

Innovation in Practice : Center Parcs, Ireland

Using Innovative Construction Methods
to build
Ireland's First Large Scale Forest Holiday Resort



Presenters: Brian Kennedy & James Moloney



Contents

Project Overview

- Lodges Project
- Village Centre Project

Our Challenge

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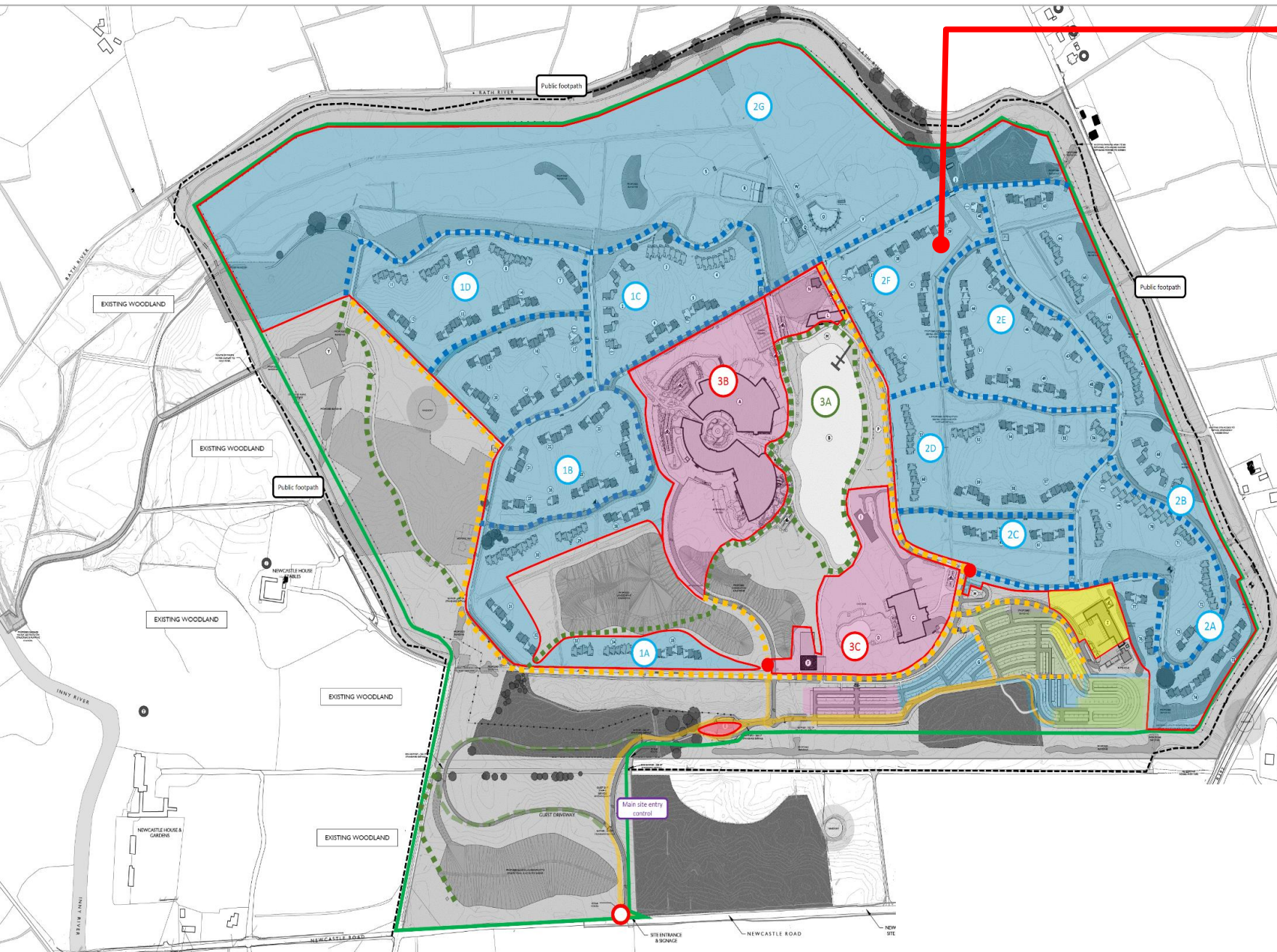
1.1 Project Overview – Center Parcs, Longford Forest



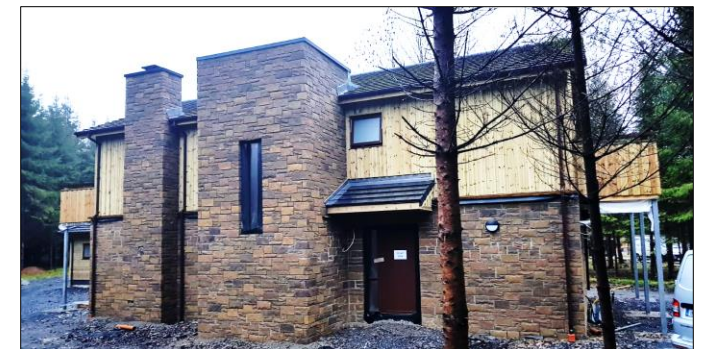
Project Outline:

1. *Construction of a Holiday Resort*
2. *400 acre Woodland Site*
3. *Infrastructure Works*
4. *Sisk delivered two projects:*
 - a) *466 Lodges and*
 - b) *Village Centre Buildings*

