business;
Wigan Public Library no longer holds the etching.]

	Trevithick/Murray/ Blenkinsop 1812	Trevithick/Daglish/ Blenkinsop 1812
Weight engine	4-5 tn	6-7 tn
Engine	4 (6) hp	8 hp
Boiler (oval)	114 x37x32 in; cast iron; 55 lb. p.s.i.	108x51x38 in; wrought iron.
Chimney diameter	14 in; cast iron	20 in (bottom) to 16 in (top); wrought iron.
Feed pump	No	Brass: diameter 2 in; stroke 4 in
Coal (lb per hour)	93	140
Water evaporation (gal per lb coal)	0.59 – 0.80	0.25
Rails	3 ft?, 4 ft?; some 6 ft; cast iron with rack on left; fish belly?	4 ft ; cast iron with rack on left; fish belly
Weight of rails (per yard)	Plain: 40 lb; cog 56 lb.	Plain 50 lb; cog 59 lb.
Pedestal	Plain 6 lb; cog 14 lb	Plain 12 lb; cog 18 lb
Stone sleepers	18-20 x 20.5-22 x 8.5-11in	30-36 in square and 8 in thick; chairs fixed by means of through bolts
Operational performance	Haul 74-94 tn on level	Haul 96 tn on level; haul 42 tn up 4% incline

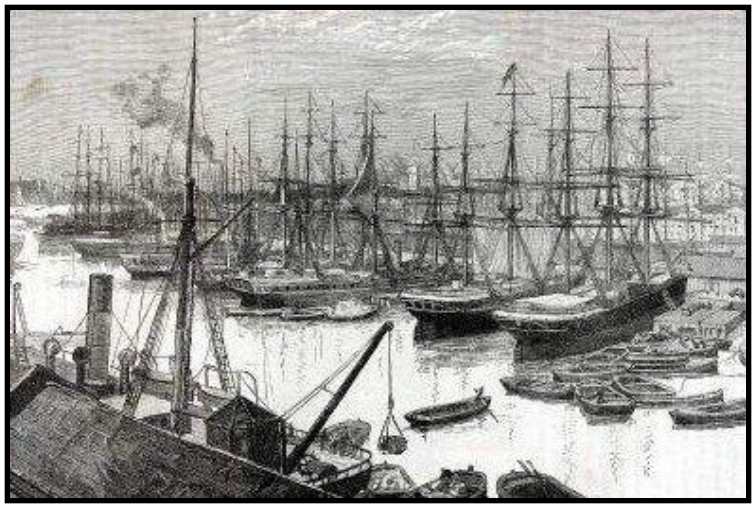
ECONOMICS

- 15 horses needed ~50 tons fodder per year.
- 1800: Blundell's Orrell Colliery horses = 35% of colliery costs.
- Grain prices England surged 90% from 1800 to 1812.
- 1813: Daglish paid 38-85% more for oats than in the 1790s.
- Price for horses rose from £14 in 1771-89 to £26 in early 19th century at Middleton Colliery.
- 1812: cost of 1 mile of tracks + 1 steam engine in Winstanley = £2,195 = cost of 1 large pumping engine.
- *Walking Horse* cost same as 16 horses or 8 men.
- Savings £300-500 per year per engine over horses.
- Price of coal doubled 1790 - 1815 and revenues increased.
- 1804-15: Clarke's Colliery average profit of £11,000.
- 1816: great fall in prices after end of Napoleonic war caused Clarke's bankruptcy and probably reduced incentives for steam locos.

