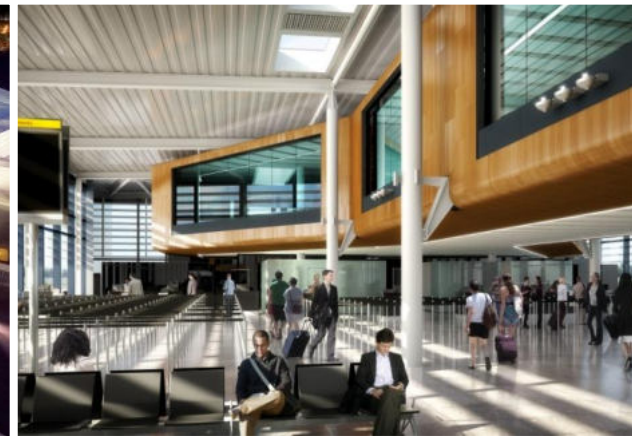


Sharing knowledge  
Heathrow Terminal 2B Site Visit

7 December 2011



**Balfour Beatty**

**Duncan Magrath**

Chief Financial Officer

# Agenda

Heathrow Terminal 2B – Project presentation

Steve O’Sullivan

Discussion with the customer

Steven Morgan, BAA

Safety briefing

Site tour

Knowledge and integrated delivery – a key differentiator

Mike Peasland

Knowledge transfer and inter-divisional synergy

Andrew McNaughton

Tea break

Q&A session

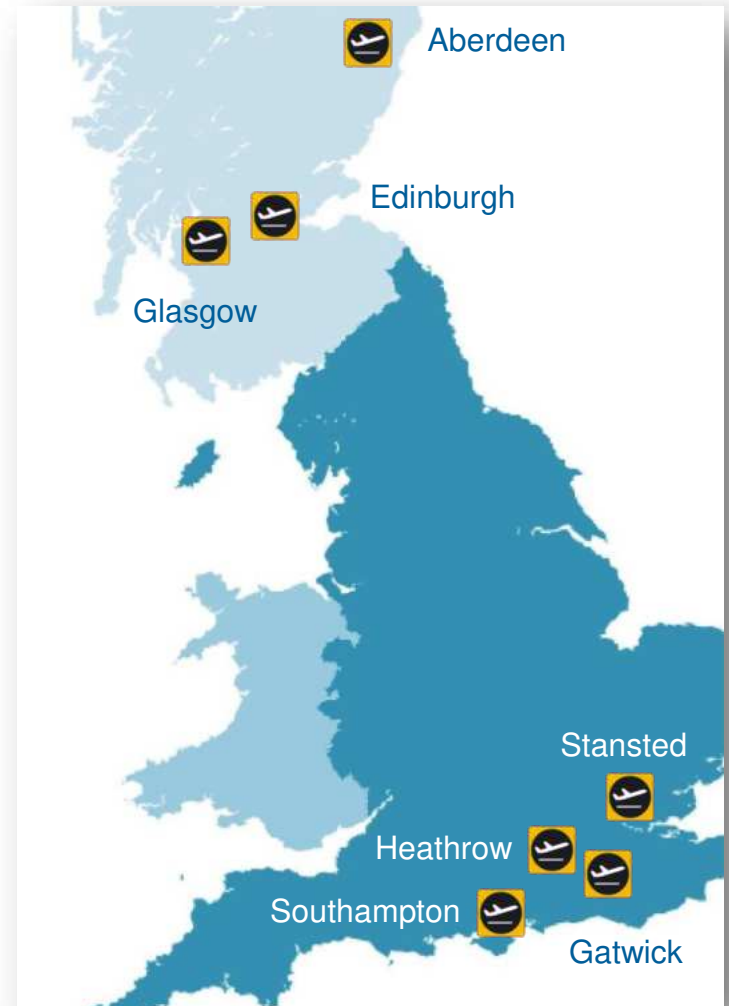
**Balfour Beatty**

**Steve O'Sullivan**

Framework Director

# Developing the BAA relationship

- Early 90's
  - Glasgow airport international pier
- 2003 – Acquisition of Mansell
  - Joined BAA partnering framework
- 2000/05 – Terminal 5, Balfour Beatty 2nd largest contractor
  - Heathrow Express extension (Hex)
  - Piccadilly line Extension (Picex)
  - T5 Main Rail Station
  - Track Transit System T5A to T5B
  - T5 M25 road link (part funded by BAA)
- 2008 - Appointed to the current BAA's 3rd Generation Framework
  - Projects delivered at Heathrow, Edinburgh, Gatwick, Southampton and Stansted
  - Early Contractor Involvement at T2B



# Aerial view of Heathrow – 2014

Existing Western Campus

T5A

T5B

T5C

Existing Central Area

T3

T1

New Eastern Campus

T2A

T2B





# Heathrow's new Terminal 2



# Terminal 2 replacement (T2) at Heathrow



**T2B**



**T2A**



- T2 Programme is a £2bn major capital investment by BAA
- Brings 18 STAR Alliance partners under one roof
- 20m passengers under initial phase
- Replacement of the old 1950's Terminal 2
- Operating by summer 2014
- Built in a Live Airport environment whilst maintaining a safe, efficient operating airport
- Next phase increases passenger numbers to 30m



# T2B – Design and Build by Balfour Beatty



# T2B Phase 1 – Completed by Balfour Beatty

- Phase 1 of development – cost of £95m
- Brought 6 aircraft stands into operations
- Enabled construction of 2nd phase
- Exceptional safety record
- Delivered early, defect-free and to budget





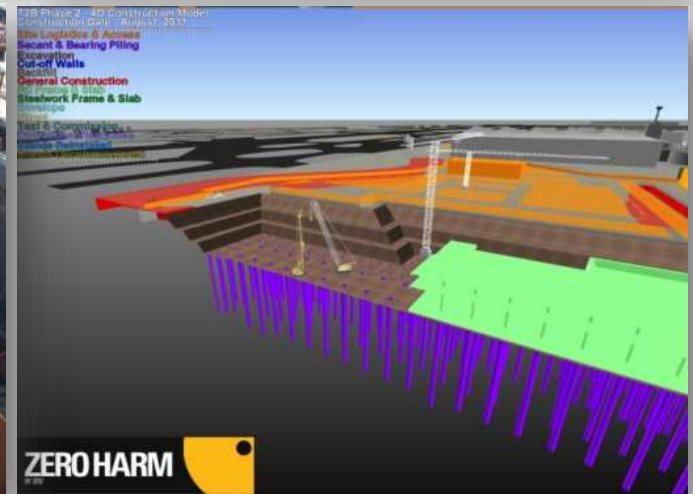
# T2B Phase 2 – Being delivered by Balfour Beatty

- 10 more aircraft stands
- Retail provision of approx. 1,275m<sup>2</sup>
- 3 CIP lounges with 3,600m<sup>2</sup> floor area
- 4,000m<sup>2</sup> of airline ops accommodation
- Safeguarded baggage basement
- Underground passenger access tunnel
- Safeguarding for future Track Transit System and baggage to T2C

