

## **Using Innovation and Value Engineering to Minimise Waste**

### **M25 Junctions 12-15 Widening**

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## **Introduction**

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- Part of Sustainable Construction
- A Balfour Beatty perspective
- Use of BB Sustainability Model
  - M25 Junction 12 – 15 and T5 Spur

## Pressures and Drivers



Investors



Government



Customers



Pressure groups / media



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## Creation and Care

Building and maintaining UK infrastructure

- Roads
- Railways
- Water / sewage treatments systems

Helping to shape the future

- Use of energy and natural resources
- Providing safe access to essential services
- Supporting communities

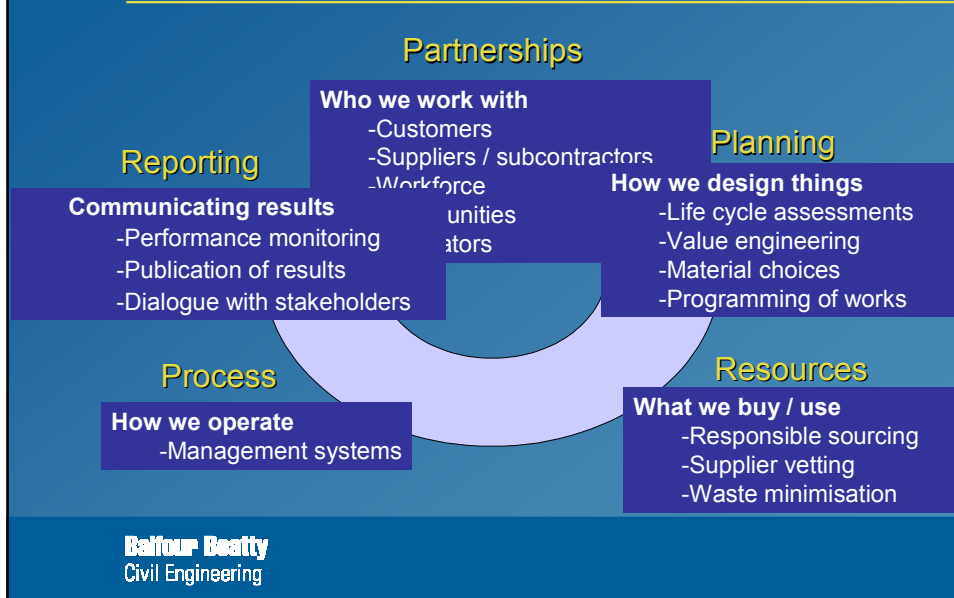
Reputation goes beyond clients

- Enforcement agencies
- Neighbours
- Users



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## Balfour Beatty's 3P2R Sustainability Model



## Case Study

### M25 Junction 12-15 and T5 Spur

- £147.5m fixed price Design & Build contract
- Construction programme of 144 weeks
- Additional lanes between junctions 12 to 15
- Improved slip roads to Junction 14.
- New roads to Terminal 5



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## M25 J12-15 and T5 Spur

### Key Issues

- 900,000 tonnes of imported aggregates and fills required
- Heavy demand on raw material supplies from existing projects
- All works within the existing highway boundary
- A winter start
- Congestion on existing road network



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## M25 J12-15 and T5 Spur

### Partnerships



### Creating Partnerships



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## M25 J12-15 and T5 Spur

### Partnerships with Regulators and Government

Surrey County Council

- Planning approval for dedicated recycling centre
- 6 Month lead in time
- Continual dialogue



Environment Agency

- Exemptions to Waste Management licensing Regs



Local Authorities

- Licensing of aggregate processing operations

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## M25 J12-15 and T5 Spur

### Planning for a more Sustainable Solution

A two-fold strategy

- Maximise use of available materials
  - Design improvements
  - Specification changes
  - Process controls
- Reduce the import of primary aggregates
  - Use of recycled markets
  - Recycling of construction and demolition wastes

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## M25 J12-15 and T5 Spur



### Design Improvements

- Redesign of landscape areas
  - Environmental benefit
  - Incorporation of 250,000m<sup>3</sup> of surplus
- Hardened verge detail
  - Utilising recycled planings with a surface dressing
- Thicker sub-base layer
  - Used on clay embankments
  - Capping omitted