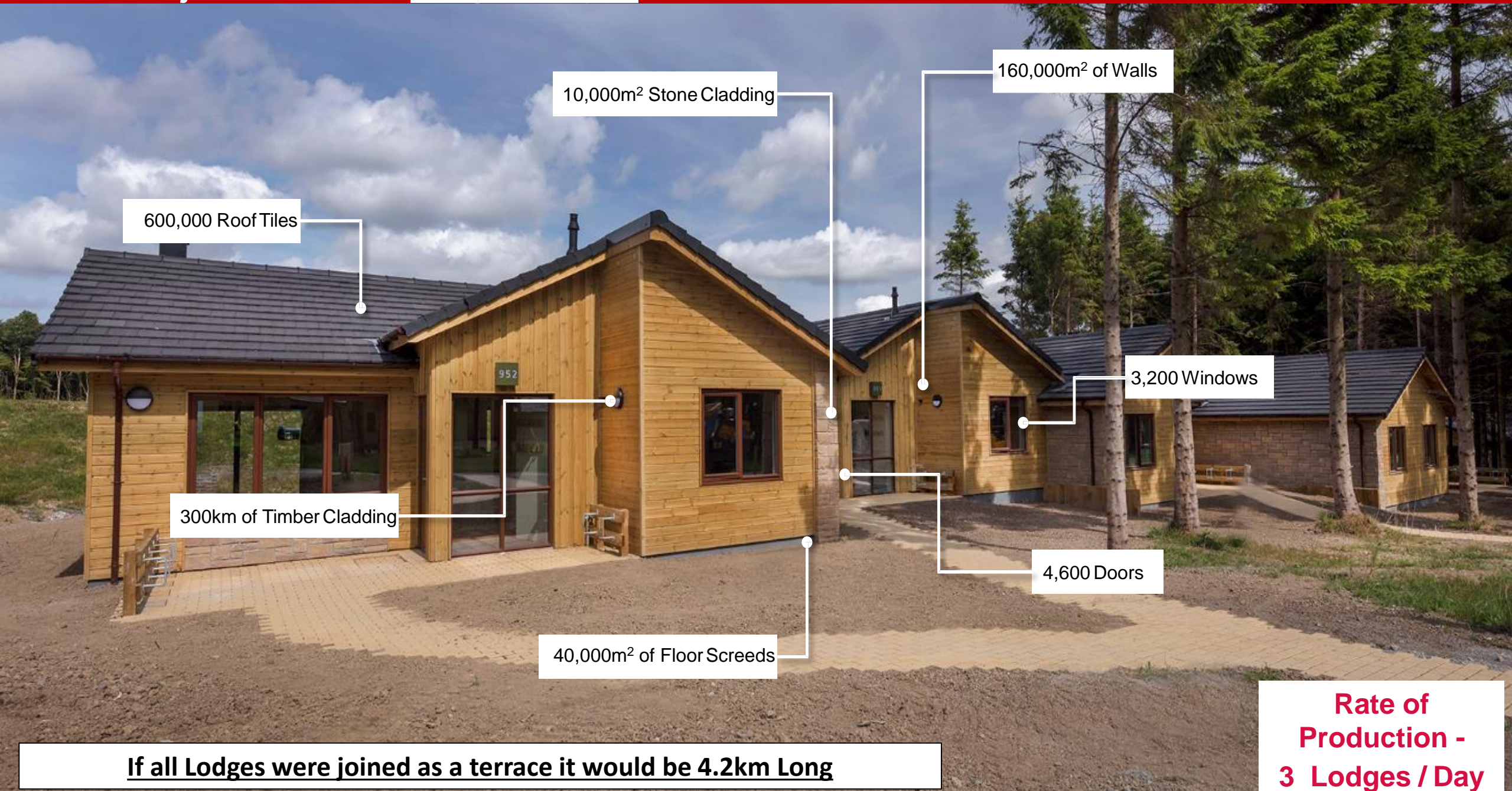
1.2 Project Overview - Lodges Project



466 A2 Rated Lodges



1.2.1 Project Overview - Lodges Project



1.2.2 Project Overview - Lodges Project



1.2.3 Project Overview - Lodges Project



1.2.4 Project Overview - Lodges Project



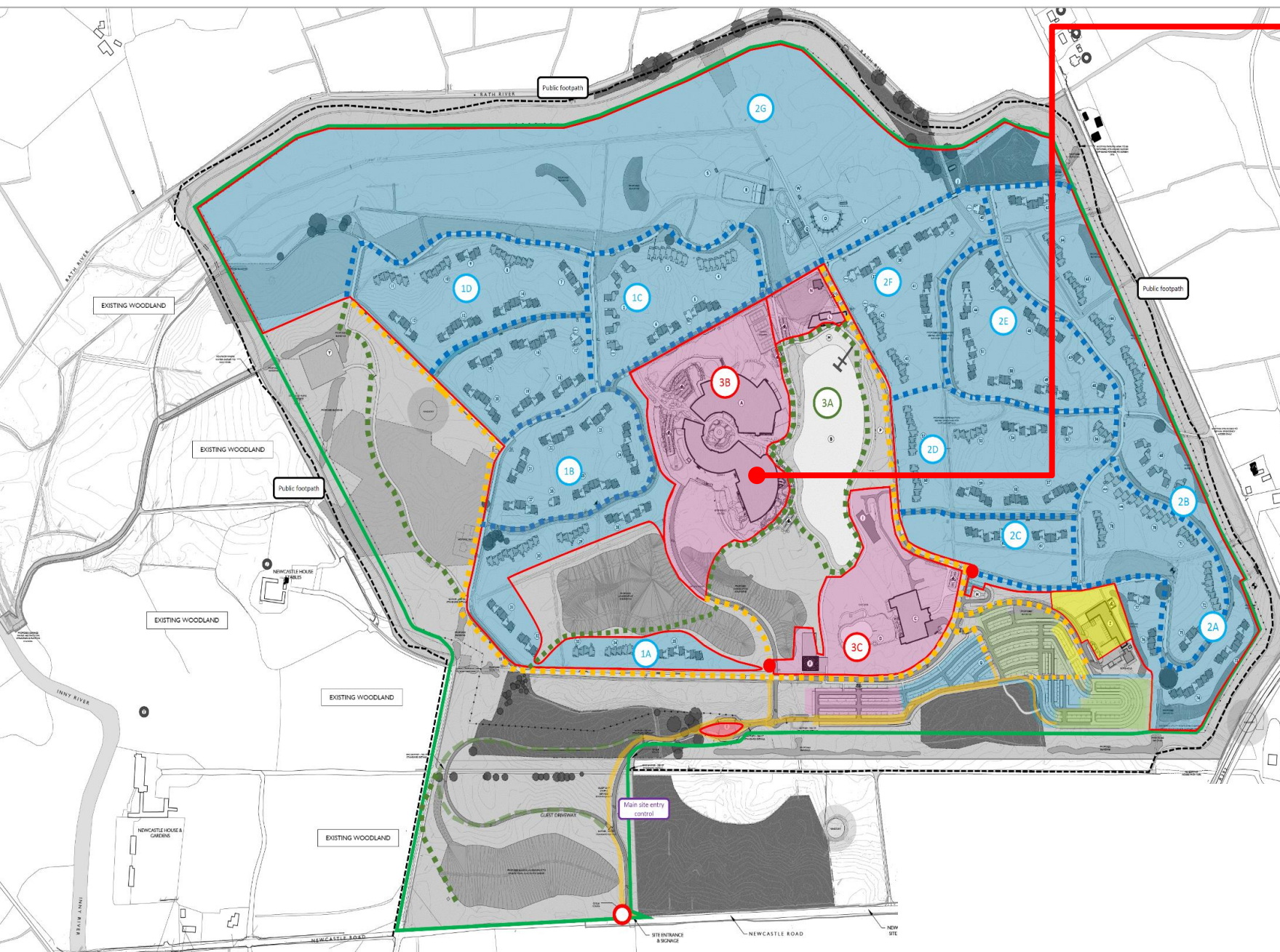
1.2.5 Project Overview - Lodges Project



1.2.6 Project Overview - Lodges Project



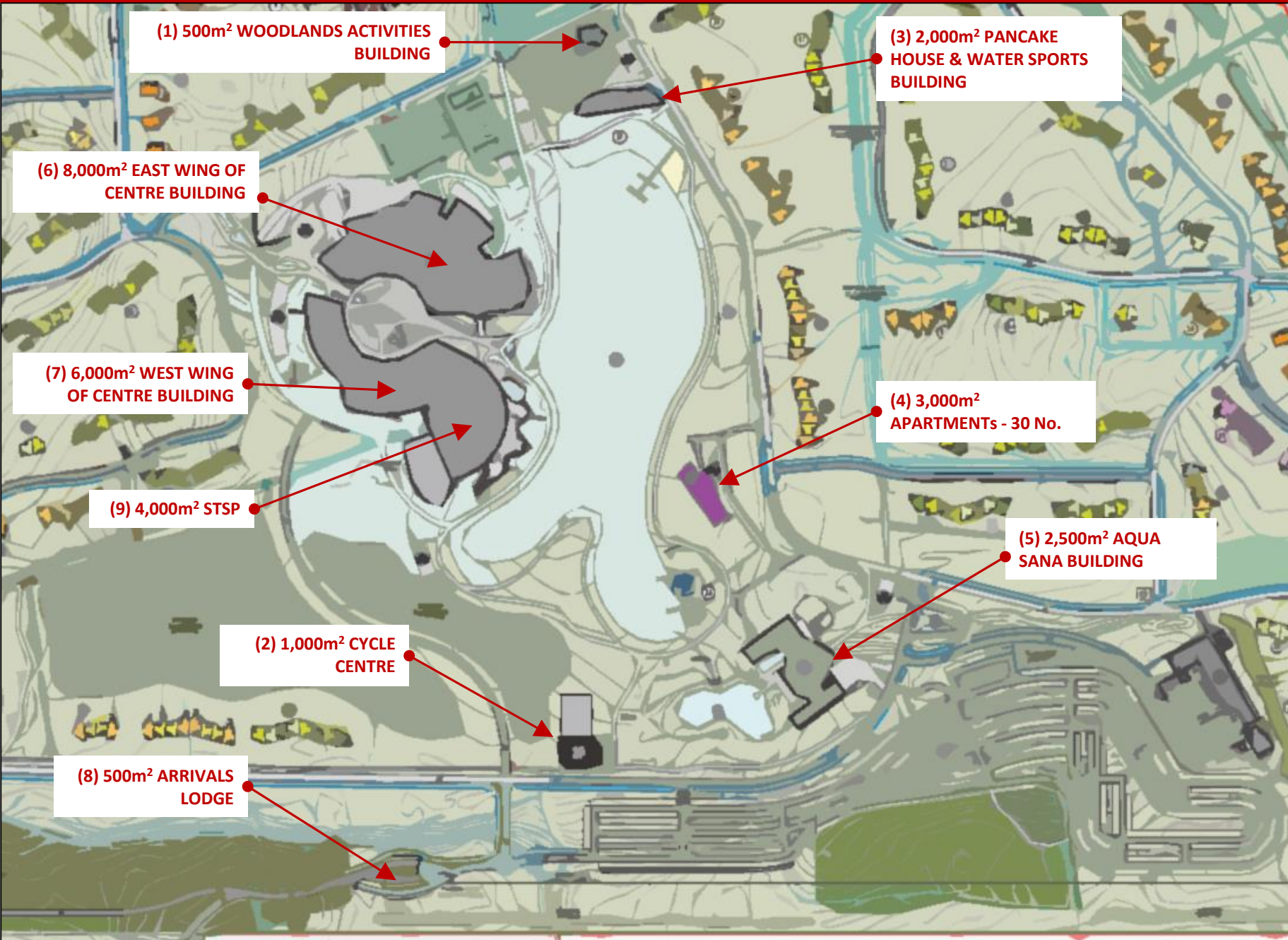
1.3 Project Overview – Village Centre Project



Village Centre Buildings



1.3.1 Project Overview – Village Centre Project



Nine Buildings

1. **Woodland Activity Building** – February 2019
2. **Cycle Centre** – February 2019
3. **Pancake House** – March 2019
4. **Apartment Block** – April 2019
5. **Arrivals Lodge** – May 2019
6. **Aqua Sana** – May 2019
7. **East Block** – Handovers from March 2019
8. **West Block** – Handovers from March 2019
9. **STSP** – June 2019

1.3.2 Project Overview – Village Centre Project



Subtropical Swimming Paradise – Design Intent – Sept. 2017



1.3.3 Project Overview – Village Centre Project



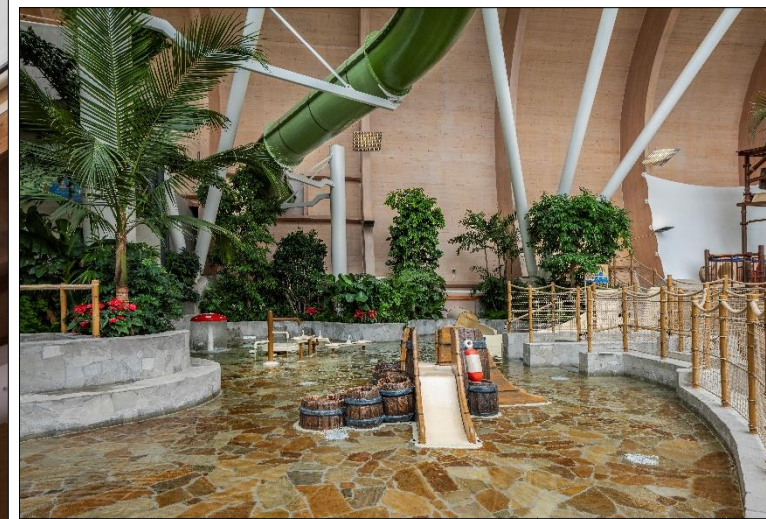
Subtropical Swimming Paradise – Sept. 2018



1.3.4 Project Overview – Village Centre Project



Subtropical Swimming Paradise – July 2019



1.3.5 Project Overview – Village Centre Project



Village Centre Landscaping



1.3.6 Project Overview – Village Centre Project



Aqua Sana Spa



1.3.7 Project Overview – Village Centre Project



1.3.8 Project Overview – Village Centre Project



1.3.9 Project Overview – Village Centre Project



Our Challenge

‘To build a new town, in
400-acres of woodland in
less than 76 Weeks’



