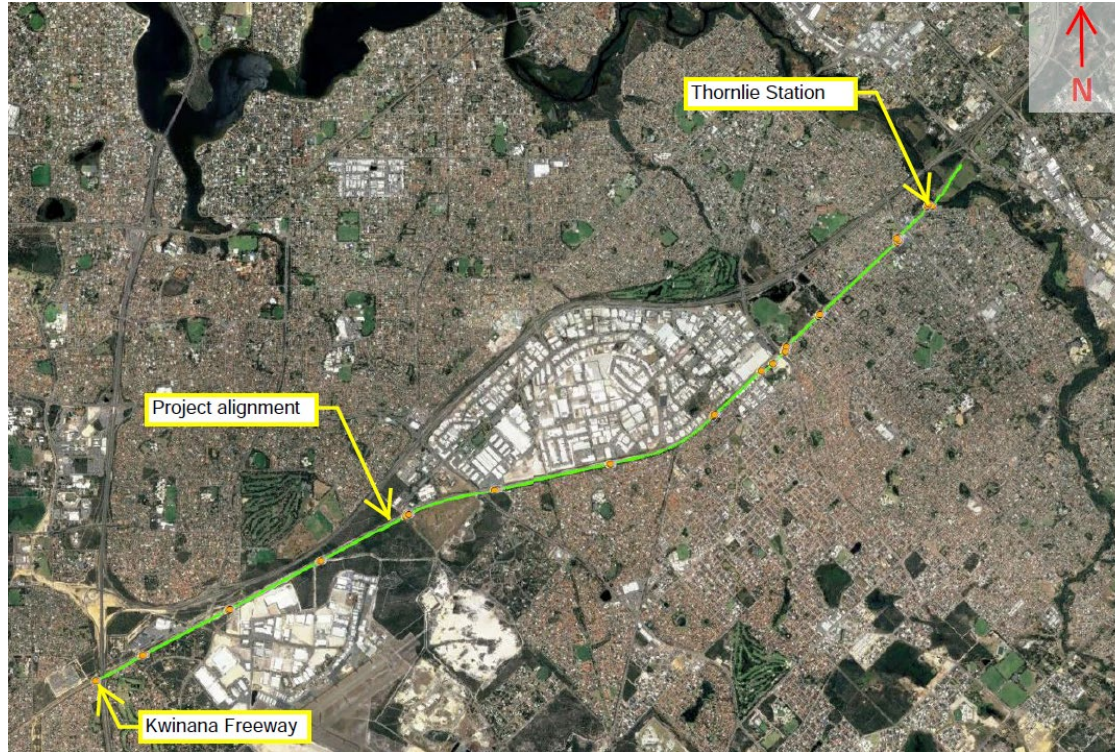




# BP KEWDALE WHITE OIL LINE

John Stuart-Robertson

# PROJECT OVERVIEW





# PROJECT OVERVIEW



John Stuart-Robertson  
BP Kewdale White Oil Line

# DESIGN DEVELOPMENT

The initial project scope for the engineering and design of the realignment to the pipeline generally included:

- 8,846m of open cut constructed pipeline
- 4,006m of horizontal directional drills split across 17 drill sites

