ISO18404: A Model for Lean Transformation in the construction sector
Lean Construction Intervention or Transformation?
Introductions

• **Steve Ward** – Technical director-WSP Continuous Improvement Services
  • Started as Apprentice Carpenter 1976
  • Discovered Lean 2001 whilst at Pearce Group
  • Became Master Engineer for BRE CLIP Programme in 2004
  • PhD in Lean Construction
  • ISO 18404 Lean Expert 2016

• **Simon Caklais**
  • Managing Director Gilbert & Goode Ltd
  • CIOS LEP Board Member leading construction & housebuilding sector strategy
  • Former Head of Projects for BAA (1999 – 2006)
  • ISO 18404 Lean Leader 2018
Lean Intervention Vs Transformation

• Lean Intervention
  • Definitions
    • The act or fact of *intervening.*
    • Ad Hoc deployment of Lean Techniques based on Waste Removal

• An Example
What do you see?
When you look at sites, offices, fabrication yards...
What do you see?
Lots of busy people?
Busy at what?

\[ \text{ACTIVITY} = \text{WORK} + \text{WASTE} \]
3 Elements of a Day

**Value Adding**
Something changes to get closer to what the customer wants

**Support Activity**
Something we currently have to do but does not in itself add value for the customer

**Waste**
Transport
Inventory
Motion
Waiting
Over Process
Over Production
Defects
Why eliminate Waste?

To raise the ratio of **Value Added** activities to **Support Activity** and **Waste**

More resources available for other activities

Eliminate

Minimise
Work Observation

Value Stream Map (VSM)

TOTAL TIME 60 min.
V.A. 11 min
S.A. 24
WASTE 20

Support activity & waste constitute 83% of the concrete panel erection process. Main waste activities include:
1. Locating & identifying the correct brackets
2. Moving and manoeuvring the cherry picker
3. Adjusting the concrete panels
Lean Intervention Vs Transformation

• Lean Transformation
  • A systems wide and continuous approach to improving operations based on Lean Thinking that benefits customers, the business and employees in the long term

• An Example
Interesting chart

Takt Time Improvement 2008 to 2012 to date

Year

2012
2011
2010
2009
2008

Takt time m2/week

0 50 100 150 200 250
Small Scale Actions...

Over the last 3 years...

Street Lighting  +20%
Patching         +20%
Slurry sealing  +30%
Blairgowrie     +10%
Forfar          +10%
Produce large scale benefits
Why ISO 18404?

- We Didn’t know how it might apply/work?
- Had heard Resistance?
- Critics?
- Gut feel was it’s the right way to go.

Now we think have an informed view.
Why ISO 18404?

ISO 18404 deals with two issues.
- Quality of Training
- Organisational Deployment

Quality of Training

- Yellow Belts? Really?
- Quality of training – some questionable
- Tendering confusion for clients – companies claiming to be Lean to get work.
Why ISO 18404?

• **Competency** of Personnel
  • Training, experience, auditable competence

• **Adequacy of the organisations approach**
  • **Strategy**
    • Must be clear link to business plan
    • Defined objectives
  • **Architecture**
    • E.g. steering groups, reporting structure, accountabilities, support.
  • **Continuous Improvement**
    • Defined Metrics, targets & review mechanisms
Rationale for our approach

STRATEGY
- Communication
- Plans of Action
- KPIs
- Reporting Structures
- Organisational Culture
- Decision Making Process
- Steering Committee
- Responsibilities/Accountabilities
- Support
- Steering Committee
- Reporting Structures
- Organisational Culture
- Decision Making Process
- Steering Committee
- Responsibilities/Accountabilities
- Support

ARCHITECTURE

KEY PERSONNEL
- Champions & Sponsors
- Improvement Leaders
- Competency Records
- Experience
- Lean
- Six Sigma
- Training

SUCCESSFUL CONTINUOUS IMPROVEMENT
Rationale for our approach

STRATEGY
- Audit
- Targets
- Communication
- Plans of Action
- KPIs
- Reporting Structures

ARCHITECTURE
- Organisational Culture
- Decision Making Process
- Support
- Steering Committee
- Responsibilities/Accountabilities

KEY PERSONNEL
- Champions & Sponsors
- Improvement Leaders
- Competency Records

What usually is left for Improvement Leaders to sort out

- Lean
- Six Sigma
- Training
- Experience
- Audit
- Targets
- Communication
- Plans of Action
- KPIs
- Reporting Structures
- Organisational Culture
- Decision Making Process
- Support
- Steering Committee
- Responsibilities/Accountabilities
- Champions & Sponsors
- Improvement Leaders
- Competency Records
- Experience
HMM... LOOKS INTERESTING, BUT IS IT FOR ME...?