- ✓ *Deliver on time & budget*
- ✓ *Live records & traceability*
- ✓ *Reduce Person Hours Onsite*
- ✓ *Remove damage*
- ✓ *Remove overlapping of trades*
- ✓ *Improve Planning & Coordination*
- ✓ *Eliminate High Risk Activities*
- ✓ *Deliver high H & S Standards*
- ✓ *Deliver high quality standards*
- ✓ *Improve efficiency*

3.0 Innovation in Practice

Innovation in Practice

across
Design, Procure & Construct

Innovations	Design	Procurement	Construction
3.1 - Offsite Construction	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.2 - Digital Project Delivery	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.3 – Standardisation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.4 - 4D Construction & Logistics	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.5 - Trade Handover / Interface	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.6 - Just in Time		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.7 – Kitting		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.8 - KPIs & Visual Indicators		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.9 - Work Sampling			<input checked="" type="checkbox"/>
3.10 - Real Time Progress Tracking			<input checked="" type="checkbox"/>



3.1 Innovation in Practice – Offsite Construction

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
3.1 - Offsite Construction	<div></div>		
Digital Project Delivery	<div></div>		
Standardisation	<div></div>		
4D Construction & Logistics	<div></div>		
Trade Handover / Interface	<div></div>		
Just in Time	<div></div>		
Kitting	<div></div>		
KPIs & Visual Indicators	<div></div>		
Work Sampling	<div></div>		
Real Time Progress Tracking	<div></div>		

