

Progress using BIM

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Efficiencies from Project inception



Do you have confidence in your critical Health & Safety data? Typical delivery models for H&S information are poorly structured with a mix of formats, stakeholders, quality levels and access points.



JACOBS Safety Web Solution

Integrating early data and establishing hazard and risk management



Create and socialise a legacy of safety information to support the full asset lifecycle.



Stay informed of hazard locations and safety risks when visiting site. Assign ownership for accountability.



Integrate with design tools to prioritise focus and mitigate hazards to avoid expensive and time consuming re-work.



Coordinate actions and manage hazard profiles efficiently with automated reporting and deliverables.

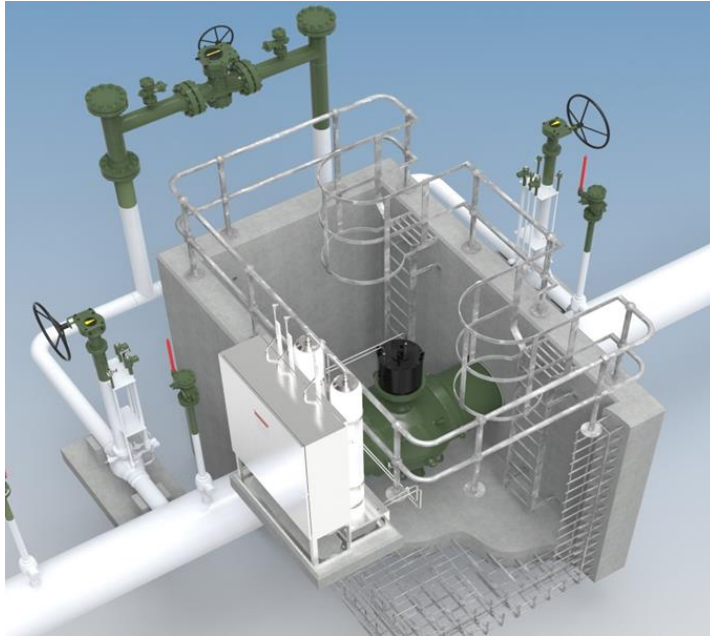


..foreseeable
risk...

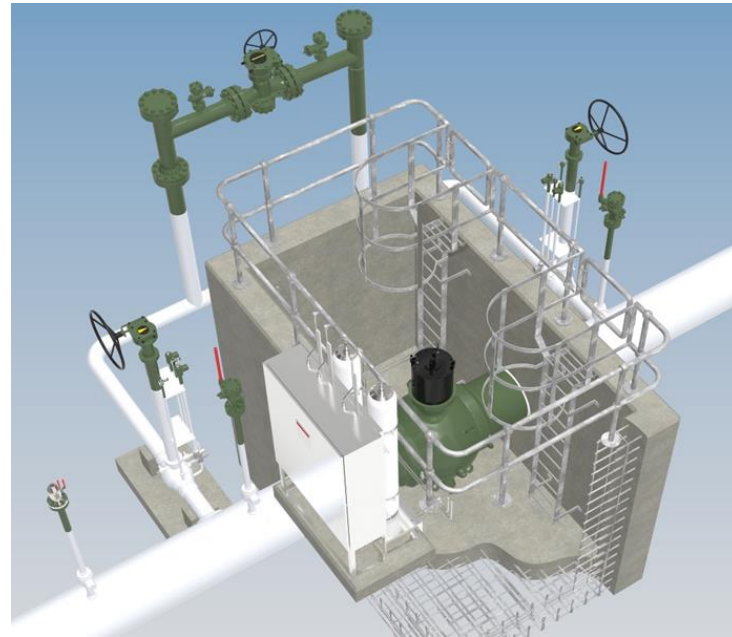


**Accident
Report
“IP Fell from
open edge on
stairwell”**

...power of Visualisation and Review



Railing Without Gated Access



Railing With Gated Access

..a line of foresight....