WHAT ARE THOSE WEIRDOS UP TO?

YAY! SHINY NEW THING!

COOL KIDS HAVE A NEW TOOL - I WANT!

I WANT MY FAX MACHINE BACK.

THE INNOVATION DISTRIBUTION CURVE

INNOVATORS
EARLY ADOPTERS
CHASM
EARLY MAJORITY
LATE MAJORITY
LAGGARDS

BUSINESSILLUSTRATOR.COM
Piloting ISO 18404 as a Transformation Model
Gilbert & Goode

- Cornish Main Contractor & Developer (with a social purpose)
- Operating for over 40 years
- C. £25 Million Annual Turnover
- Over 70 employees
- Owned by Ocean Housing Group
Lean Journey

• Knowledge transfer from BAA of basic lean tools

• Need to drive business efficiency through increased productivity & reduction of waste

• Met Steve Ward through Constructing Excellence Network

• Initiated awareness & training sessions for construction teams

• Held collaborative planning sessions for pilot projects

• Initial awareness sessions for supply chain
Productivity

Cornwall Productivity
75.1% of UK Average

The UK economy produces...
£31.50 of GVA* per hour worked.

Manufacturing produces...
£35.50 of GVA per hour worked

Services produce...
£31.50 of GVA per hour worked

Construction produces...
£25.50 of GVA per hour worked

Productivity growth in the UK between 1995–2015

- UK economy: 24%
- Manufacturing: 60%
- Services: 42%
- Construction: 10%

*GVA: Gross Value Added
Lean Journey

• Success realised for two pilot projects; desire to rollout across company and all operations
• ISO18404 identified as possible route to support this
• GAP Analysis carried out by Prof. Tony Bendell
• Bid made to CITB for the implementation of ISO18404 within construction
• Deliverables agreed
• Agreed funding through CITB
CITB Agreed Deliverables

- 2 Lean Leaders
- 8 Individuals Trained to Lean Practitioner (6 certified)
- 100 Staff & Supply Chain Lean Touch
- Organisation Accreditation to ISO 18404
- Creation of Future Training Materials
- Case Study (Best Practice Guide)
- Partnered Organisations
Appointment of Resource

- External Lean Expert
- External Lean/RSS/Audit Professional
- Internal Project Manager
- Internal Auditor
- Internal Staff Time for Training / Completing Portfolio’s
Specific Resource Allocations

• 4 Lean Leaders
• 6 Lean Practitioners
• 13 Lean Implementers
• 100 Staff & Supply Chain Lean Touch
• 6 KPI’s & Associated Forums
• 1 Lean Management Team Overarching Forum
G&G Lean Objective Hierarchy

Ocean Corporate Plan
200 new homes per annum

G&G Vision / Raison D’etre
Maximise value to the Ocean Group

How
Professionalism & Innovation (Good to work with/for) – Productivity & Efficiency – Customer Satisfaction/Reputation

Long Term Targets
- 20% design time reduction
- 20% site time reduction
- 10% build cost reduction
- 100% Customer Satisfaction
- 20% defect reduction
- 10% accident reduction

Short Term Targets
- 10% design time reduction
- 10% site time reduction
- 5% build cost reduction
- 98% Customer Satisfaction
- 10% defect reduction
- 5% accident reduction

Deployment
Lean Forums – Improvement Projects via Lean Leaders, Lean Practitioners, Lean Implementer's
Performance Analysis

(Assess) Benchmark performance / set targets

(Plan) Analyse for Improvement Opportunities

(Do) Implement Improvement Projects

(Check) Re-assess Performance

(Act) Adjust Processes to Include Improvements
Continuous improvement works most effectively when it is implemented and influenced with input from everyone as it provides an integrated approach.
### Progress to date