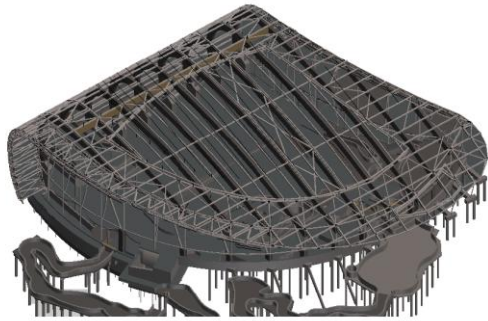


3.1 Innovation in Practice – Offsite Construction

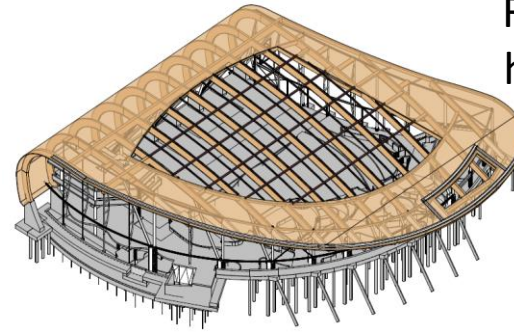
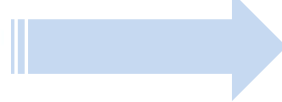
Structure

Design for Manufacture & Assembly

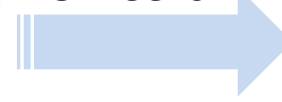
Sub Tropical
Swimming
Paradise



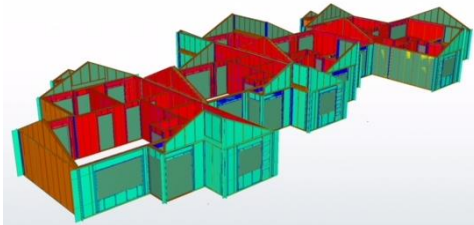
Reduction of
480T Steel



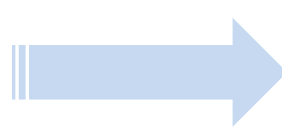
Reduced person
hours & time by
8 weeks



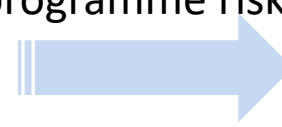
466 Nr. Lodges



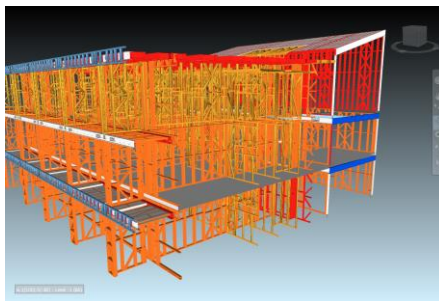
Reduction of
Person Hours



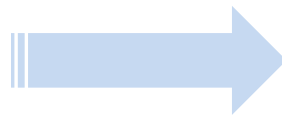
Reduction in
WAH &
programme risk



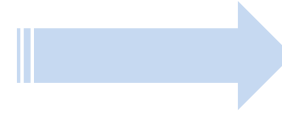
30 Nr. Apartments



Lightweight
Panels



Reduction in
WAH & time

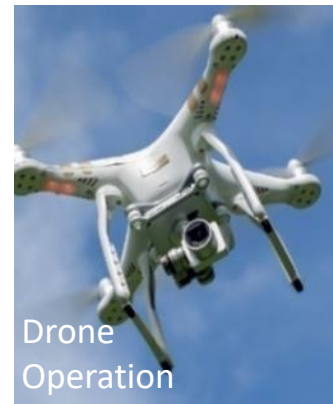
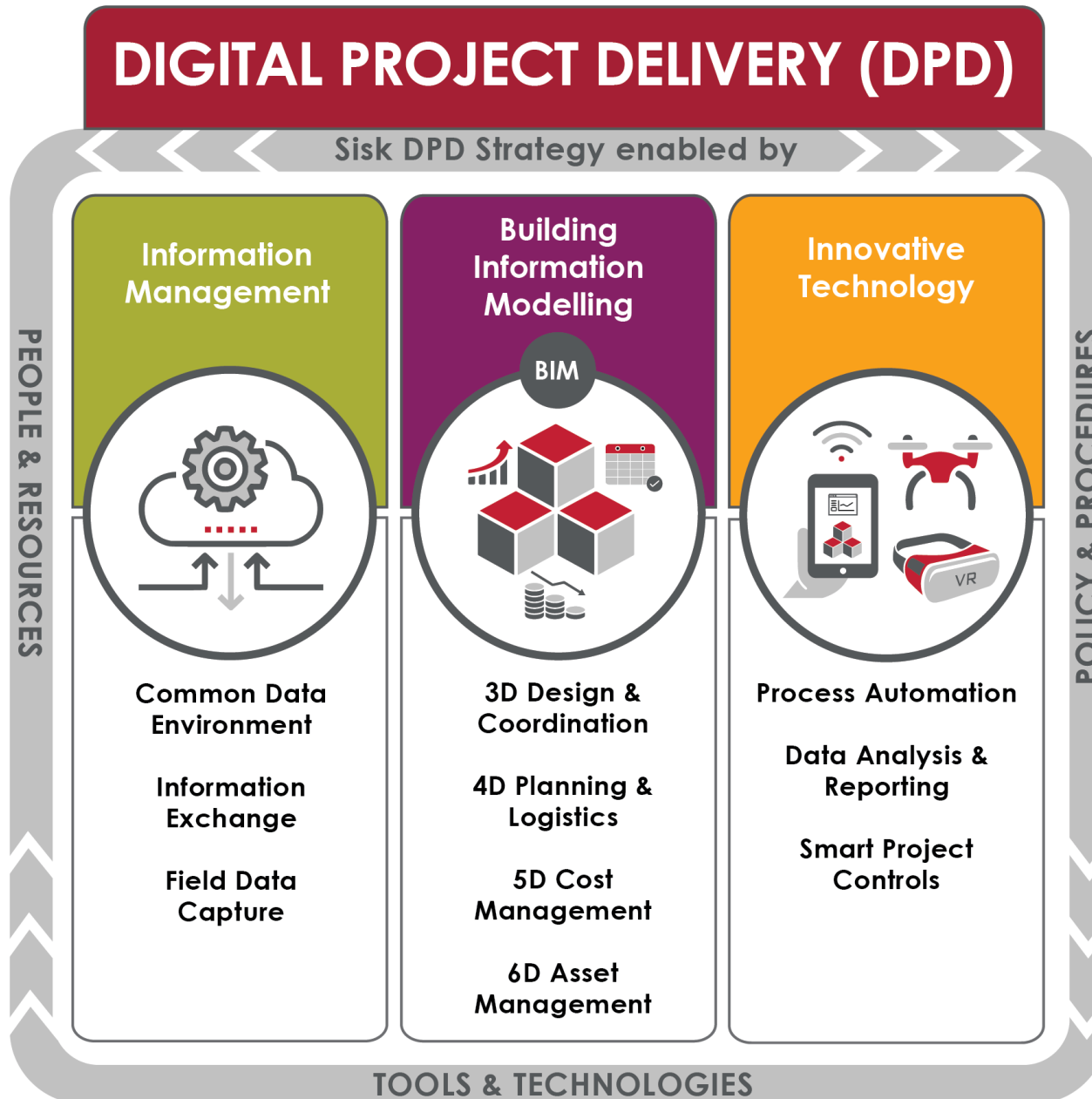