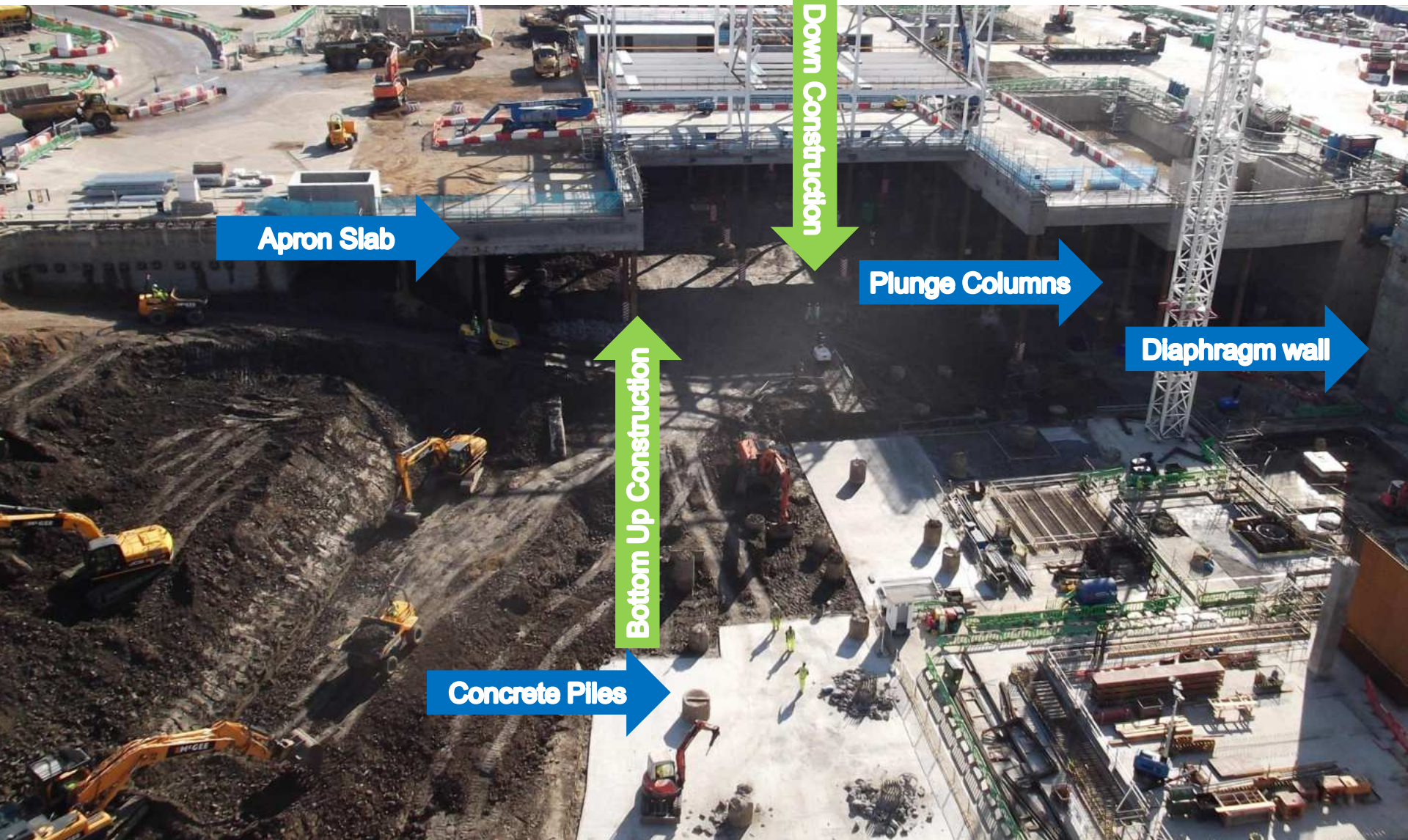


# T2B Phase 2 – Programme challenge

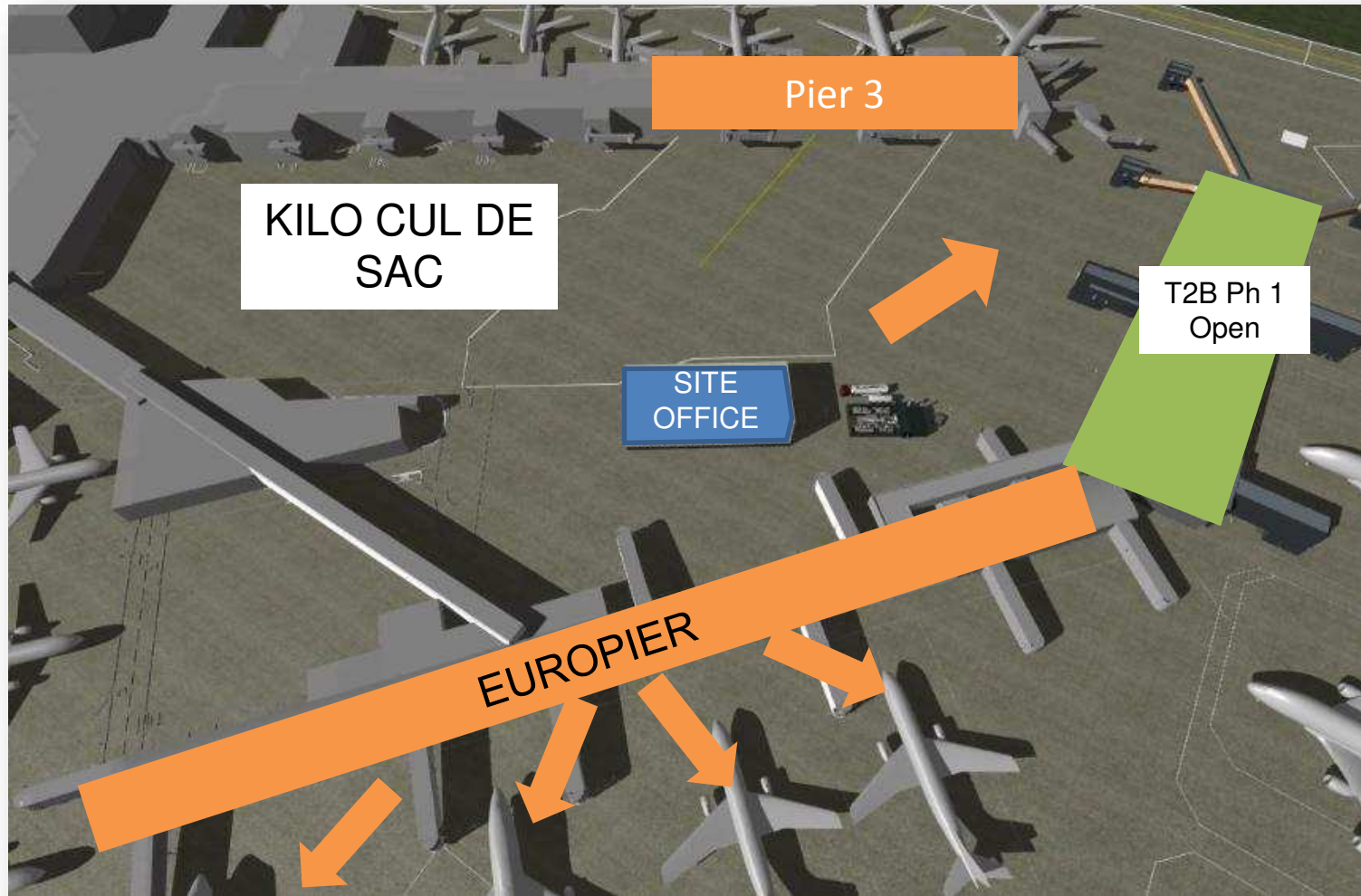
- 30+ active stakeholders
- 90+ design briefs
- Safeguarded baggage facility to T2B and extension to T2C
- Programme demands changed construction techniques
- Open Cut “Bath Tub” replaced with Diaphragm Wall solution
- Longer piles driven from Apron Level (35km of piles)
- Top Down construction introduced in two sections