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## M25 J12-15 and T5 Spur



### Specification Changes

- Fill to structures
  - Changed from 6N to 6P - allowed recycled aggregates
- Type 1 sub-base
  - Agreement to use to Type 4 in lieu of Type 1
- Class 1A general fill with CBR >15% used
  - Avoided the requirement for capping layer in granular embankments

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## M25 J12-15 and T5 Spur



### Maximise use of Available Materials

- Re-use to highest possible value
- Separation of different classes to enable re-use / recycling
- Hard materials separated from clay
- Specific stockpile areas
- Redesign of landscaping and screening to re-use 250,000m<sup>3</sup>
- Recovery of aggregates for re-use / processing
- Recovery of pavement materials and soils
- Regular monitoring and reconciliations



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## M25 J12-15 and T5 Spur



Application	SHW Class	Tender Quantity	Current Quantity	Recycled Quantity	Percentage Recycled
Granular Fill	Class 1A / 6I	172,000	250,000	250,000	100%
Capping Layer	Class 6F2	239,000	85,000	85,000	100%
Starter Layer	Class 6A / 6C	115,000	125,000	95,000	92%
Fill to Structures	Class 6N / 6P	48,000	110,000	110,000	100%
Granular Sub-base	Type 1 & 4	128,000	115,000	98,000	85%
Topsoil	Class 5B	124,000	165,000	165,000	100%
Subsoil	Class 4A	22,000	22,000	22,000	100%
Drainage Aggregate	Cl 503 / 515	59,500	56,000	0	0%
Sand Fill		0	8,000	8,000	100%
Gabion Stone	Class 6G	100	300	0	0%
<b>TOTAL</b>		<b>907,600</b>	<b>936,300</b>	<b>833,000</b>	<b>90%</b>

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## M25 J12-15 and T5 Spur

### Operating Effective Processes

- Separating Materials
- Crushing
- Screening
- Blending / Mixing
- Loading to site



## Recycling – The Process

- Material crushed to <125mm using mobile tracked jaw crusher
- Products split into sizes to meet 6C / 6P / Type 1 using mobile tracked finger screen
- Materials screened to remove debris for recycling
- Products blended to meet specifications
- Sand added to 6P for integral structures
- Compost added to topsoil

## M25 J12-15 and T5 Spur

Partnerships  
Reporting  
Process  
Planning  
Resources

### Quality Control

#### Import of C&D wastes

- Experienced staff (30+ years)
- Inspections platform at weighbridge
- High level Surveillance Camera
- Weighbridge ticket for every load

#### Processing

- Screening to remove debris
- Good segregation
- Regular quality control testing
- WAMITAB approved staff
- ISO17025 certified laboratory



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## M25 J12-15 and T5 Spur

Partnerships  
Reporting  
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Planning  
Resources

### Benefits - Environmental

- Reduction in primary aggregates use - 820,000 tonnes.
- Reduction in disposal to landfill - 770,000 tonnes.
- Reduction in (C&DW) destined for landfill – 165,000 tonnes.
- Reduction in lorry miles – 1.6 million miles.
- Reduction in vehicle movements – 55,000 less.
- Reduction in CO<sub>2</sub> emissions – 2,760 tonnes CO<sub>2</sub>

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## M25 J12-15 and T5 Spur



### Benefits - Technical

- High quality aggregates produced particularly Type 1 Sub-base, Class 6C starter layer and 6P fill to structures
- A wide range of materials produced that were not available locally
- Programme certainty - ability to supply the large volumes
- Suitability for winter working

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## M25 J12-15 and T5 Spur



### Benefits - Financial

- Reduced disposal costs – £2 million (landfill tax only).
- Reduced costs of imported aggregates – £1 million (aggregates levy only)
- Significant further cost saving compared to the use of primary aggregates being used throughout the project.

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## M25 J12-15 and T5 Spur



### Challenges

- Timescales
  - Obtaining planning permission and consent
  - Lead in time to enable raw material stock to be established
- Securing large area of land required
- Client concerns
  - Responsibilities to encourage greater recycling
  - Material quality
  - New highway specification permits wider use

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### Further Information

Balfour Beatty

- Safety, Environment and Social Reports
- [www.balfourbeatty.com](http://www.balfourbeatty.com)

TRL / WRAP Case Study

- [www.aggregain.org.uk](http://www.aggregain.org.uk)

Quality Control – the production of recycled aggregates (QPA, HA, DETR, BRE)

The quality protocol for the production of aggregates from inert waste (HA, QPA, WRAP)



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