3.2 Innovation in Practice – Digital Project Delivery

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
Offsite Construction	<div></div>		<div></div>
3.2 - Digital Project Delivery	<div></div>		<div></div>
Standardisation	<div></div>		<div></div>
4D Construction & Logistics	<div></div>		<div></div>
Trade Handover / Interface	<div></div>		<div></div>
Just in Time	<div></div>		<div></div>
Kitting	<div></div>		<div></div>
KPIs & Visual Indicators	<div></div>		<div></div>
Work Sampling	<div></div>		<div></div>
Real Time Progress Tracking	<div></div>		<div></div>



3.2 Innovation in Practice – Digital Project Delivery

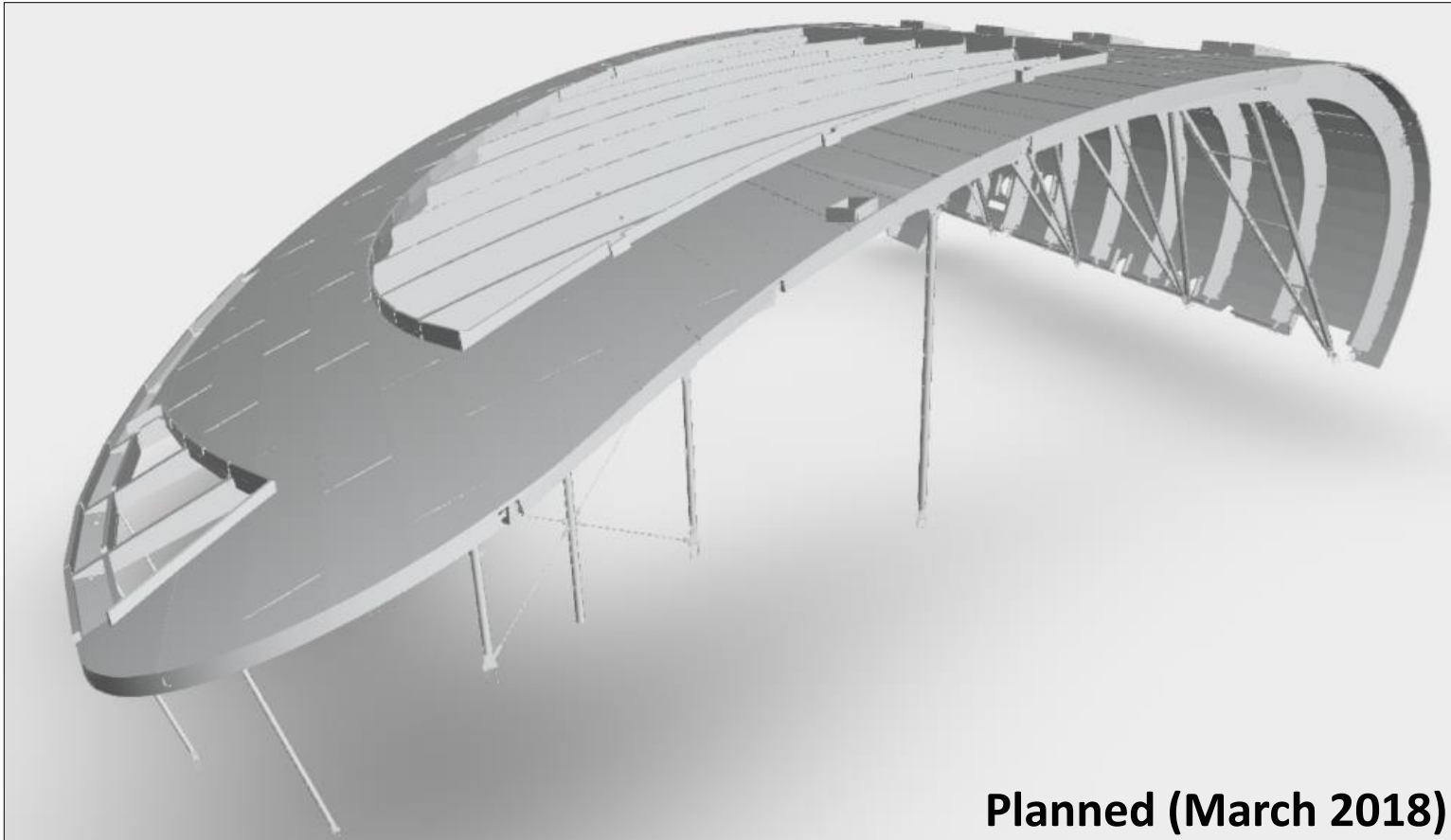


3.2 Innovation in Practice – 3D BIM Coordination

Building Information Modelling

Wiehag (Glulam & CLT):

- Calculate glulam deflections
- Understand the interface with the R.C. structure
- Plan the logistics & erection sequence



Planned (March 2018)



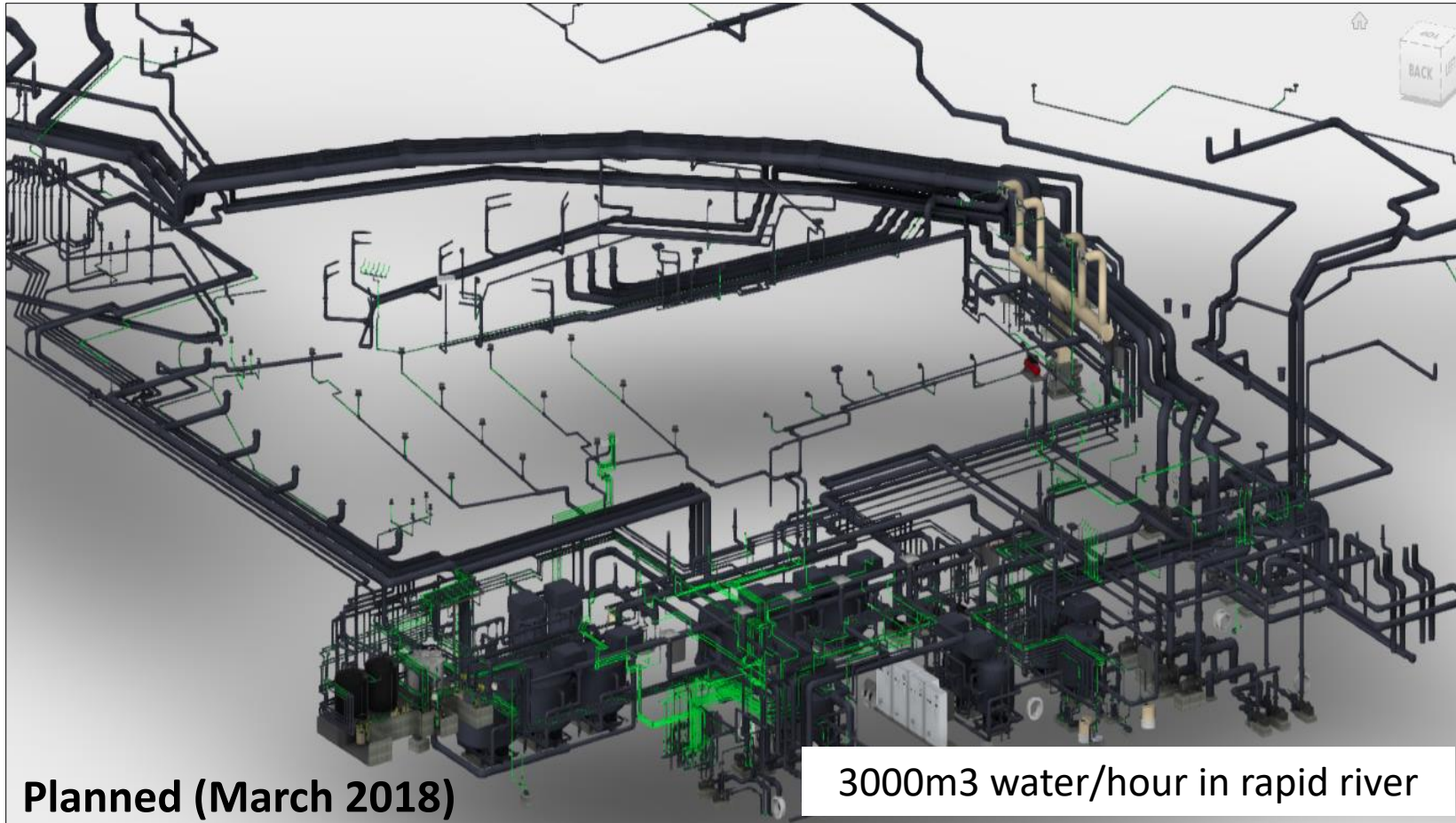
Actual (Oct. 2018)