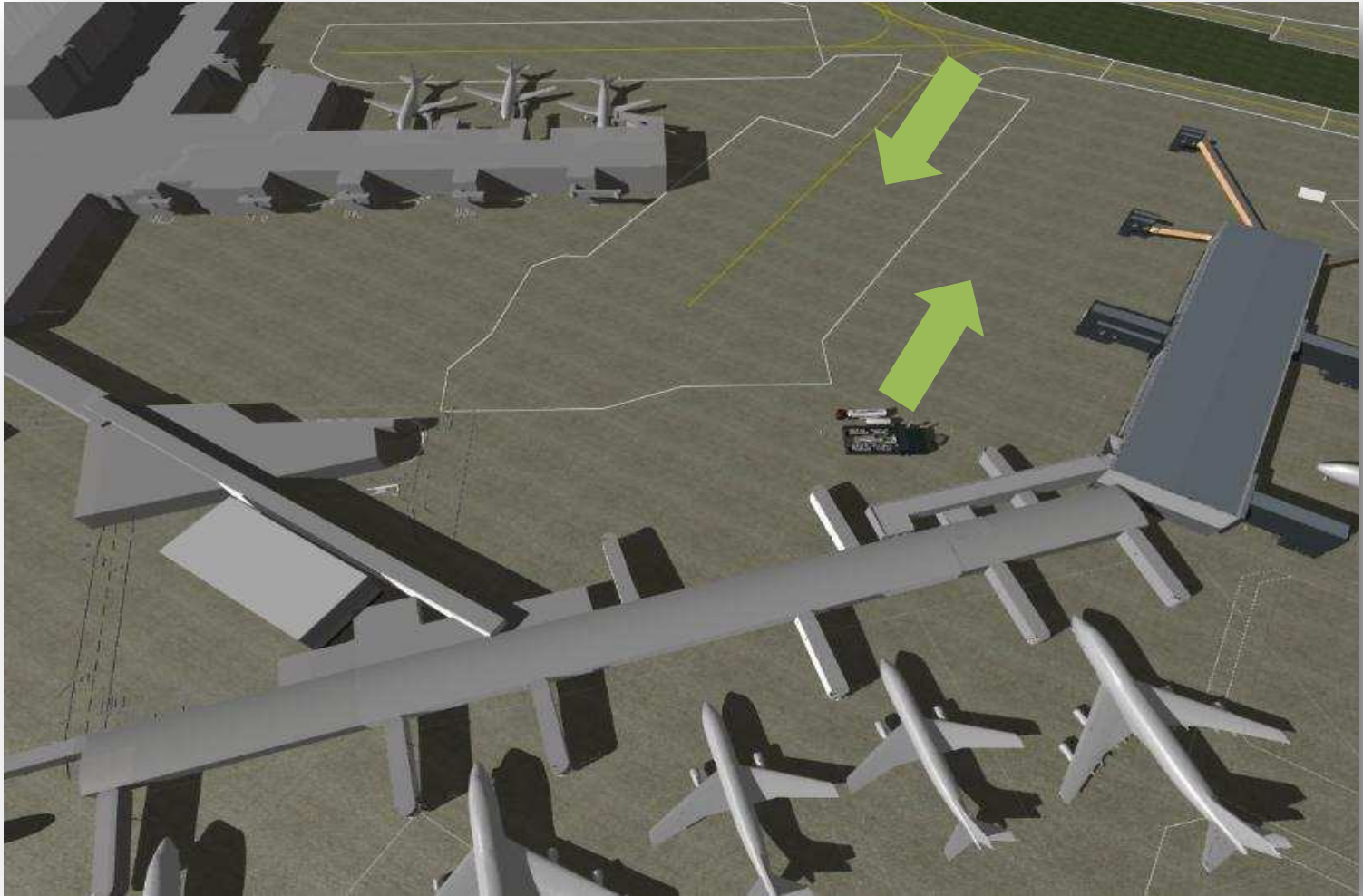


# Enabling phase 2 – the October 2010 story

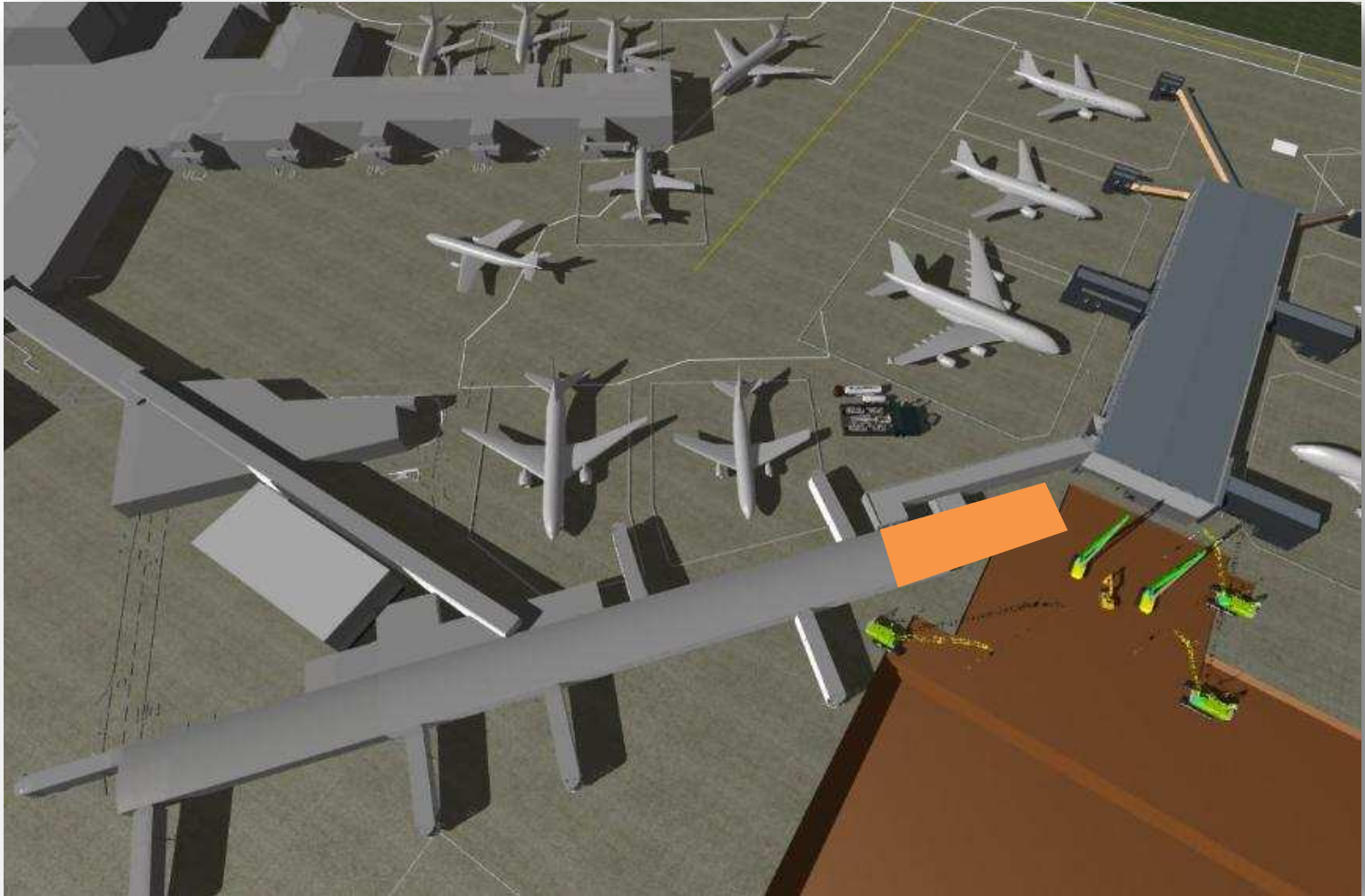




## Enabling phase 2 – the October 2010 story



## Enabling phase 2 – the October 2010 story





# Construction challenges

- Largest ever airside project at Heathrow
- Enabling works to clear entire footprint
- 2km of diaphragm walling; largest in Europe
- 700 large bore piles and 160 plunge columns
- 575,000 m<sup>3</sup> of excavation (15m deep)
- 165,000 m<sup>3</sup> of reinforced concrete
- 5,000 t of structural steel
- 13 interfacing projects
- Peak construction workforce 1,600
- Construction to be completed in Q4 2013



# Achievements

- Design completed – PB integral part of team – leading to £30m betterment
- Diaphragm Wall completed ahead of schedule by engineering services
- Earthworks ahead of programme
- Spoil being used to regenerate local household waste tip
- Structural steelwork commenced on time
- Third RoSPA Gold safety Award received
- 2m hours worked without injury (RIDDOR)
- T2B makes front cover of New Civil Engineer



