Horizontal Directional Drilling (HDD)

Managing Risk

A Client’s Eye View
HDD RISK - CLIENT PERSPECTIVE

PILOT HOLE

PRE-REAMING

PULL-BACK
Risk Assessment – why bother??
HDD risk - client perspective

A pond of raw sewage surrounds a pump station at Buena Vista Creek, which flows into the Buena Vista Lagoon in Carlsbad.

Dead fish!

RISK Assessment – why bother??
HDD RISK – CLIENT PERSPECTIVE

Establish the context
- Objectives
- Stakeholders
- Criteria
- Define key elements

Identify the risks
- What can happen?
- How can it happen?

Analyse the risks
- Review controls
- Likelihoods
- Consequences

Evaluate the risks
- Evaluate risks
- Rank risks

Treat the risks
- Identify options
- Select the best responses
- Develop risk treatment plans
- Implement

Monitor and review
<table>
<thead>
<tr>
<th>Risk Class</th>
<th>Significance</th>
<th>Level of Risk Acceptability</th>
<th>Extent of Management Required (e.g. Prevention, Mitigation, Reporting, Auditing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Minor</td>
<td>Acceptable</td>
<td>Nil, or Low-cost prevention or mitigation where justified.</td>
</tr>
<tr>
<td>Class 2</td>
<td>Low</td>
<td>Tolerable if improvement uneconomic</td>
<td>Low-cost prevention or mitigation where justified. Should be periodically reviewed.</td>
</tr>
<tr>
<td>Class 3</td>
<td>Moderate</td>
<td>Most likely unacceptable; but may be tolerable if the cost of risk elimination or reduction is greater than the improvement gained.</td>
<td>Preventive measures and mitigation measures required, where practicable. Requires routine review.</td>
</tr>
<tr>
<td>Class 4</td>
<td>High</td>
<td>Unacceptable without further control or treatment; May be tolerable if the cost of elimination or reduction is significantly greater than the improvement gained.</td>
<td>Preventive measures are required where practicable. Mitigation measures required in all cases (included in formal Emergency Preparedness Planning); Requires regular review.</td>
</tr>
<tr>
<td>Class 5</td>
<td>Very High</td>
<td>Intolerable; Risk reduction must be investigated.</td>
<td>Prevention and mitigation measures as per Class 4. Reported immediately to the Chief Executive and to the Board of Directors.</td>
</tr>
</tbody>
</table>
### HDD RISK – CLIENT PERSPECTIVE

<table>
<thead>
<tr>
<th>Risk Number</th>
<th>Risk Description</th>
<th>Discipline / Issue</th>
<th>Project Stage</th>
<th>Risk Controls Identified with responsibility assigned?</th>
<th>Active Risk?</th>
<th>Risk Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>The project incurs schedule delays caused by unforeseen services relocation.</td>
<td>Civil</td>
<td>Existing fathers services</td>
<td>Yes</td>
<td>Yes</td>
<td>Class 4</td>
</tr>
<tr>
<td>35</td>
<td>During the project external stakeholders are adversely impacted by poor traffic management.</td>
<td>Civil</td>
<td>Construction</td>
<td>Yes</td>
<td>Yes</td>
<td>Class 3</td>
</tr>
<tr>
<td>36</td>
<td>The project incurs schedule delays caused by unforeseen ground conditions or groundwater.</td>
<td>Civil</td>
<td>Construction</td>
<td>Yes</td>
<td>Yes</td>
<td>Class 3</td>
</tr>
<tr>
<td>37</td>
<td>The project incurs cost overrun because of inappropriate ground conditions for trenchless construction.</td>
<td>Civil</td>
<td>Construction</td>
<td>Yes</td>
<td>Yes</td>
<td>Class 3</td>
</tr>
<tr>
<td>38</td>
<td>During the project external stakeholders are adversely impacted by inappropriate construction methodologies.</td>
<td>Civil</td>
<td>Construction</td>
<td>Yes</td>
<td>Yes</td>
<td>Class 2</td>
</tr>
<tr>
<td>39</td>
<td>The project incurs schedule delays due to procurement of large load items required for early works construction.</td>
<td>Other</td>
<td>External dependencies</td>
<td>Yes</td>
<td>Yes</td>
<td>Class 4</td>
</tr>
<tr>
<td>40</td>
<td>During the project conduct does not comply with legislative requirements due to construction damage to trees.</td>
<td>Civil</td>
<td>Construction</td>
<td>Yes</td>
<td>Yes</td>
<td>Class 2</td>
</tr>
<tr>
<td>41</td>
<td>During the project conduct does not comply with legislative requirements due to construction damage to trees.</td>
<td>Civil</td>
<td>Construction</td>
<td>Yes</td>
<td>Yes</td>
<td>Class 2</td>
</tr>
</tbody>
</table>
HDD RISK - CLIENT PERSPECTIVE

- Risk register – example (H4)
HDD RISK - CLIENT PERSPECTIVE

Develop Project Risk Register

• Classify the risks, identify control measures
• Define Key Risks
• How close to the envelope?
• Designer / PM experience and expertise
• Early contractor involvement
• Contractor selection - Track record, project history, key personnel, equipment, expertise
HDD RISK - CLIENT PERSPECTIVE

Concept design (Planning)
Trenchless?
Is HDD the right answer?
Go / No go

Preliminary design / investigation phase
Trenchless?
Is HDD the right answer?
Go / No go

Detail design
HDD RISK - CLIENT PERSPECTIVE

• Selection of design team (technical / consents / project management)

• Selection of delivery model and overall project risk profile
  NZS3910 / NEC / FIDIC / other
HDD RISK- CLIENT PERSPECTIVE

- Pipeline diameter and type
- Line & Level accuracy – how critical?
- Drill shot length, multiple shots?
- Project constraints – e.g. 3rd party infrastructure construction
- Future maintenance costs, NPV analysis
- Contingency planning (what if ….)
- Specialist subcontract skills (pipe welding, etc)
- QA by client or contractor?
- Risk sharing; Payment model
HDD RISK- CLIENT PERSPECTIVE

MR FLOATIE VISITS CITY HALL!