3.2 Innovation in Practice – 3D BIM Coordination

Building Information Modelling

FT Leisure (Pool Filtration Systems):

- Optimum layout of pool filtration equipment in the basement achieved
- Informed R.C. designers of the numerous critical penetrations in the R.C. structure



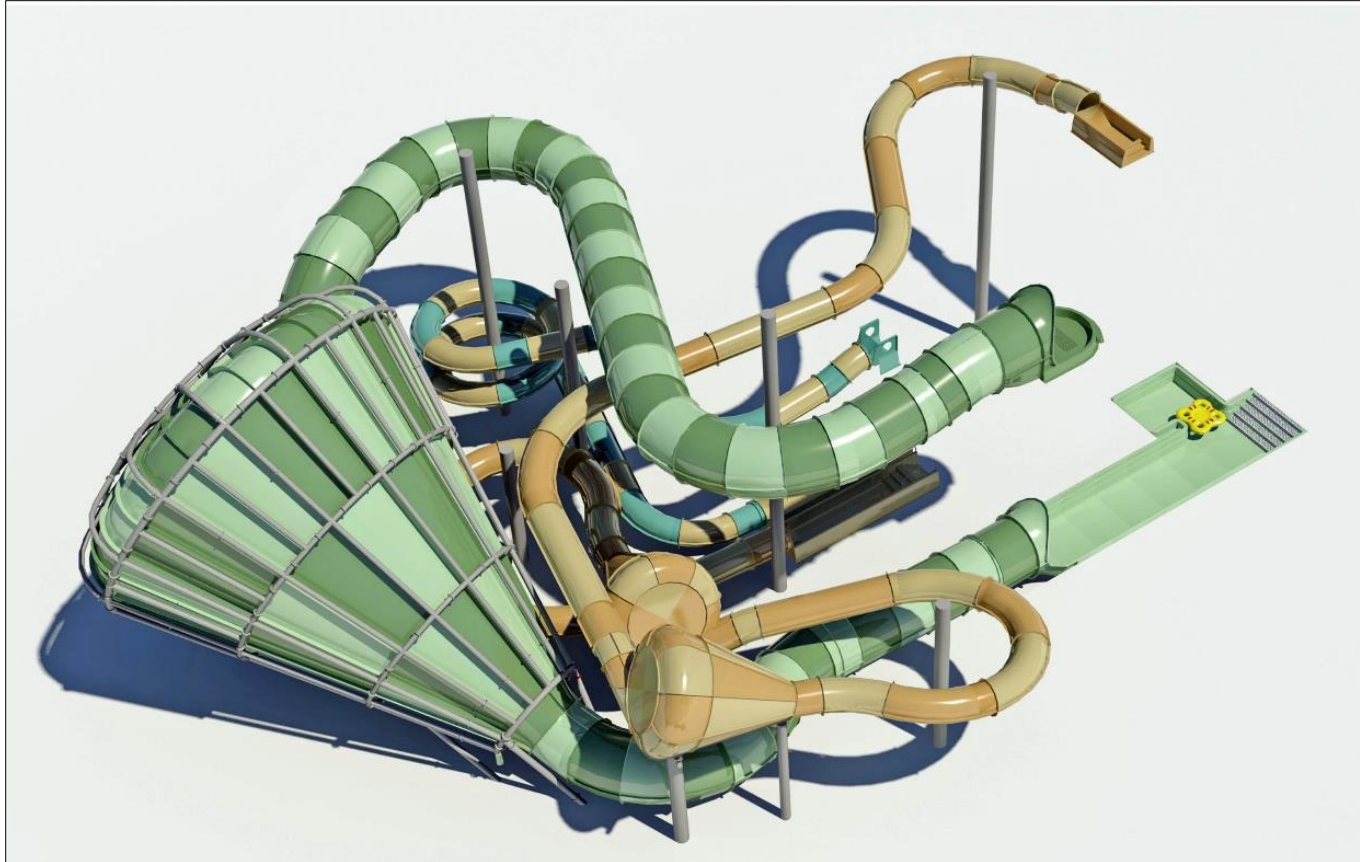
Actual Jan. 2019)

3.2 Innovation in Practice – 3D BIM Coordination

Building Information Modelling

Van Egdom & API:

- Intricate flume foundations made achievable
- On-site assembly streamlined to be as efficient as possible
- Rapid River water flow – complex geometry simplified



Planned (March 2018)



Actual April. 2019)