Capital Safety League Table September & October 2011

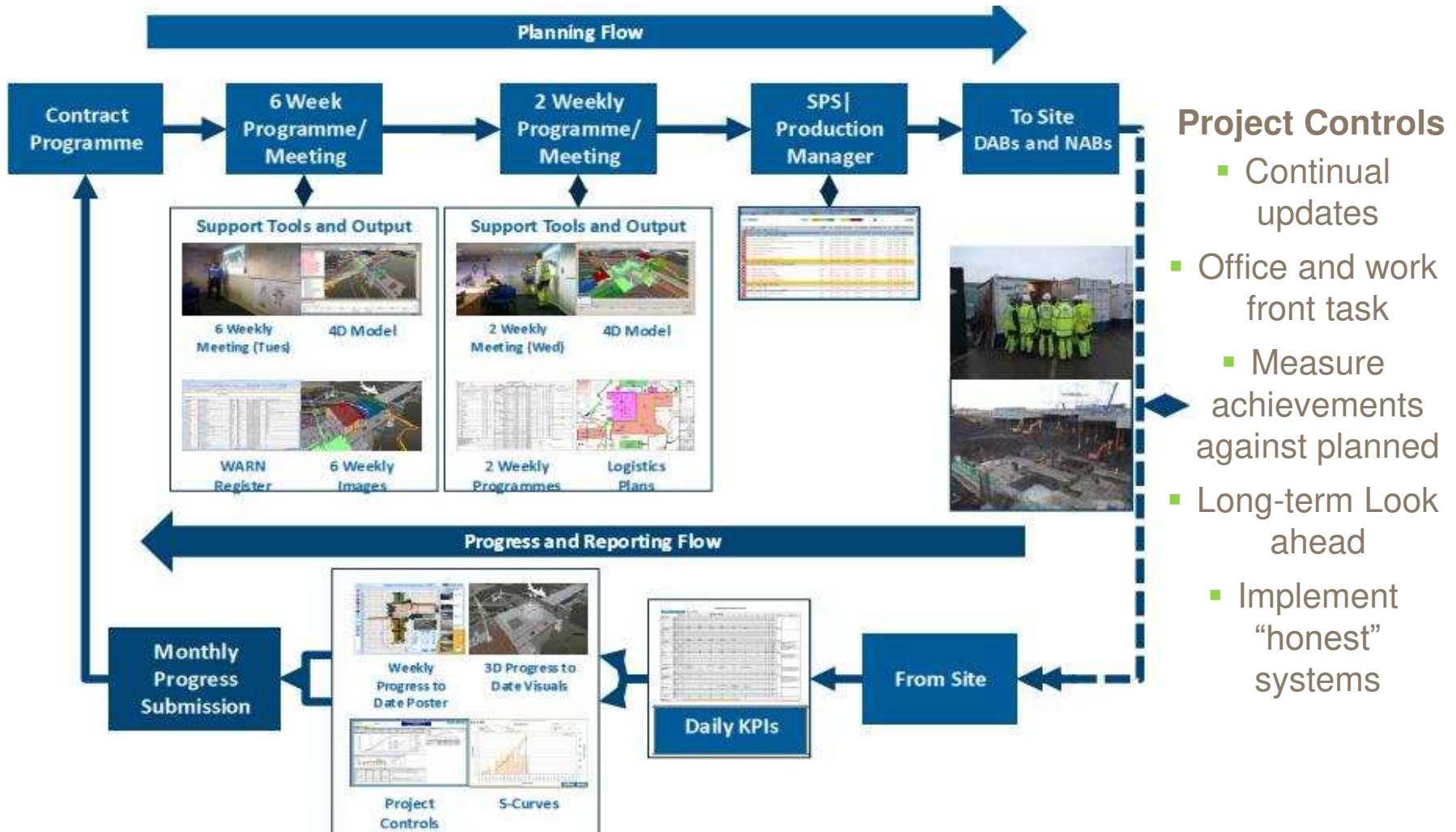
Position	Supplier	Leadership (15)	Training & Behavioural Programme (15)	Worker Engagement (15)	Visible HSAE (15)	Fire Safety (15)	H&E Mgmt (20)	Safety Performance (Reductions)	Bonus (5)	TOTAL SCORE
1	Balfour Beatty	15	11	11	13	12	15	4	3	78
2=	Supplier 1	12	8	12	12	9	13	3	3	66
2=	Supplier 2	12	9	9	12	11	12	4	5	66
4=	Supplier 3	10	8	9	11	10	12	0	5	65
4=	Supplier 4	11	9	12	9	9	12	2	5	65
6	Supplier 5	10	8	9	11	9	12	0	5	64

BAA Suppliers Safety League

2010	BBG 1st Position	8/12 Months
2011	BBG 1st Position	9/9 Months
		17/21 Months



# Effective project controls



# Systems map – Realising BIM

## 2D/3D CAD Design

- AutoCAD Architecture
- Revit
- TEKLA Xsteel
- Google Sketchup
- Others

## MEP/ICS Design

- CAD-Duct
- ElcoCAD
- Amtech

## Review Tools

- Navisworks
- Design Review

## XML Formatted Datasets

- GIS
- Asset Register
- Maintenance plans

## Databases

- STAG Access Control
- SharpOWL
- Primavera P6
- others....