**The final pipeline route comprises of one new section using DN300 diameter carbon steel pipeline,**

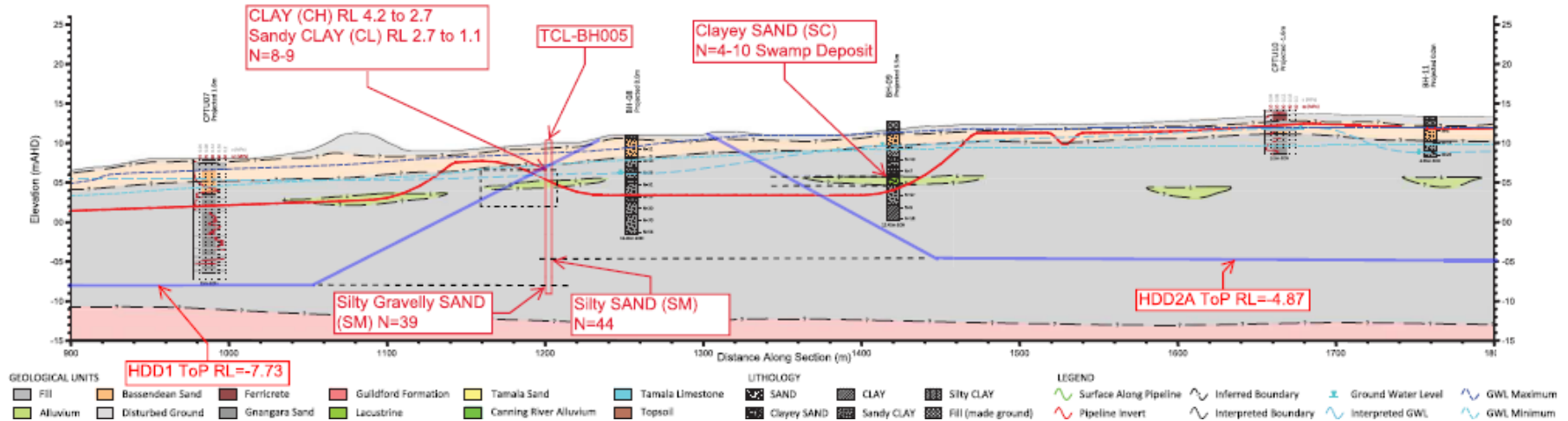
**approximate length 12.67 km including a revised composition focused on HDD techniques:**

- **1,202 m of open cut constructed pipeline.**
- **11,327 m of Horizontal Direction Drills split across 12 drills.**