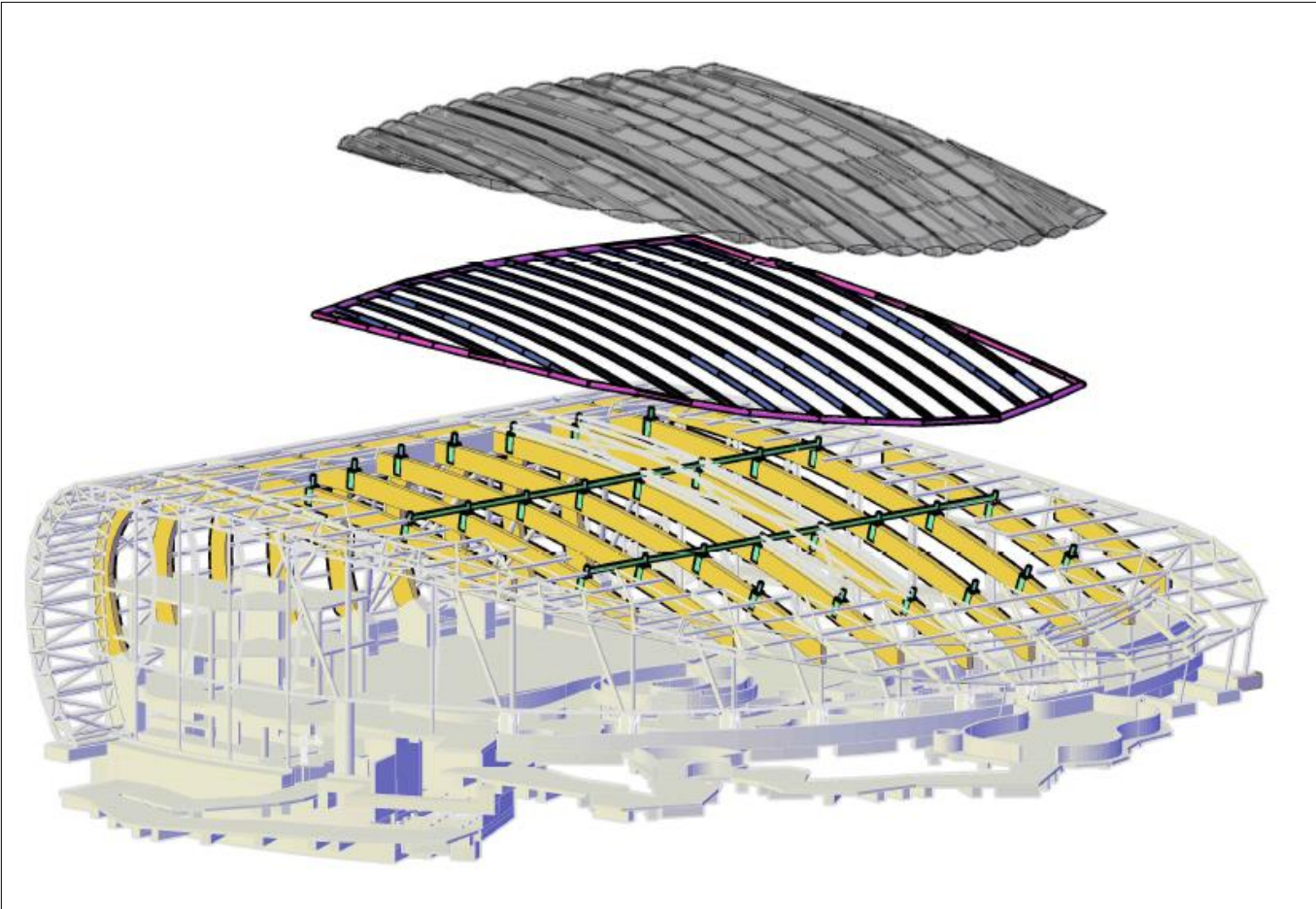


3.2 Innovation in Practice – 3D BIM Coordination

Building Information Modelling

Vector Foiltec (ETFE Roof):

- Design of deflection bracketry
- Detail the bowstring truss support system for glazing
- Rolled roof steelwork designed on as-built BIM information



Planned (March 2018)



Actual April. 2019)



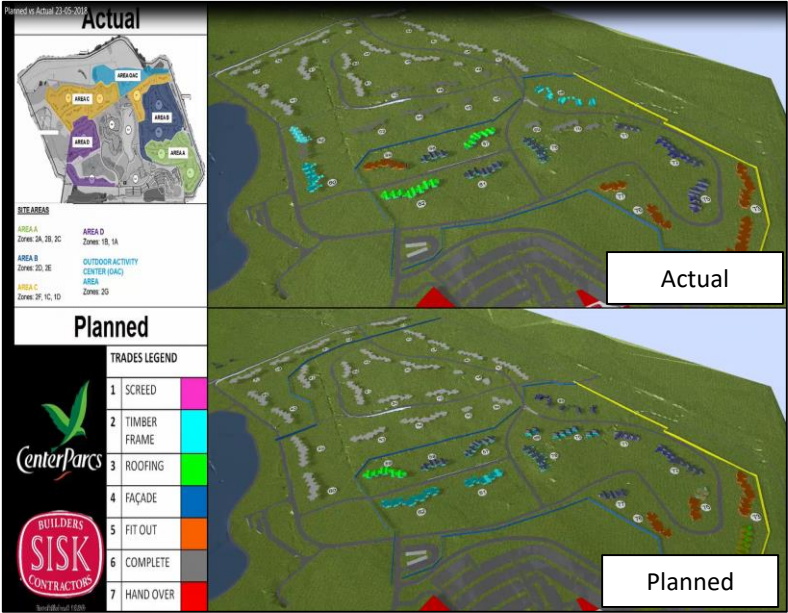
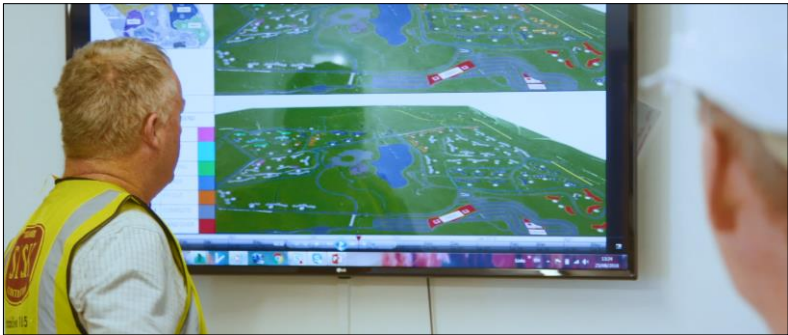
3.3 Innovation in Practice – Standardisation

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
Offsite Construction			
Digital Project Delivery			
3.3 - Standardisation			
4D Construction & Logistics			
Trade Handover / Interface			
Just in Time			
Kitting			
KPIs & Visual Indicators			
Work Sampling			
Real Time Progress Tracking			



3.4 Innovation in Practice – 4D Construction & Planning

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
Offsite Construction			
Digital Project Delivery			
Standardisation			
3.4 - 4D Construction & Planning			
Trade Handover / Interface			
Just in Time			
Kitting			
KPIs & Visual Indicators			
Work Sampling			
Real Time Progress Tracking			



3.4 Innovation in Practice – 4D Construction & Planning



3.5 Innovation in Practice – Trade Handover / Interface

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
Offsite Construction	→		→
Digital Project Delivery	→		→
Standardisation	→	→	→
4D Construction & Logistics	→	→	→
3.5 Trade Handover / Interface	→		→
Just in Time		→	→
Kitting		→	→
KPIs & Visual Indicators			→
Work Sampling			→
Real Time Progress Tracking			



3.6 Innovation in Practice – Just in Time

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
Offsite Construction			
Digital Project Delivery			
Standardisation			
4D Construction & Logistics			
Trade Handover / Interface			
3.6 - Just in Time			
Kitting			
KPIs & Visual Indicators			
Work Sampling			
Real Time Progress Tracking			







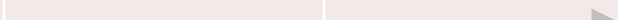





3.7 Innovation in Practice – Kitting

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
Offsite Construction			
Digital Project Delivery			
Standardisation			
4D Construction & Logistics			
Trade Handover / Interface			
Just in Time			
3.7 - Kitting			
KPIs & Visual Indicators			
Work Sampling			
Real Time Progress Tracking			



3.8 Innovation in Practice – KPI's & Visual Indicators

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
Offsite Construction			
Digital Project Delivery			
Standardisation			
4D Construction & Logistics			
Trade Handover / Interface			
Just in Time			
Kitting			
3.8 - KPIs & Visual Indicators			
Work Sampling			
Real Time Progress Tracking			

[illegible]