## SCADA

- MAID

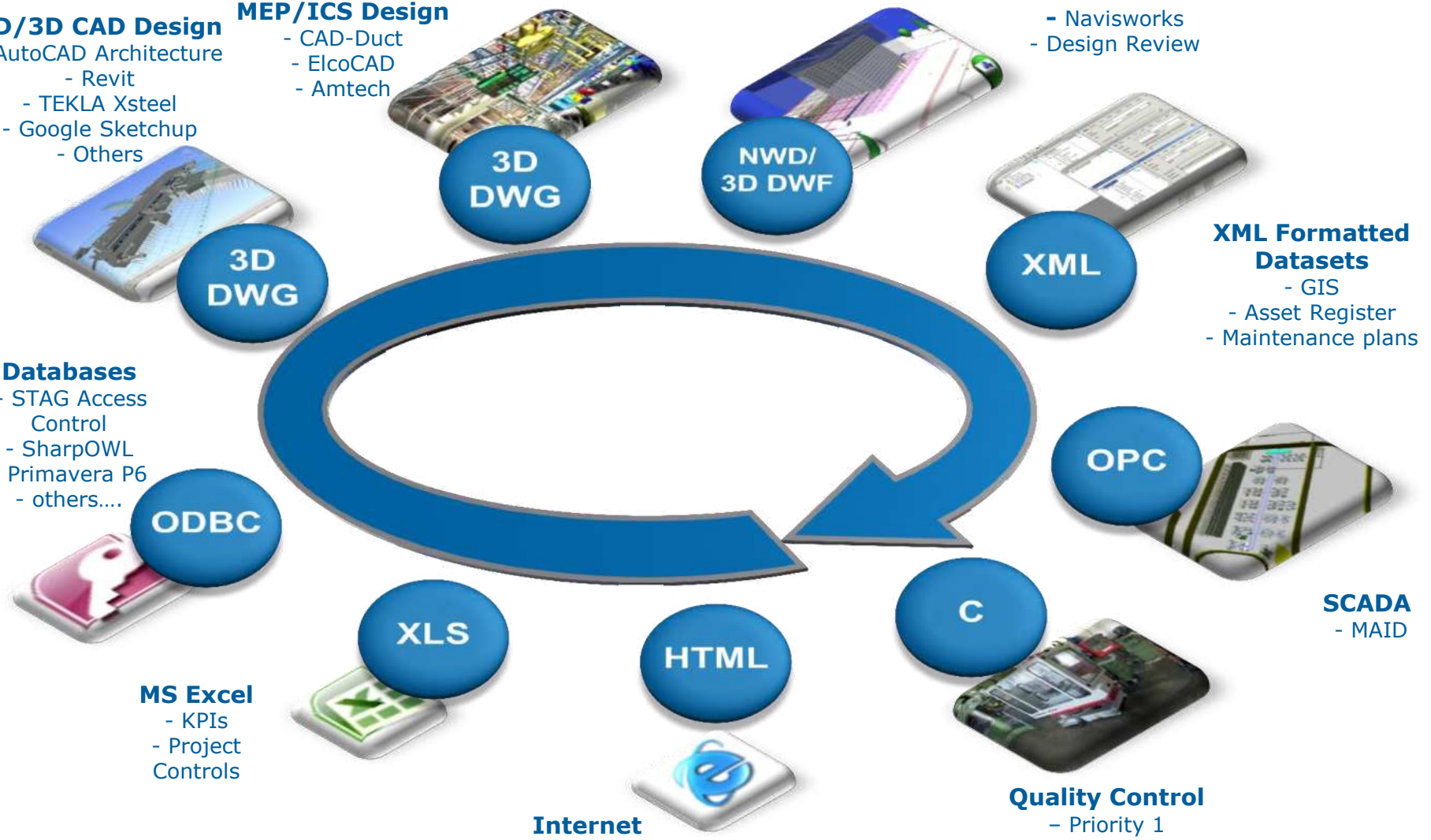
## MS Excel

- KPIs
- Project Controls

## Quality Control

- Priority 1

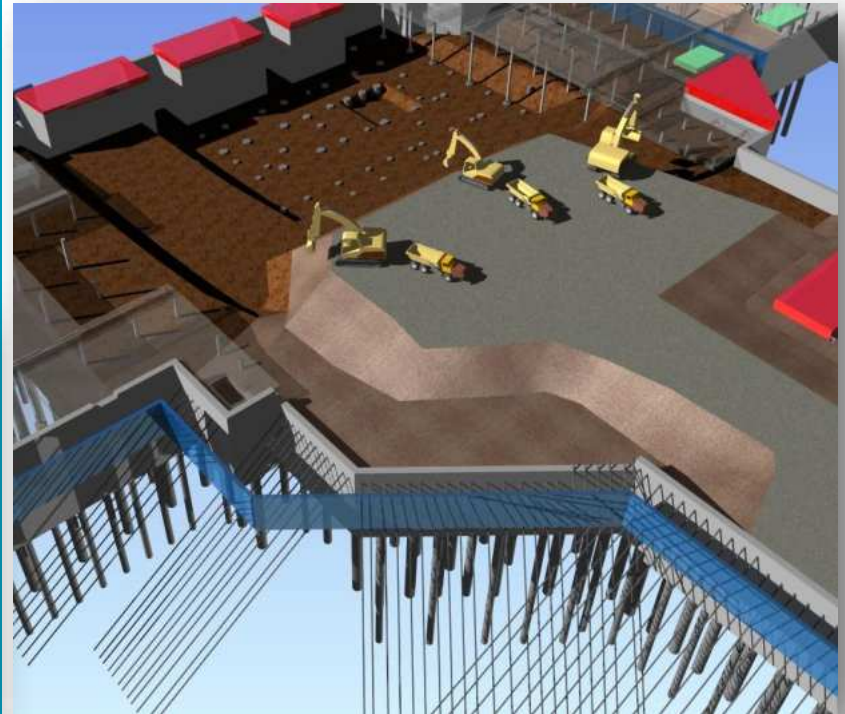
Internet





# Building Information Management (BIM)

- Use of BIM allows change to be fully assessed before making untested decisions



# Next steps

- M&E off-site modules arriving
- Procurement complete
- £1m / day spend profile in 2012
- Construction completion by Q4 2013
- Integrating project into operations by Q2 2014
- Maintain and improve upon safety achievements
- Continue development of BIM
- Transfer innovation into future Q6 spend with BAA
- Strengthen further relationship with BAA



# Balfour Beatty differentiators

- Single point of service to clients utilising full Group capabilities
- Early Contractor Involvement – Using PB at scheme design
- End-to-end ownership of project
- Strong, open relationship with BAA
- Leading Health, Safety and Sustainability Agendas
- Leading implementation BIM Technology
- Developing and transferring identified innovations



*"Balfour Beatty is one of those companies who routinely looks for the better way to make things better. From what I have seen innovation and safety are clearly culturally embedded values in the Balfour Beatty T2B culture"*

**Steve Morgan BAA Capital Projects Programme Director**



Balfour Beatty T2B Milestones	Date	Timing
Start of FRC Works	23/03/11	On time
South of Euro-pier truncated	31/03/11	Early
Zone 3 basement FRC start	30/06/11	On time
Ready for steelwork start North	06/07/11	On time
Ready for steelwork start South	26/08/11	On time
Ready for steelwork start Centre	21/12/11	On time
Envelope start	17/10/11	On time
Completion of LIMA FRC Works	20/06/12	On time
PQ area available for stand constr.	31/07/12	On time
Power on	12/08/12	On time
Weather tight (Envelope / roof)	11/09/12	On time
Mech. services available (via PAX)	02/05/13	On time
Sectional completion	30/10/13	On time

Please note: Milestones may complete early

**T2B 13 by 13 Milestones**



# Why Balfour Beatty

## INDUSTRY DIFFERENTIATORS

- Proven Group capability (T5, T2B, Edinburgh Airport)
- Design and BIM capability in Parsons Brinckerhoff
- Unsurpassed track record in UK Construction Services
- Leading Health and Safety
- Caring approach to Sustainability

## BAA DIFFERENTIATORS

- Mature business-to-business relationship
- Proven delivery in complex airside restricted areas
- Understanding stakeholders' needs
- Long-term committed people delivering projects from options to operations
- Early Design Involvement has led to £30m reduction to budget



## DEVELOPING NEW DIFFERENTIATORS

- Multi disciplinary team involvement at outset of design
- Developing innovative solutions and sharing these across Balfour Beatty
- Bringing IT solutions together to create a best practice area - BIM development via Parsons Brinckerhoff
- Leading project management techniques via Parsons Brinckerhoff – from Office to Work Face and back again
- Modular M&E facility and design support