**Project ref.**

**Description**

**Lean Champion**

<table>
<thead>
<tr>
<th>Project ref.</th>
<th>Description</th>
<th>Lean Champion</th>
<th>Progress Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Des1</td>
<td>Design Last Planner (Tracker)</td>
<td>Mike Jeffs</td>
<td>100% 0%</td>
</tr>
<tr>
<td>Des2</td>
<td>Designer Monthly Planner</td>
<td>Mike Jeffs</td>
<td>0% 100%</td>
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<tr>
<td>Cons1</td>
<td>Weekly Work Planning &amp; PPC</td>
<td>Callum Yeowell</td>
<td>80% 20%</td>
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<tr>
<td>Cons2</td>
<td>Timber Frame Option Trials</td>
<td>Callum Yeowell</td>
<td>100% 0%</td>
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<td>Cons3</td>
<td>Groundworks Procedure Restructure</td>
<td>Adrian Cocks</td>
<td>10% 90%</td>
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<tr>
<td>Cons4</td>
<td>On Time Material Procurement</td>
<td>Adrian Cocks &amp; Callum Yeowell</td>
<td>5% 50%</td>
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<tr>
<td>Cons5</td>
<td>Reducing Kitchen Lead Times</td>
<td>Adrian Cocks &amp; Callum Yeowell</td>
<td>5% 50%</td>
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<tr>
<td>Cons6</td>
<td>6 Weekly Lookaheads</td>
<td>Callum Yeowell &amp; Adrian Cocks</td>
<td>5% 50%</td>
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<tr>
<td>Cons7</td>
<td>Jetfloor (New Floor System)</td>
<td>Adrian Cocks</td>
<td>25% 75%</td>
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<td>Cost1</td>
<td>New QS Required Info Forms</td>
<td>Shaun Rabey</td>
<td>10% 90%</td>
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<td>Cost2</td>
<td>Reduced no. of Skips</td>
<td>Dan Cole</td>
<td>10% 90%</td>
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<td>Cost3</td>
<td>Estimating Make Ready Needs</td>
<td>Darren Hicks</td>
<td>10% 90%</td>
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<td>Cost4</td>
<td>Process Map of Key QS Functions</td>
<td>Shaun Rabey</td>
<td>10% 90%</td>
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<td>Cost5</td>
<td>Estimating Enquiries Standardised</td>
<td>Darren Hicks</td>
<td>10% 90%</td>
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<td>Cost6</td>
<td>General QS Failure Demand Assessment</td>
<td>Dan Cole</td>
<td>10% 90%</td>
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<td>Dfct1</td>
<td>New QA System</td>
<td>Adrian Cocks &amp; Callum Yeowell</td>
<td>5% 90%</td>
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<tr>
<td>H&amp;S1</td>
<td>New Accident &amp; Near Miss Reporting Documents</td>
<td>Callum Yeowell</td>
<td>100% 0%</td>
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<tr>
<td>H&amp;S2</td>
<td>Standardised H&amp;S Standards</td>
<td>Adrian Cocks</td>
<td>0% 100%</td>
</tr>
<tr>
<td>H&amp;S3</td>
<td>Accidents from 1st Half 2018</td>
<td>Adrian Cocks &amp; John Hutchens</td>
<td>10% 90%</td>
</tr>
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</table>

**KPIs**

Type  | Description          | Progress for yr1  | Progress for yr3  | Remaining for yr1  | Remaining for yr3  |
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<tbody>
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<td>Pre-Construction (10%)</td>
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<tr>
<td>Construction (10%)</td>
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<tr>
<td>H&amp;S AFR (8%)</td>
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<tr>
<td>Bill Cost (5%)</td>
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<tr>
<td>Customer Satisfaction (On Completion) (10%)</td>
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<tr>
<td>Customer Satisfaction (After Defects Period) (10%)</td>
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<tr>
<td>Defects (10%)</td>
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</tbody>
</table>