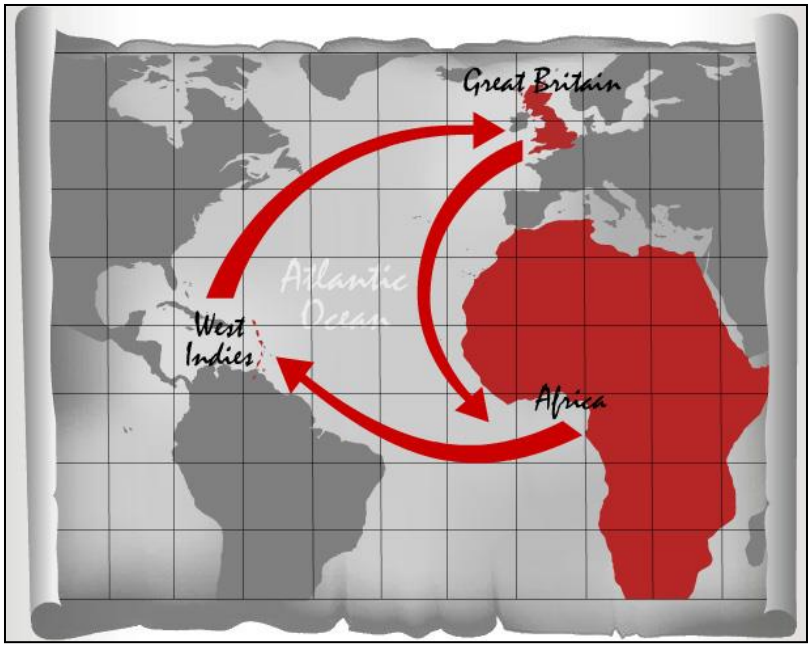
SOURCES OF CAPITAL FOR CANAL, COLLIERIES, RAILWAYS AND FOUNDRY

- LOCAL landowners, bankers, merchants and businessmen
- 'FOREIGN' engineers and wool merchants (Hardcastle, Hustler, Longbotham, Haliburton)
- LIVERPOOL merchants and bankers who engaged in and/or benefited from slave trade: Blundell, Earle, Chaffers, Warren, Brancker, Leyland, Clarke
- LAND OWNERS who became rich from land leases: Bankes
- EARL of BALCARRES owner of Haigh Foundry – Governor of Jamaica 1994-1801 – owned hundreds of slaves and plantations

LIVERPOOL SLAVE TRADE



http://www.canalscape.net/Liverpool%20Link/LR%20Liverpool%20Docks%20-%20Old.jpg



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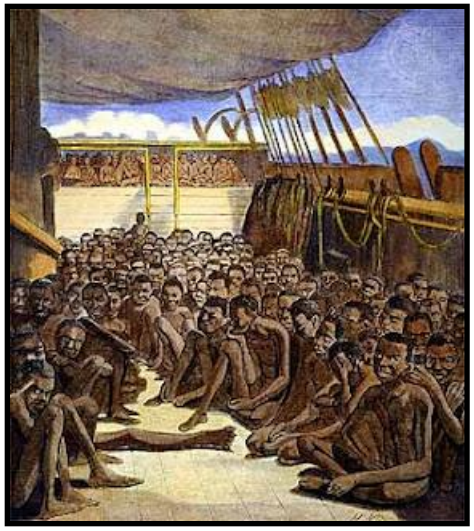

http://3.bp.blogspot.com/_xHhjcK7y3XM/Rq94oWHIU4I/AAAAAAAAAz0/8dhR8vuDi7k/s320/slave+ship.jpg

1695 to 1807:
5,300 voyages from Liverpool transported ~1.5 million slaves

CLARKE/DAGLISH RAILWAY

- *The Arches Viaduct* – 1st railway viaduct (c.1790s) and 1st steam locomotive viaduct (January 1813) in world
- *The Walking Horse* January 1813
  - 1st steam loco to be built and operate in Lancashire
  - 1st steam loco in world to cross a viaduct (stone)
  - 1st steam loco in world to work for 4 decades
  - 1st steam loco in world to haul loaded wagons up 4% incline
  - 3rd commercially successful steam loco in world
  - Significant improvements over Middleton locos
    - more power; wrought iron boiler & chimney; feed pump; stronger rails, pedestals and sleepers
  - George Stephenson adopted wrought-iron boiler & 20 ins flue tube in 1814
  - Daglish: 1st colliery manager to build successful steam loco
- *Haigh Foundry* – 2nd in world to build successful steam loco (1812)

CONCLUSIONS

- **Evolution of early railways shaped by geology, topography, economics, risk taking, unfettered capitalism and money from the slave trade.**
- **Stationary steam engines were necessary for pumping water; early steam locos were cost-saving luxuries.**
- ***The Walking Horse* demonstrated improvements in power, reliability and stamina of early railways.**
- **Engineering advances led to development of a new generation of steam locos and public railways.**

The Mount on Orrell Road built for John Clarke c:1790s

Orrell Lodge (Cottage) west of Oldham's Fold on Orrell Road built for Robert Daglish c.1811

Crooke Hall

UpHolland Parish Church