**Balfour Beatty**

**Steven Morgan**

Capital Projects Programme Director  
BAA

# Discussion with the customer



# Mike Peasland

Chief Executive Officer  
Construction Services UK

Knowledge and  
integrated delivery as a  
key differentiator

# M74

Value £440m

Completed June 2011

- Major Civil Engineering
- Regional Civil Engineering
- Regional Building





# A3 Hindhead

Value £289m

Completed July 2011

- Civil Engineering
- Building Construction
- Mechanical & Electrical Systems



# Fife Hospital

Value £170m

Completed Oct 2011

- Investments
- Construction
- Mechanical and Electrical Services
- FM Services

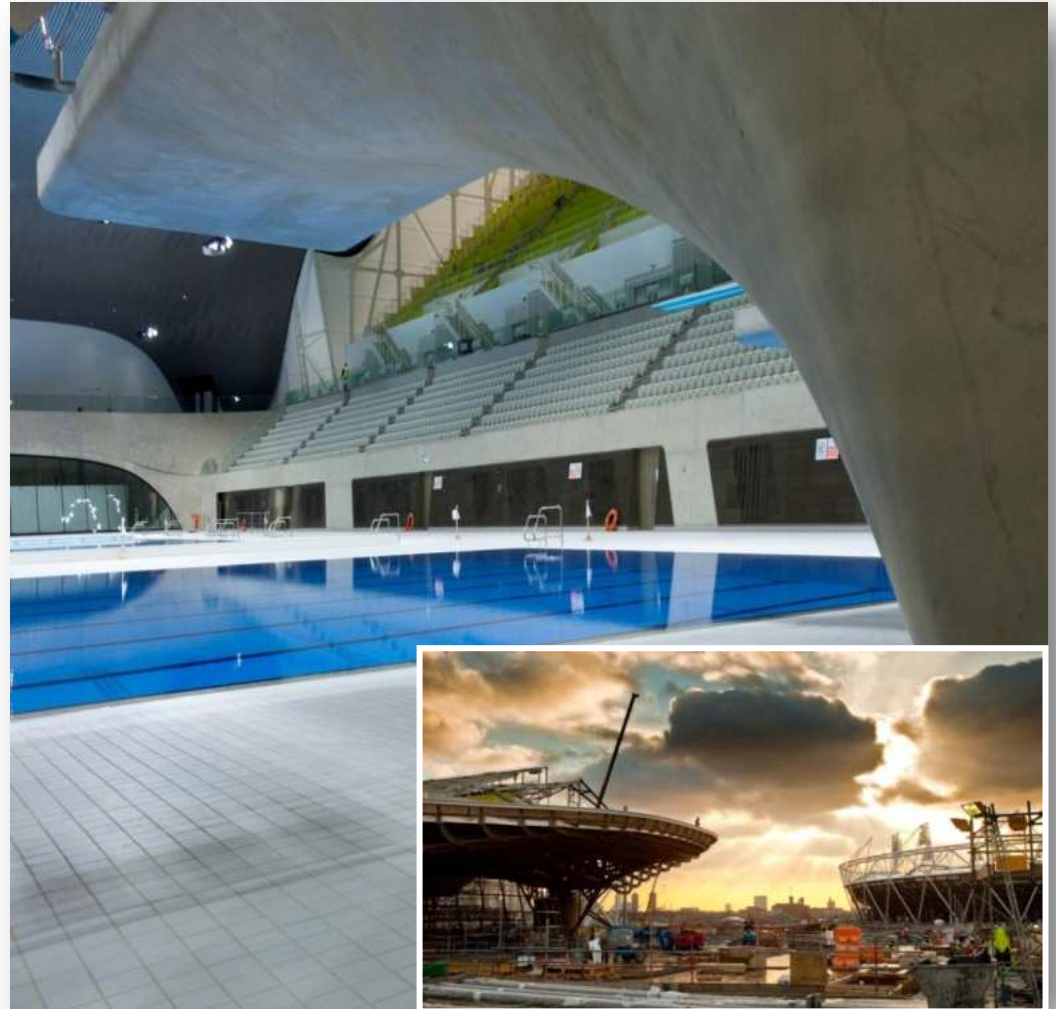


# Aquatics Centre

Value £265m

Completed July 2011

- Parsons Brinckerhoff
- Ground Engineering
- Civil Engineering
- Building Construction
- Mechanical and Electrical Services



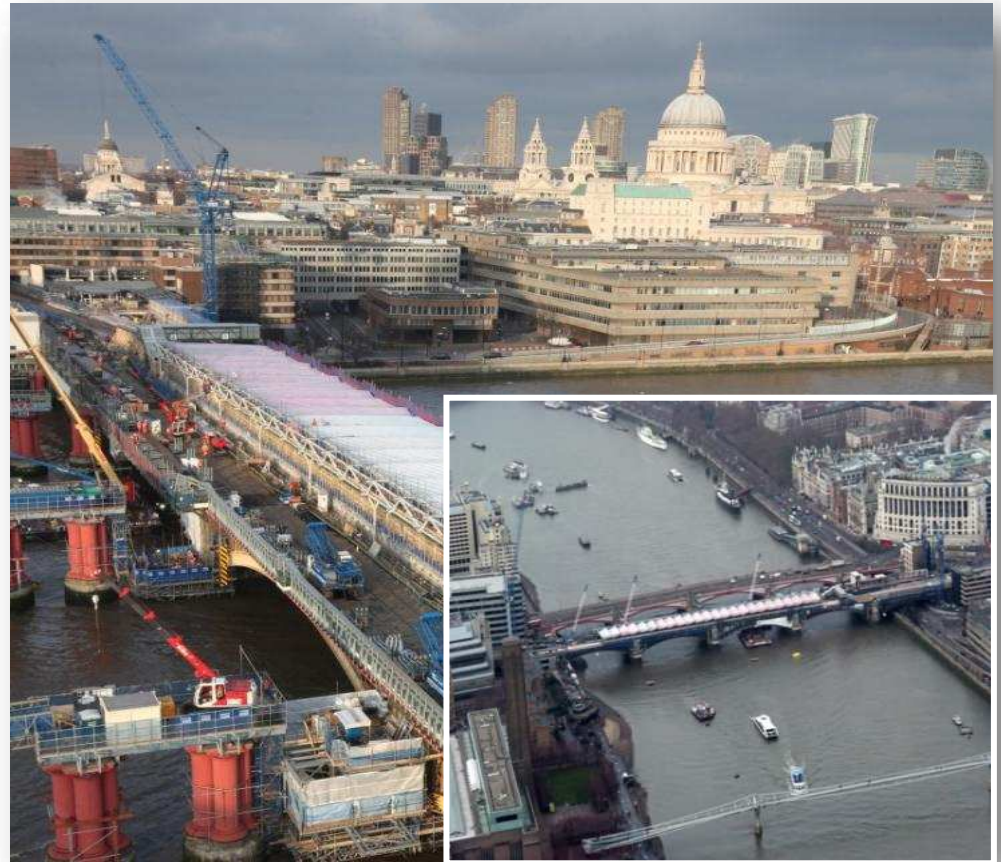


# Blackfriars

Value £460m

Construction in progress

- Parsons Brinckerhoff
- Civil Engineering
- Building Construction
- Mechanical and Electrical Services



# Major customers 2011



Knowledge capability



Customer asset knowledge



Vertical markets



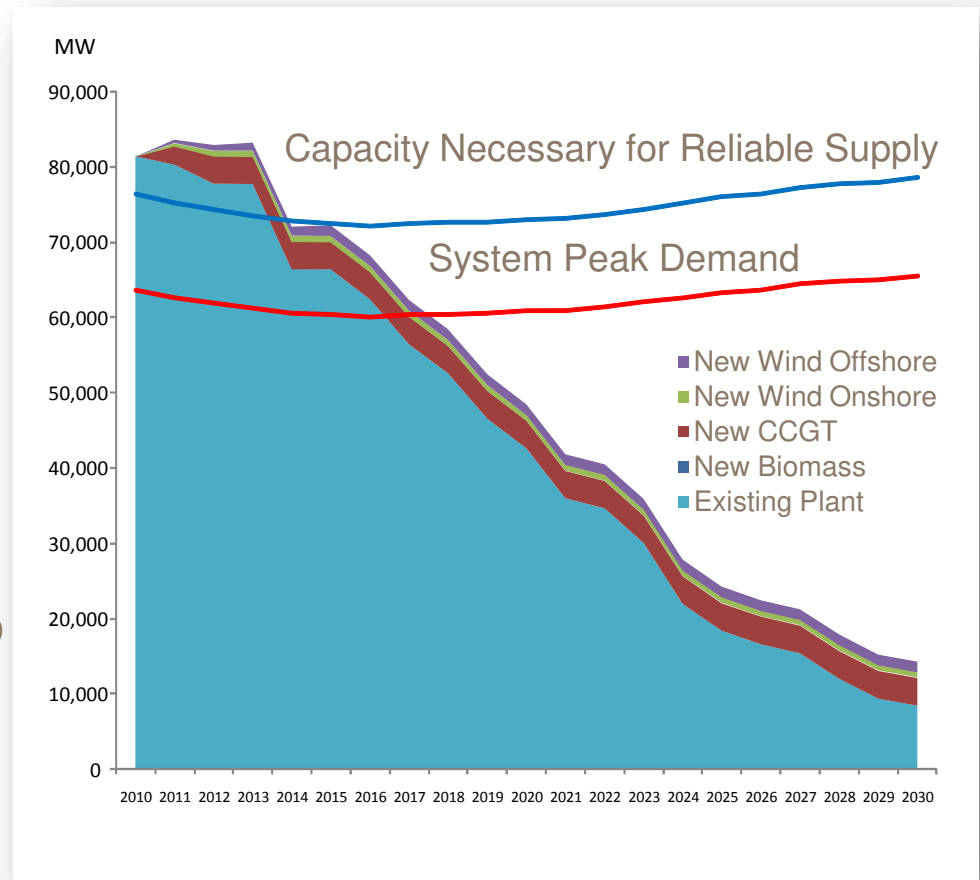
# Growth markets

- Energy
- New nuclear
- Rail

# Energy

# Energy gap

- Significant long-term growth anticipated as UK strives to manage key policy objectives
  - Security of supply
  - Reduction in carbon emissions (80% target by 2050)
  - Delivery of affordable energy
- Electricity Market Reform a key factor
- Demand for electricity expected to double by 2050 and substantially from low carbon sources by 2040
  - Utilising wind, new nuclear, carbon capture and storage, biomass and energy from waste initiatives