Knowledge of incident – fall through opening in floor slab

First opportunity to spot risk

FOR
Design
Element

WHEN
Work Activity
and location

WITH
Having
risk factors

HAVING
Risk

THEN
Treatment
actions

After Houssain et al 2018

Eliminate
Reduce
Control t.s.d.
Inform

Discovering Safety Project
Linking risk factors to treatment action

National Grid Asset Health Offtake Replacement (2019)

Digital Rehearsal (Rehearse & De-risk)

BIM

Block Valve (2017)

Offtake Replacement (2018)

Offtake Replacement (2019)

Large Scale Projects

Site Establishment

DRPL

Work Flow

Clash Detection & Hazardous Areas

Areas



Large Scale & Complex Projects

Digital Rehearsal (Rehearse & De-risk)



- Methodology and plant selection
- Confirmation of temporary works and working areas

BIM

Block Valve
(2017)

Offtake
Replacement
(2018)

Offtake
Replacement
(2019)

**Large Scale
Projects**

Site
Establishment

DRPL

Work Flow

Clash Detection
& Hazardous
Areas

National Grid Asset Health Offtake Replacement (2018) Digital Rehearsal Vs. Reality

BIM

Block Valve
(2017)

**Offtake
Replacement
(2018)**

Offtake
Replacement
(2019)

Large Scale
Projects

Site
Establishment

DRPL

Work Flow

Clash Detection
& Hazardous
Areas



National Grid Asset Health Offtake Replacement (2019) Stakeholder Engagement

BIM

Block Valve
(2017)

Offtake
Replacement
(2018)

**Offtake
Replacement
(2019)**

Large Scale
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Greenwich Pumping Station Site



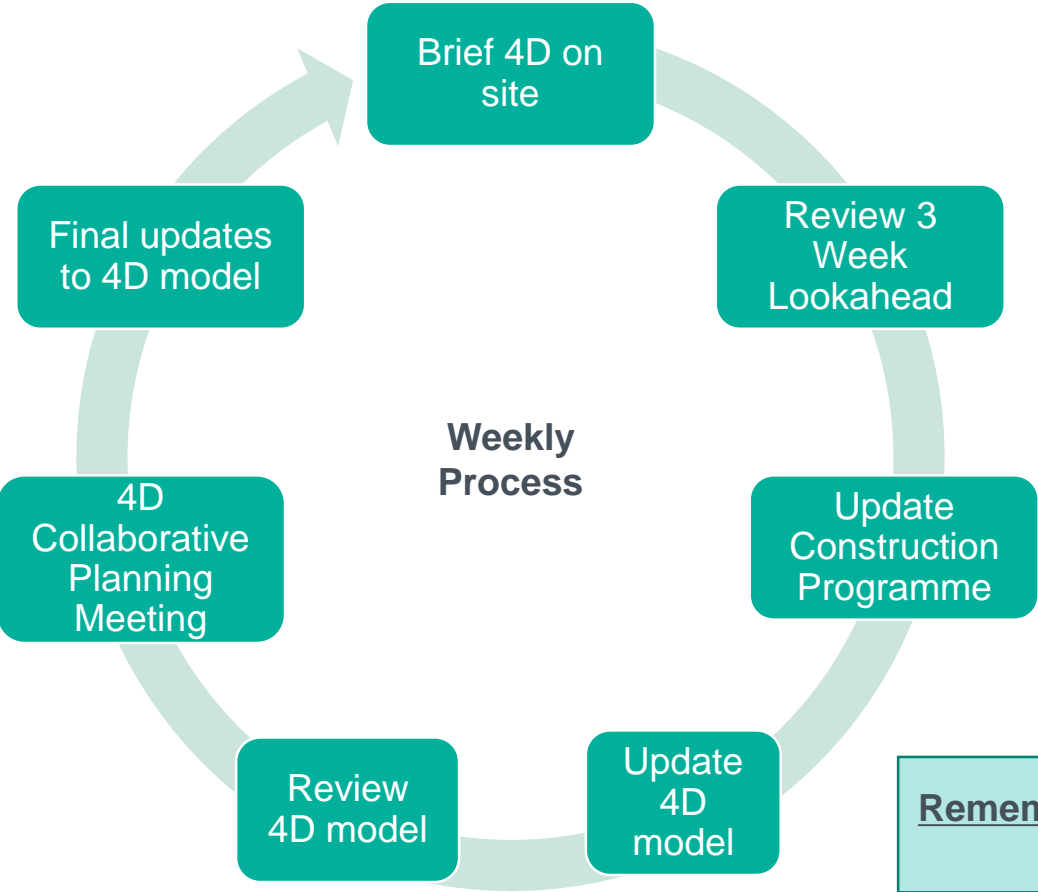
Thames Tideway Super Sewer Project

- Congested site
- Residential area
- Logistics are key
- Multiple structures
- Adjacent railway