**Legend**

- p: Partial Impact
- t: Strong Impact

**Total**

Remaining Percentage for 1 Year Target

- 5% 10% 3% 5% 0% 0% 5%

**Description**

- **Improvement Projects**
  - Design Last Planner (Tracker)
  - Designer Monthly Planner
  - Weekly Work Planning & PPC
  - Timber Frame Option Trials
  - Groundworks Procedure Restructure
  - On Time Material Procurement
  - Reducing Kitchen Lead Times
  - 6 Weekly Lookaheads
  - Jetfloor (New Floor System)
  - New QS Required Info Forms
  - Reduced no. of Skips
  - Estimating Make Ready Needs
  - Process Map of Key QS Functions
  - Estimating Enquiries Standardised
  - General QS Failure Demand Assessment
  - New QA System
  - New Accident & Near Miss Reporting Documents
  - Standardised H&S Standards
  - Accidents from 1st Half 2018

- **KPIs**
  - Pre-Construction (10% for yr1, 20% for yr3)
  - Construction (10% for yr1, 20% for yr3)
  - H&S AFR (8% for yr1, 10% for yr3)
  - Bill Cost (5% for yr1, 10% for yr3)
  - Customer Satisfaction (On Completion) (10% for yr1, 4% for yr3)
  - Customer Satisfaction (After Defects Period) (5% for yr1, 10% for yr3)
  - Defects (10% for yr1, 20% for yr3)

- **Remaining Percentage for 1 Year Target**
  - 5% 2% 0% 2% 3% 5%
Training & Communication
### Competency Evidence

18 Competencies, 32 sections, 72 sub-sections across Understanding, Applying, Managing & Training.
18 Competencies, 32 sections, 72 sub-sections across Understanding, Applying, Managing & Training.
Lean transformation

- Continuous improvement Culture
- Leadership & Ownership
- Relevant & Understandable
- Construction not Manufacturing
- Add value
Timeline

- Awareness Sessions Early 2016
- Trial Projects 2016 – 2017

- Commencement of Improvement Projects & Forums – March 2018
- BSI Scoping Audit – 11/9/18
- BSI Stage 1 Audit – 8/10/18
- BSI Stage 2 Audit – 29/10/18
Summarised Learnings to Date

• Leadership / Team Involvement / Collaboration is essential
• Substantial support and expert guidance
• Challenging existing methods or thinking
• Changing culture
• Data, data, data, The importance of measuring performance and improvements
• You won’t get it right all the time
  • Sustain
Any Questions?
Some examples to date
# Single Page Plan

## Improvement Projects

<table>
<thead>
<tr>
<th>Project ref.</th>
<th>Description</th>
<th>Lean Champion</th>
<th>Cons1 - Weekly Work Planning &amp; PPC</th>
<th>Cons6 - 6 Weekly Lookaheads</th>
<th>Cons2 - Reduction of Skip Use</th>
<th>Target Date</th>
<th>Completed Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cons1</td>
<td>Create Template</td>
<td>Callum Yeowell</td>
<td>0%</td>
<td></td>
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<td>31/01/2018</td>
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<td>Cons1</td>
<td>Training</td>
<td>Callum Yeowell</td>
<td>20%</td>
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<td>01/02/2018</td>
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<tr>
<td>Cons1</td>
<td>Ongoing 1-1 Support</td>
<td>Adrian, Craig, Steve</td>
<td>20%</td>
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<td>To Start 2/2/18</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Cons1</td>
<td>Collect Completed Plans</td>
<td>Adrian, Craig, Steve</td>
<td>0%</td>
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<td></td>
<td>To Start 2/2/18</td>
<td>Ongoing</td>
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<tr>
<td>Cons1</td>
<td>Collate Data</td>
<td>Callum Yeowell</td>
<td>0%</td>
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<td></td>
<td>To Start 2/2/18</td>
<td>Ongoing</td>
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<tr>
<td>Cons1</td>
<td>Run Individual Improvement Project for Issue found on Project 1</td>
<td>Adrian</td>
<td>30%</td>
<td></td>
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<td>30/07/2018</td>
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<tr>
<td>Cons1</td>
<td>Run Individual Improvement Project for Issue found on Project 2</td>
<td>Craig</td>
<td>30%</td>
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<td>30/08/2018</td>
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<td>Cons1</td>
<td>Run Individual Improvement Project for Issue found on Project 3</td>
<td>Steve</td>
<td>30%</td>
<td></td>
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<td>30/09/2018</td>
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## LEGEND