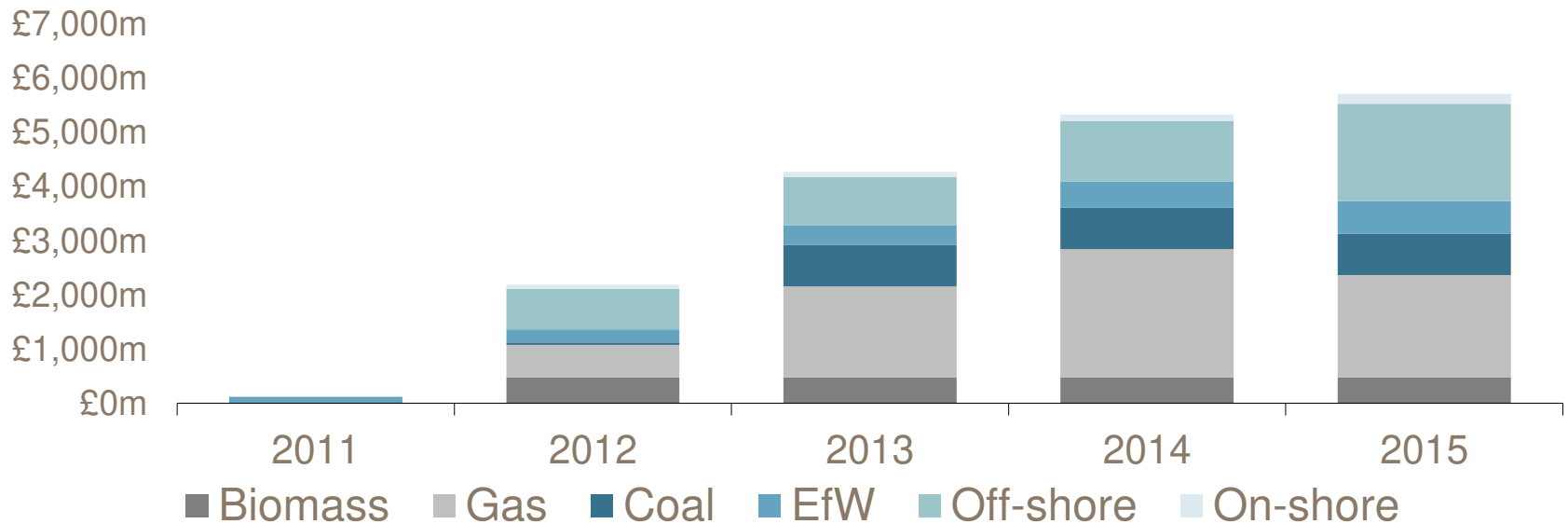




# Energy

- In the short term, the “energy gap” is anticipated to open up by 2015-2017 as existing coal and nuclear plants start closing
- Addressable market of some £6bn pa (excl. new nuclear) by 2015

## Addressable market

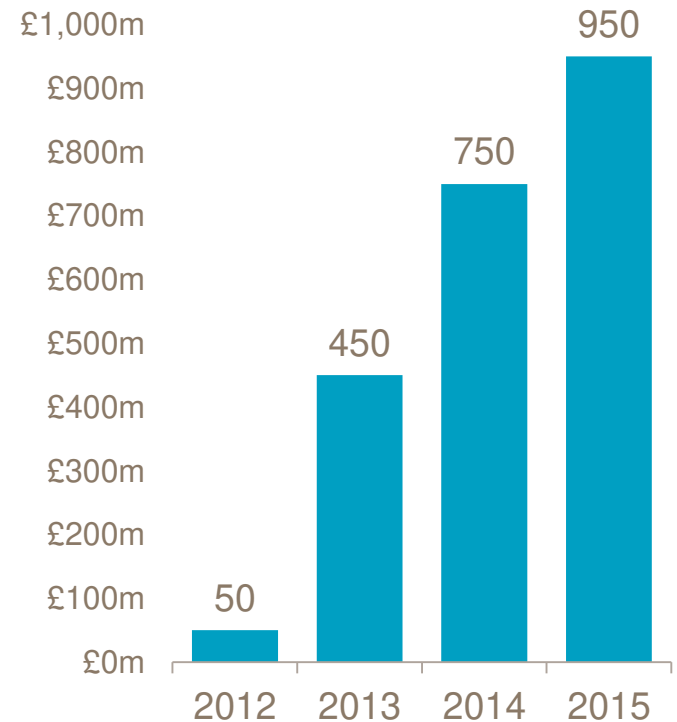


# New nuclear

# New nuclear

- Growth market as low carbon alternative energy source to meet UK demand
  - Ageing nuclear and coal plants to come offline
- Coalition government has adopted pro-nuclear stance with eight sites identified for investment over next 20 years
  - £100bn (of which construction work some £40bn)
- Intention that first of new stations will come online by 2017
  - First two projects will be Hinkley Point and Wylfa
- Key issue is Energy Market Reform and commercial viability
- Fukushima not seen as significant barrier to progress
- Ongoing accessible market to Balfour Beatty of c. £1bn pa
- Balfour Beatty well placed through experience at Sellafield and collaboration with Vinci
- Growth plans assume revenues from 2014 onwards

## Addressable market





Rail

# Rail

- Sector left relatively unscathed by CSR despite £1bn scope reduction on Crossrail and output expected to increase significantly given anticipated 30% passenger growth in mainline rail to 2017
- Investment to exceed that for Roads for the first time on record
- Network Rail funding of £34.6bn under CP4 (2009-14) although cuts of c.£5bn likely under CP5 (2014-19)
- CSR confirmed allocation of £750m for design works on High Speed Rail 2, £5.5bn Thameslink project also confirmed
- Major upgrade programme being undertaken by London Underground through to 2017/18 with £8.6bn spend on enhancement and renewals
- Accessible construction spend of £2.5bn pa by 2015

**Balfour Beatty**

**Andrew McNaughton**

Chief Operating Officer

# Knowledge transfer and inter-divisional synergy



# Knowledge transfer

- Broad capability across the life cycle of key infrastructure assets
- Deep asset knowledge
- Transferring knowledge
  - Drives innovation
  - Creates opportunity by differentiating us

# BAA

- Offsite manufacturing process
- BIM modelling
- Manufacturing and assembly facility in Wednesbury
- Design innovation
- Value to customer



# Birmingham Hospital

## Modelling and modular construction

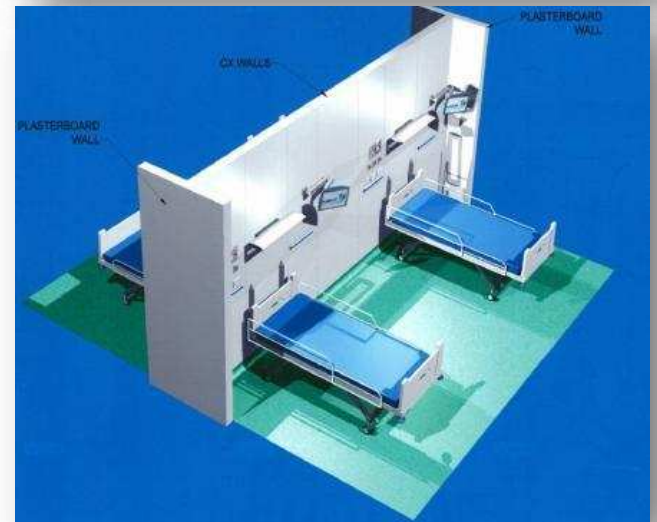
- BIM model-enabled development
- Prefabrication and pre-assembly of M&E systems
- Applied to quality, commissioning risk management and efficiency
- Cladding and curtain walling



# Birmingham Hospital

## Hospital knowledge applied to design

- Integrated modular walls in wards and operating theatres
- Simplifies installation
  - Electrical systems and medical gasses
- Interfaces with modules and modular wiring
- Experience of owning and operating hospitals

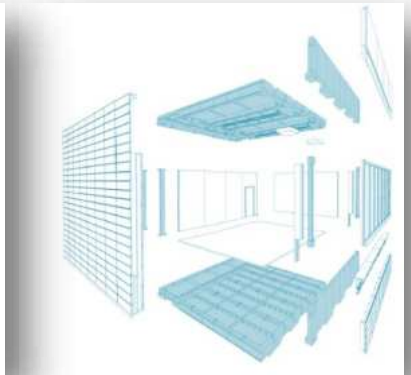
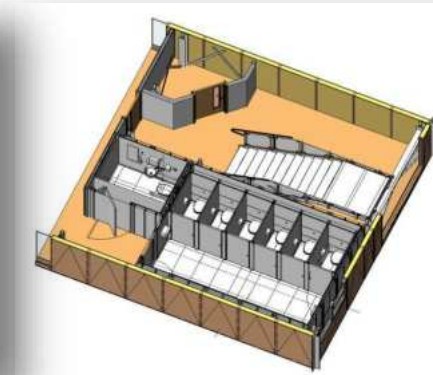
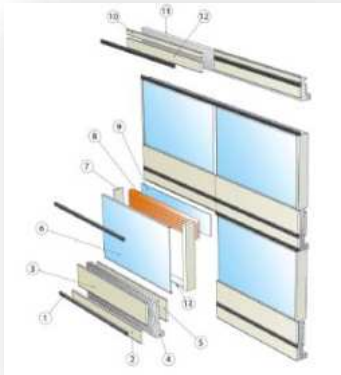