Execution – 4D Collaborative Planning



4D-based Start of Shift briefings

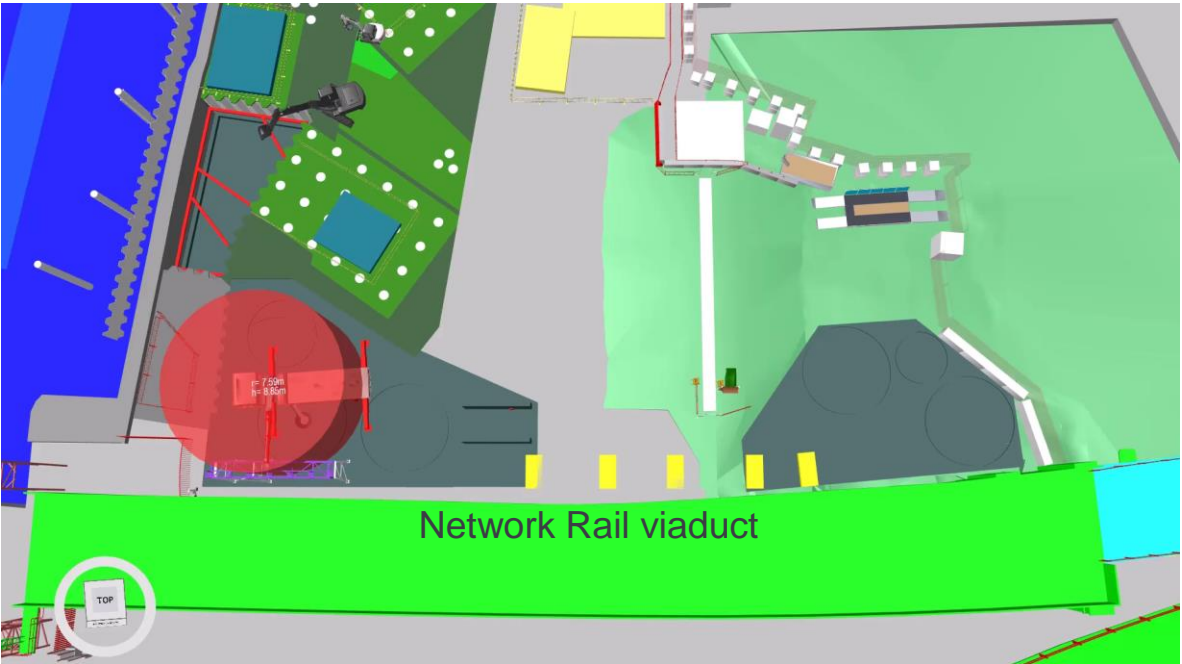


Remember: *“We are not trying to perfect the model we are trying to get it perfect on site”*

Execution – 4D Collaborative Planning



Pipe Racks interface with Network Rail viaduct



- 50%** less meetings
- Avoided** night working
- 50%** programme reduction



- Enhanced** constructability analysis
- Improved** collaboration with stakeholders
- Advanced** internal/external planning



7 Key Sequence and

7.1 Excavation

The following methodology will be adopted. Bin A will be completed using a 25t excavator for Bin B and Bin C.

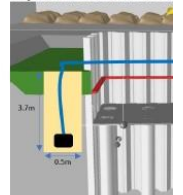
7.1.1 River wall exclusion zones to be in planform from the back face crawler crane to be cleared for

HOLD POINT – Permit to dig to be signed

7.1.2 Using an excavator mounted outside of sheet piles next to complete with 2" pump with filter

7.1.3 The water will be pumped into wall and is pumped again further to our trade effluent discharge. No groundwater is expected to only and direct from the creek

7.1.4



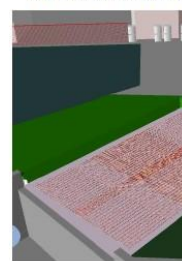
7.1.5 A 25t excavator is located out (8T Max) will be within the Muck Bin A

7.1.6 Excavation will occur to 102.4 into hydrant and stockpiled on

7.1.7 Access to the muck bin will be on platform or man rider basket. as per the manufacturer's instructions protection or work from scissor excavation occurs handrails with protection into the excavation.

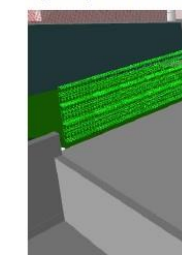
HOLD POINT – Concrete pre-pour inspection

6.2.3 Pour base, the excavation wall



6.3 Filter Press Walls

6.3.1 Install steel reinforcement to as much as possible. The crane as possible to the working area under the load at any time. 1 height. These can be fixed in steps installed on the base cage at any time if there is no