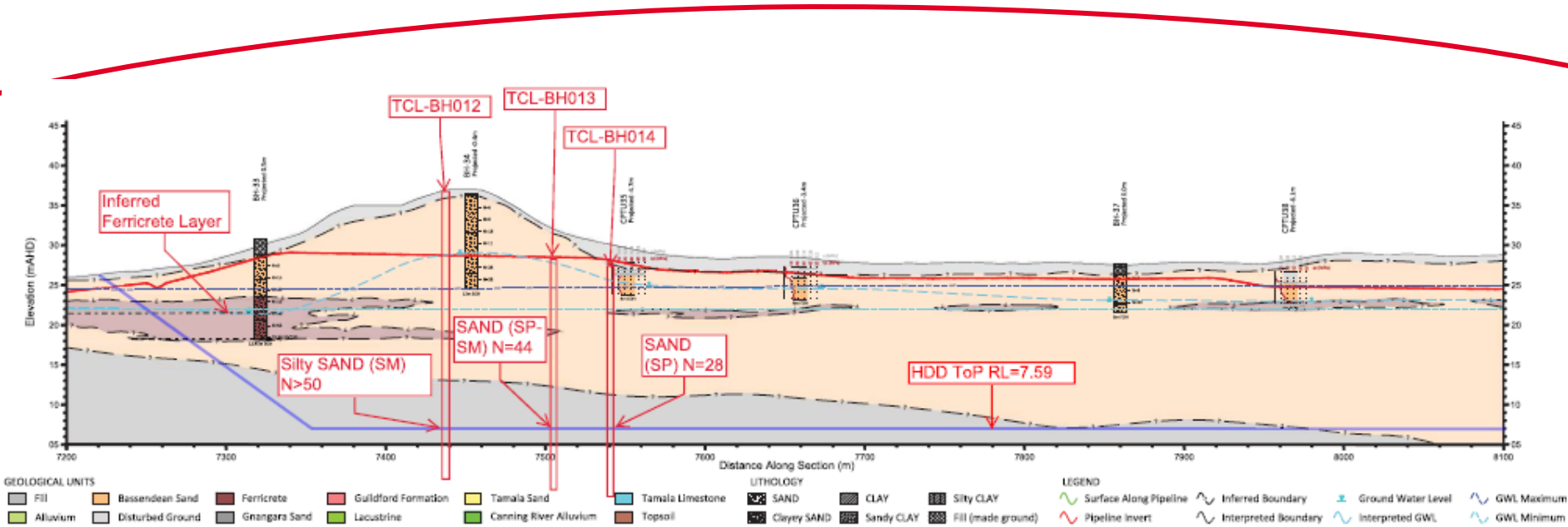
# CROSSING LIST



Section	Start CH	End CH	Length (m)	MD (m)
HDD1	705	1215	510	548.64
HDD2A	1330	2593	1263	1297.19
HDD2B	3172	2647	525	560.05
HDD3	3277	3505	228	253.47
HDD4	3539	4413	874	896.97
HDD5	4457	5838	1381	1409.85
HDD6	7263	5872	1391	1417.02
HDD7	7305	8375	1070	1093.01
HDD8	8433	9557	1124	1147.96
HDD9	10816	9591	1225	1249.38
HDD10	10850	11988	1138	1168.82
HDD11	12031	12627	596	622.43



# GEOTECH





# EXECUTION PHILOSOPHY





# SITE LAYOUTS



# PIPE STRINGING





# ANCHOR DESIGNS



# PILOT HOLE DRILLING



No.	Task
1.	Complete equipment setup and amend entry pit configuration post surface casing installation as required for HDD operations.
2.	Tool up pilot 12-1/4" Jetting BHA (inc. Steering Assembly) on rig. Once on face, drill pilot hole.
3.	Pilot hole complete.
4.	Once BHA reaches exit. Breakdown pilot BHA at exit.
5.	There were then two options for removing the wire line (steer wire) and establishing a tail string: <ul style="list-style-type: none"><li>a. Trip the pilot drill string from entry to exit establishing tail strings on exit and removing wireline on pipe side (exit side).</li><li>b. Trip drill string back to the rig, adding drill pipes at the exit and remove wireline on rig side. In this methodology drill pipe would then be transported to pipe side to maintain tail string during reaming.</li></ul>