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<tr>
<th>Status No.</th>
<th>Allocated</th>
<th>Started</th>
<th>Reviewed</th>
<th>Complete</th>
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</table>

<table>
<thead>
<tr>
<th>Strong Impact</th>
<th>Partial Impact</th>
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<tbody>
<tr>
<td>p</td>
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</tbody>
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Description:

- Ongoing 1-1 Support
- Collect Data
- Run Individual Improvement Project for Issue found on Project 1
- Run Individual Improvement Project for Issue found on Project 2
- Run Individual Improvement Project for Issue found on Project 3

**Target Date**

- 31/01/2018
- 01/02/2018
- To Start 2/2/18
- To Start 2/2/18
- To Start 2/2/18
- 30/07/2018
- 30/08/2018
- 30/09/2018

**Completed Date**

- Ongoing
- Ongoing
- Ongoing

**Note:**

- Single Page Plan

---

**Create Template**

**Training**

**Collect Completed Plans**

**LEGEND**

- Improvement Projects

  - Cons1 - Weekly Work Planning & PPC
  - Cons6 - 6 Weekly Lookaheads
  - Cons2 - Reduction of Skip Use

- Target Date

- Completed Date

---

**Description**

- Run Improvement Project - no.2
- Run Improvement Project - no.3
- Run Improvement Project - no.4

**Target Date**

- 10/07/2018
- 25/07/2018
- To Start 26/7/18
- To Start 26/7/18
- To Start 10/10/2018
- 30/10/2018
- 30/11/2018
- 20/12/2018

**Completed Date**

- Ongoing
- Ongoing
- Ongoing

**Note:**

- Skip Use

---

**Collect Historical Data**

**Run Workshop with Supervisors & Workforce on how to reduce quantity of waste**

**Run Workshop with Site Managers on how to reduce quantity of waste**

**Collect Responses for Largest Causing Factors**

**Run Improvement Project - no.1**

---

**Create Template**

**Training**

**Collect Completed Plans**

---

**CITB**

**Gilbert & Goode Construction**
G&G Lean Efforts

6 Weekly planning

Weekly planning
# G&G Lean Efforts – Planning Matrix

**Key:**
- Planned
- Done
- Quality Checked

<table>
<thead>
<tr>
<th>Plot 1</th>
<th>Plan</th>
<th>Planned</th>
<th>Does</th>
<th>Quality Checked</th>
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<tbody>
<tr>
<td>Plot 2</td>
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<td>Plot 12</td>
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</table>
G&G Lean Efforts – Quality Assurance System

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<thead>
<tr>
<th>Contract</th>
<th>Contract No</th>
<th>Date</th>
<th>Subcontractor</th>
<th>No.</th>
<th>Project</th>
<th>Work</th>
<th>Expected Standard</th>
<th>Not Accepted</th>
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</table>

### Quality Checks

- Site access/roads are clear and unobstructed
- The following are within specification:
  - Plane dimensions
  - Straightness
  - Level
  - Rotation
  - Cut/finish
  - Tolerances
  - Observations
  - Arrangements
  - Leadwork

### Additional Comments

By signing the below you acknowledge that the elements of work are complete in accordance with the relevant documents & standards. The site has been subjected to inspection by the relevant parties. Fixing work has been completed in accordance with the manufacturers' instructions. Any work not completed or not correct to the requirements may be subject to refusal.

Signed by:

Site Manager

Sub-Contractor

Representative
<table>
<thead>
<tr>
<th>Task</th>
<th>Developed Architectural Layout</th>
<th>Topo Survey</th>
<th>Submit Pre-</th>
<th>Target Completion Date</th>
<th>Identify Grant Availability</th>
<th>Job Number</th>
<th>Actual Completion Date</th>
<th>Wks</th>
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</table>

New Mills Lane, Kenwyn
House types, mix and sizes revised following oversizing of units.

Vicarage Hill, Mevagissey
Actual Completion Date
10/11/17
1/10/17
26/04/2018
18/05/2018

## Project Progress Tracker

### Project Check List

<table>
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<tr>
<th>Ref</th>
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<td>Planning</td>
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<td>Submit Pre-App</td>
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O/M finishes spec

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Thank You!!