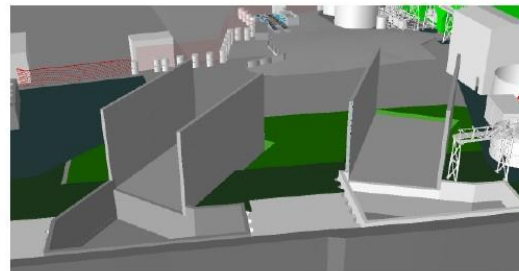
6.3.2 Install perimeter formwork for wall filter press walls. These panels



6.3.6 Pour 2nd and 3rd pours using boom pump. Collapse radius to be outside of the network rail viaduct.



6.3.7 Strike Shutters



Risk Assessment Method Statements + 4D

30% document size reduction

20% less time to create

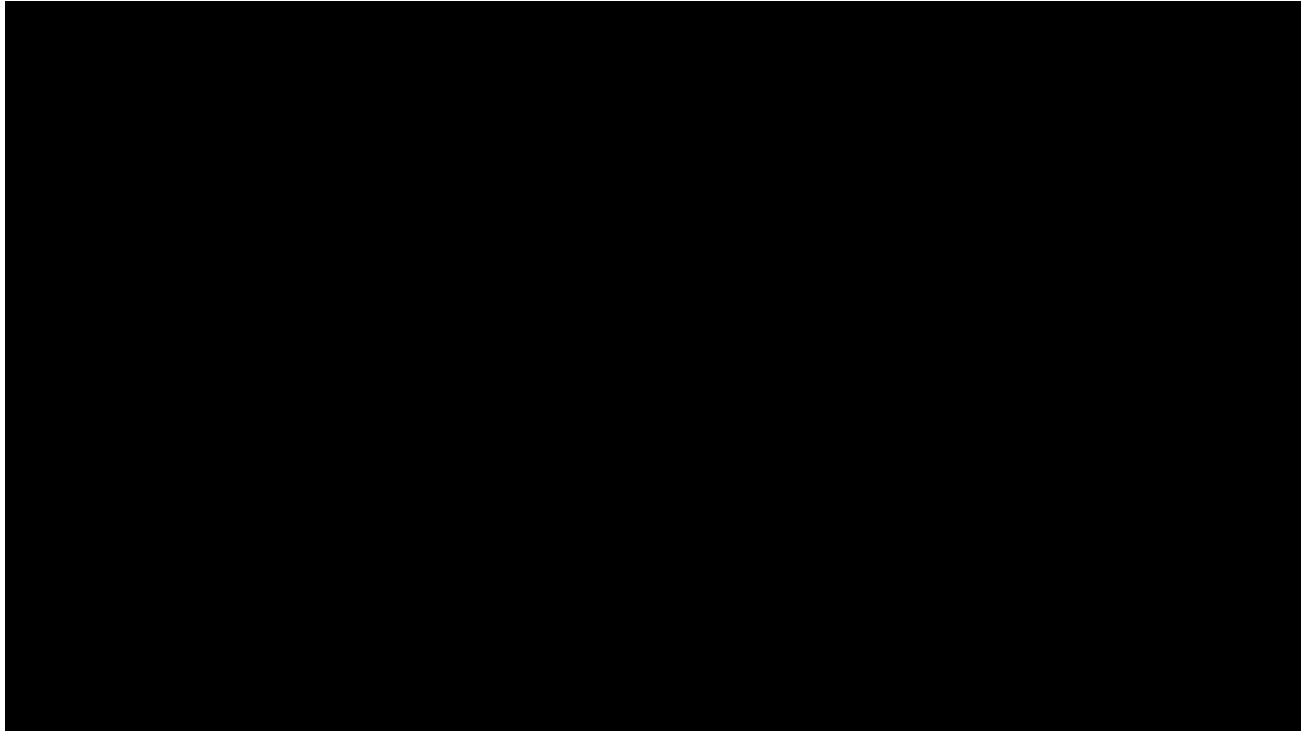
Streamlined approval process

Improved understanding by site operatives and different teams

Lessons Learned

- An effective CDE
- Requirements for Models in Contracts
- Detailed examination and improvement of programme
- Detailed 4D Models
- Training involves everyone
- Senior management buy in

The Digital H&S File



Structured H&S Information:

- Compliant 007G H&S File
- Pertinent O&M data
- Readily accessible to end user
- Clarity through visualisation
- Pre Construction Information ready for future projects.

Conclusions

- Evidence is growing that BIM techniques and tools enhance H&S delivery –at every stage
- Visualisation using 3D and 4D models is powerful in enhancing early identification of risk
- The tracking of risk and risk treatment through a project into end use is increasingly important
- Clients hold the keys – recognise what can be done and invest in early detailed design
- Reducing risk is productivity – good business