Each of these processes were used dependent on the exit space available



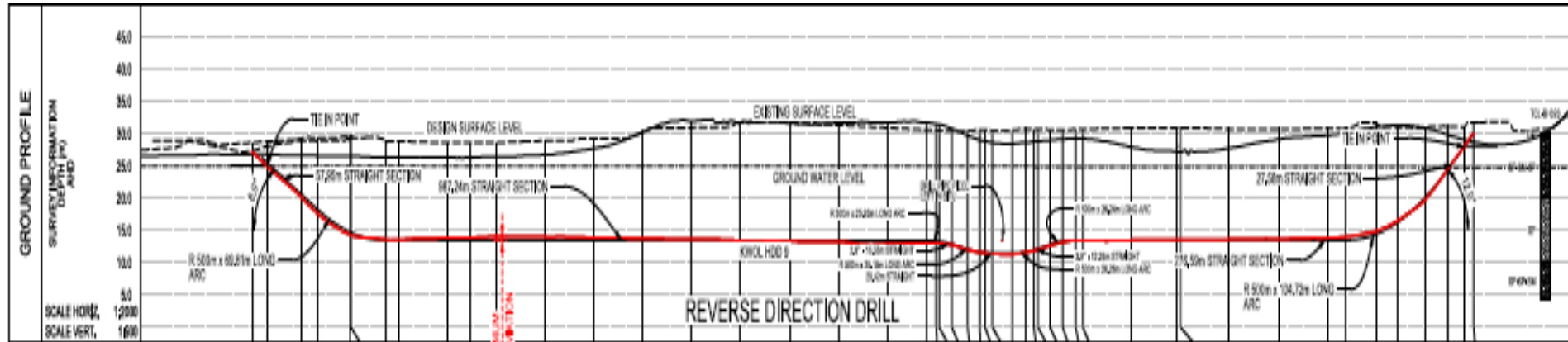
# REAMING PASSES

No.	Task
6.	Tool up 18" back ream BHA with breakout unit at exit.
7.	Ream along pilot hole, pulling from exit to entry, stopping at the bottom of the surface casing.
8.	Trip 18" barrel reamer from bottom of the casing out to the exit (push back out).
9.	Remove 18" reamer from drill string and tool up 16" cleaning barrel at the exit.
10.	Condition drilling fluid and gauge bore hole by back reaming with 16" cleaning BHA.
11.	Bore hole enlargement complete.

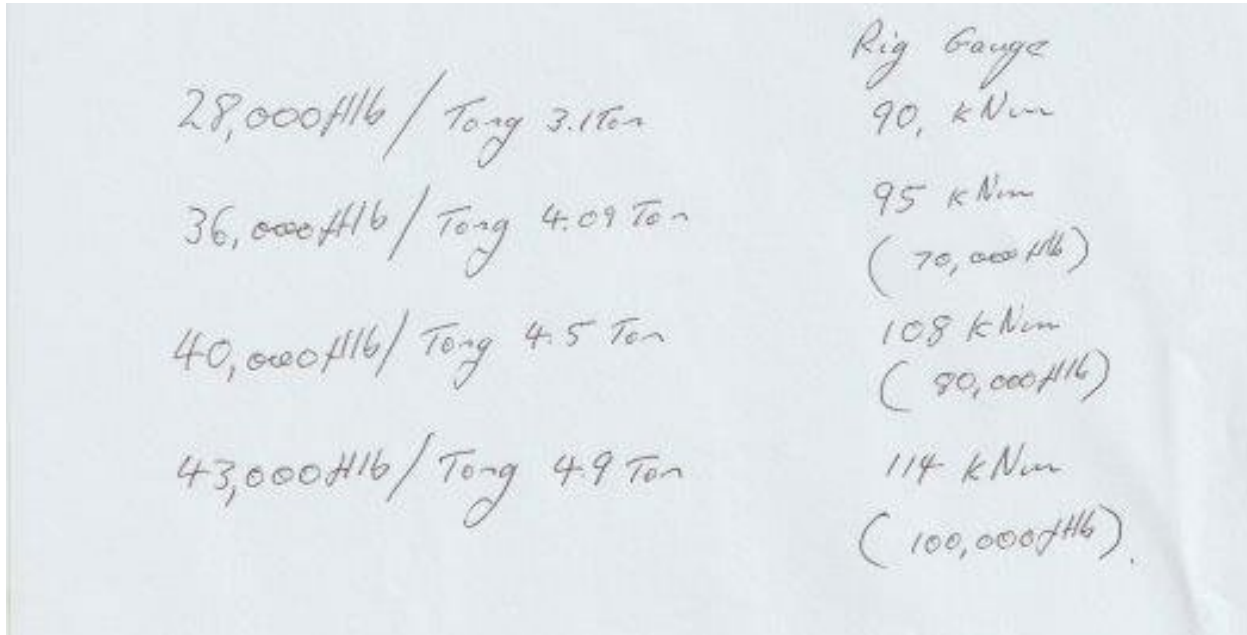
# INSTALL LOADS

HDD	Pipe String Installation Load	
	kN	Tonnes
HDD1	206.3	22
HDD2A	458.7	47
HDD2B	190.9	20
HDD3	95.3	10
HDD4	325.4	34
HDD5	576.8	59
HDD6	468.9	48
HDD7	387.6	40
HDD8	382.8	40
HDD9	412.3	43
HDD10	389.9	40
HDD11	222.0	23