# Education sector

## Reducing the cost of delivery

- Designed a system build model that allows flexibility
- Now being used at Hertfordshire Schools
- Thought leadership in the industry
  - Submitted to the Department of Education's Capital Review



# Energy sector

## New service offerings through asset knowledge

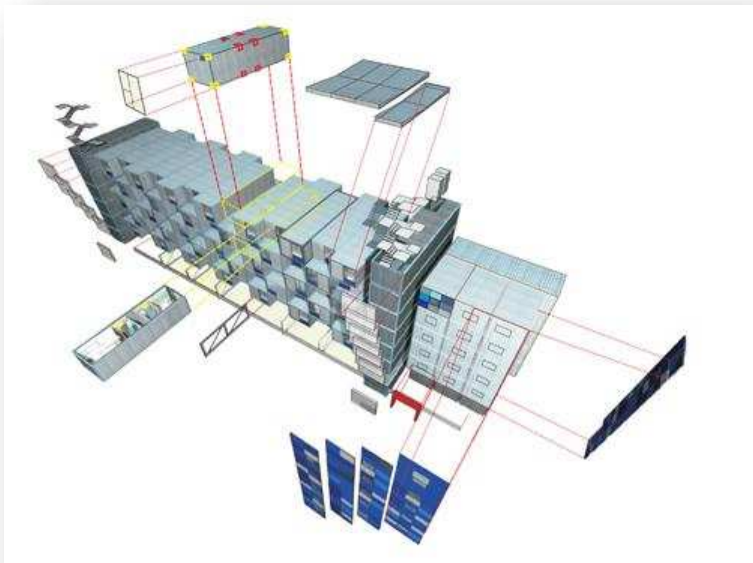
- Energy services company model developed by Support Services
- Making improvements to assets to reduce energy consumption



# Parkland Hospital, Dallas

## Knowledge transfer to the US

- Prefabrication knowledge transfer
- Manufacturing facility in Texas commences in February 2012
- Operational savings
- Market differentiation in US building sector with BIM modelling



# Abu Dhabi BK Gulf

- Trialled in Dubai three years ago
- Servicing ongoing M&E contracts across the UAE
- Crowne Plaza Hotel in Abu Dhabi completed 18 months ago
  - Traditional construction required 1200 people
  - Was completed with under 1000 with offsite assembly

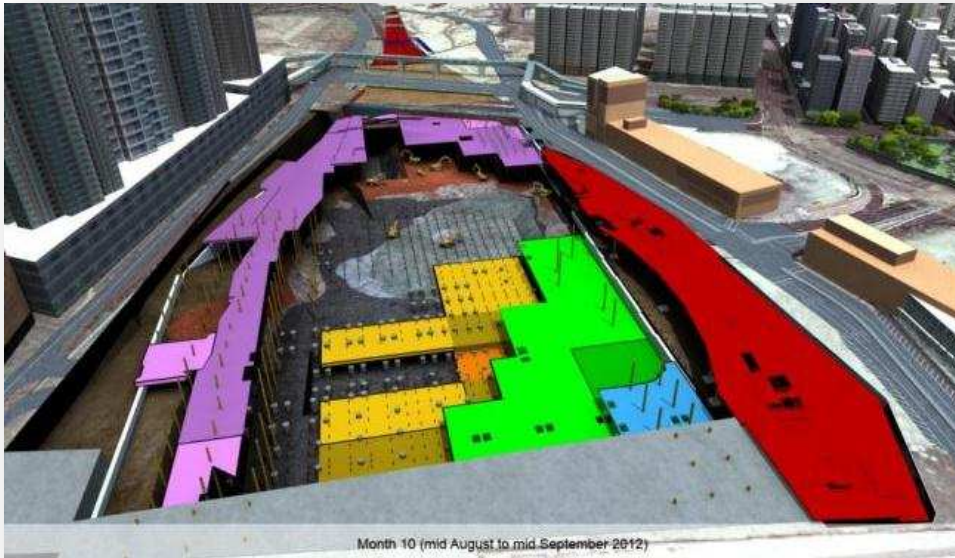




# BIM modelling in infrastructure projects

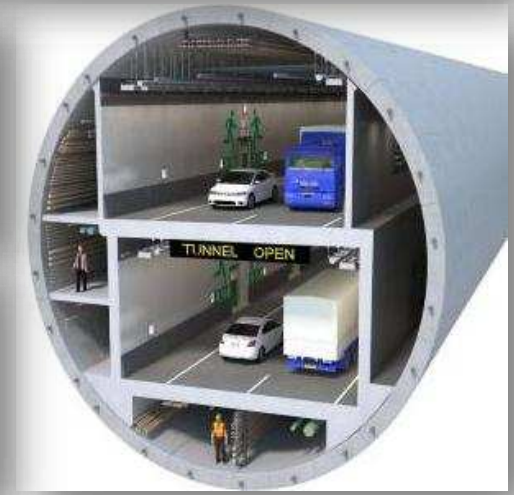
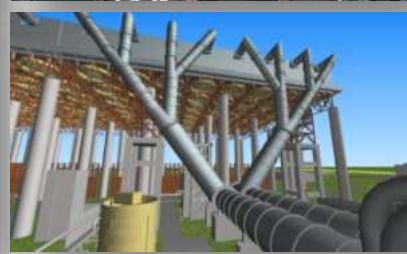
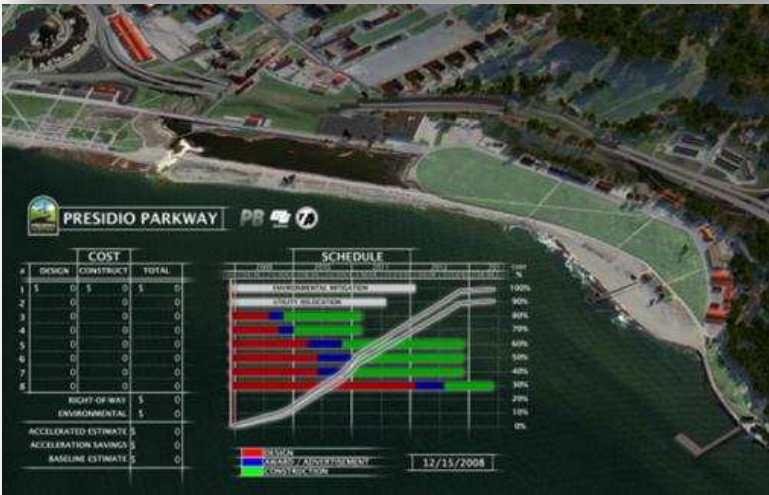
## Hong Kong West Kowloon Terminus

- Differentiation through:
  - Clarity of design
  - Management of risk and quality
  - Confidence in delivery



# Transportation infrastructure

## Use of knowledge as a differentiator





# Rail

## Denver P3 project

- Developed capability in rail projects and maintenance in the US
- Position enhanced significantly with the acquisition of PB
  - Design
  - Project management
  - Systems integration



# Delivery capability transferred to PB

- Knowledge and experience of upgrading the London Tube network
- Key factor in PB becoming the programme manager for Washington MTA





# Bringing wider capability together in rail

- Rail design and rail delivery
- Civil, building and M&E capability

- Solution to East Kent Spur for Crossrail
- One integrated team for Network Rail



# Integrated capability in Australia

- PB and Rail Construction
- Design and construction capability in JV with civil contractor
- Unique proposition in Australia



# Conclusion

- Integration of capability
- Transferring knowledge
- Applicable to many sectors from rail and transportation through to power and natural resources
- Increasing breadth of business opportunity

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