3.9 Innovation in Practice – Work Sampling

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
Offsite Construction			
Digital Project Delivery			
Standardisation			
4D Construction & Logistics			
Trade Handover / Interface			
Just in Time			
Kitting			
KPIs & Visual Indicators			
3.9 - Work Sampling			
Real Time Progress Tracking			



CLIENT/PROJECT		Center Parcs		ISSUE DATE		09/09/2018		OBSERVER(S)			
CONTRACTOR		SISK		SECTION		Roofing		Henry Cosgrove			
SUB CONTRACTOR		Edmund Lewis		PROCESS		7 tile valley construction.		7 tile valley construction to front of cluster 75. No of men 2 men, 5 crew			
No	Activity / Element	Time		Time Analysis		Comments/Issues		Safety	General	Improvement Idea	Estimated Time Saving
		Clock	Activity / Element	VA	SA	Waste	Waste Category				
1	Load GRP to scaffold	11.55	5		5			General Care			
2	Get nails	12.00	15			15		Not to break	Couldn't find		15
3	Lay 2 no. GRP on valley	12.15	5	5				fitted tiles while	any nails on the		
4	Fix GRP valley	12.20	5	5				working on	scaffold and had to		
5	Chalk O/S line on tiles	12.25	10		10			the pitched roof	to the store		
6	Remove tiles and cut on scaffold	12.35	5	5							
7	Insert full tile in place	12.40	5	5							
8	Fix and cut tile into valley	12.45	15	15							
9	Stop	13.00									
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
Totals		65	30	20	15	Waste Categories : WM - Worker Motion IN - Inventory CP - Over Production		IT - Waiting PR - Process	D - Defects TR - Transportation	Total	15
%		100	46	30	24					% Improvement	24.0

Activity Sampling -

40% Value Add (VA)
30% Support Activity (SA)
24% Waste
6% Idle (I)

• 1 • 2 • 3

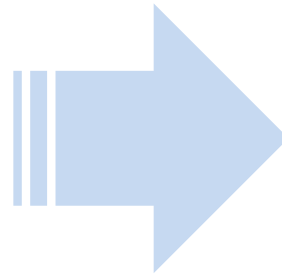
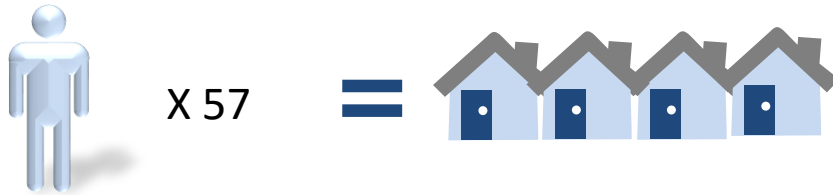


3.9 Innovation in Practice – Work Sampling

Before

Roofing - Work Sampling

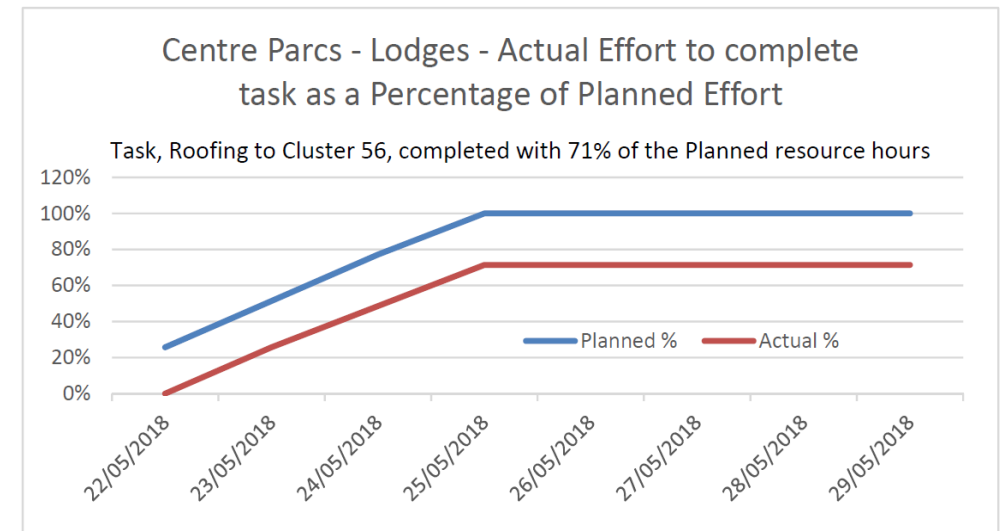
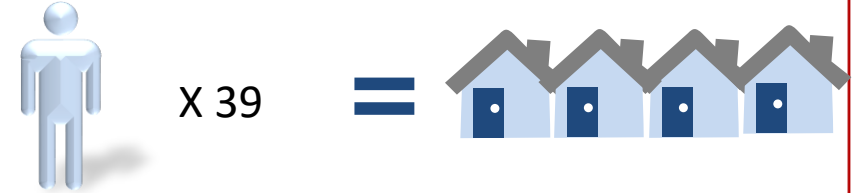
57 person days required to complete a 4Nr Lodge Cluster



After

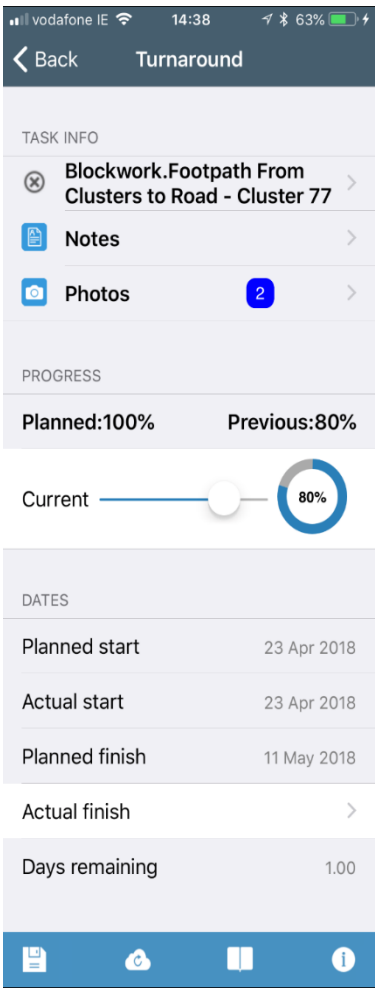
Roofing - Work Sampling

39 person days required to complete a 4Nr Lodge Cluster



3.10 Innovation in Practice – Real-Time Progress Tracking

Lean Principals	Pre-Construction Stage		Construction Stage
	Design	Procurement	
Offsite Construction			
Digital Project Delivery			
Standardisation			
4D Construction & Logistics			
Trade Handover / Interface			
Just in Time			
Kitting			
KPIs & Visual Indicators			
Work Sampling			
3.10 - Real Time Progress Tracking			





4.0 Conclusion – Center Parcs, Longford Forest

Thank You

Brian Kennedy

James Moloney

John Sisk & Son (Holdings) Ltd

Completion Metrics	
Person hours Worked	2.5M+
Hours without reportable accident	2.5M+
Peak Employees onsite	1,000+
Reportable Accidents	0
On-site Start Date	Jan. 2018
466 Lodges – Build Duration	68 Weeks
Lodge Handover Rate (zero snags) peaked @ 15 / week	466
Village Centre – Build Duration	76 Weeks
Overall Completion	June 2019