# HDD 9



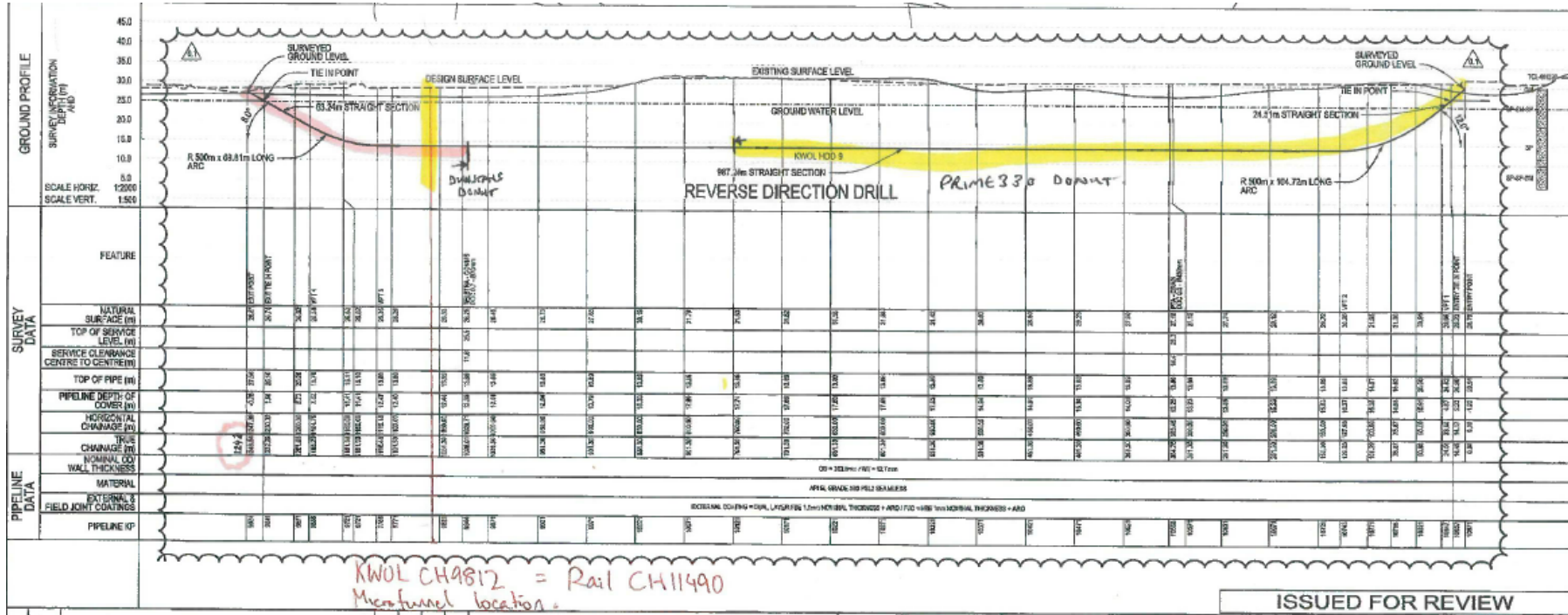
# HDD 9



28,000 #16 / Tong 3.1 Ton	Rig Gauge 90, kNm
36,000 #16 / Tong 4.09 Ton	95 kNm ( 70,000 #16 )
40,000 #16 / Tong 4.5 Ton	108 kNm ( 80,000 #16 )
43,000 #16 / Tong 4.9 Ton	114 kNm ( 100,000 #16 )



# HDD 9



# HDD 9



# LESSONS LEARNED

This project was a success due to several key factors and learnings.

- The project undertook an extensive design and constructability optioneering process to maximise efficiency while minimising the community and environmental impacts.
- Equipment was selected that was suitable for the works. With the final solution involving more than 11.5km of horizontal directional drilling technique, it was one of the largest ever completed in Australia and needed to draw on international experienced personnel – their efforts was a key part of the project's success.
- The project safely navigated several complex construction stages, including: seven crossings between 1.1km-1.4km in length and four crossings between 600m-900m. Each was at a considerable depth of 25m within a narrow 10m corridor parallel to the operational rail, and in many cases near residential properties.