Permanent Way Institution

JOHN HOLLAND

Young Achiever Award Submission

"Tracking through a Pandemic"

Author: Chris Wills
Date: 10 June 2022

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1. Introduction

Having grown up in Western Australia, "FIFO" or "Fly-In, Fly-Out" is common terminology as mining has a big impact on the WA economy and brings with it numerous jobs, primarily in the Pilbara. Working a roster is very common for mining jobs and brings with it the challenge of a "work-life balance". The roles within mining companies are generally a 5:2 or 8:6 (days) roster, however, construction projects in the Pilbara are often 2:1 and 3:1 (weeks) which brings added challenges in fatigue management and mental health. With COVID-19 and a hard border closure thrown into this mix, a greater complexity not experienced by the mining and construction industries in this generation or in recent history is felt.

As we move into a brave new world that is "post-COVID", the construction industry and Permanent Way community is moving into a new way of working where flexible working and "work-life balance" is at the heart of people's career choices. This paper has been written to highlight some of the unique challenges overcome by the team on the Gudai-Darri Project Phase 1, as well as highlighting some of the great achievements and technical excellence achieved by the team.

2. Eligibility

The 180km greenfield rail construct only contract for Gudai-Darri (formerly labelled Koodaideri) Project Phase 1 was awarded to John Holland in August 2019. The project ran from August 2020 through to November 2021 and meets all the criteria for the Permanent Way Institute. I worked as the Construction Manager for the project from late-2019 (pre-mobilisation) through to late June 2021 and was under the age of 35 as of the 1st of January 2022 which qualifies me for the PWI Young Achiever Award.

3. Statement of Ambitions

During high school I was unsure which career path to take as, although I excelled in Maths and English subjects, I had various interests in both music and sport. When asked about my career path during this time my answer would vary from sports science to psychology to engineering. Ultimately, my aim was always to achieve the highest university entrance score I could and make my decision then. When it came to deciding, I couldn't move past my fascination with iconic structures like the Empire State Building or the Sydney Harbour Bridge and I decided I wanted to be a part of a construction project of such magnitude. It wasn't just the construction of the bridge or structure I was intrigued with; it was also the purpose it fulfilled. I recall admiring the foresight required to plan and execute the Sydney Harbour Bridge to allow multiple modes of transport i.e., vehicles, trains and trams while also allowing for expansion of the population. Wanting to be a part of this kind of forward thinking was one of the

reasons I studied a double degree of Civil Engineering and Corporate Finance at the University of Western Australia.

Upon completing my degree in 2010, I applied for a Graduate Engineering vacancy at John Holland in the Rail division. Although I had never envisioned myself working in rail during my studies, I was excited by the challenge of trying something new, as well as working in an area that is always clear on its purpose for customers and community alike which is to be the most efficient means of freight and passenger transport.

Working at John Holland for the last 11 years has allowed me to put into practice what I've learnt at university plus learn a lot of the job that was never included in the Engineering curriculum. I am driven in both my personal and professional life and have been lucky enough to achieve many successes due to my ability to be flexible and willing to try anything once. I have done FIFO work for eight years and I have worked in numerous states primarily; Western Australia and New South Wales but have also worked over 12 months in South Australia as well as tendering some work in Victoria. My mantra has always been to allow opportunities to present themselves and seize them as they appear.

4. A Description of the Project and Paper

The Gudai-Darri Project Phase 1 is a 180km regional greenfield rail project connecting the Gudai-Darri mine to the existing Tom Price mainline and on to the ports in Dampier and Cape Lambert. Being a remote project in the Pilbara has it's challenges due to its remoteness, but the Pilbara is a region which often faces its own unique challenges relating to long rosters and extreme weather conditions. Adding to this, Gudai-Darri had its own unique challenge with border closures and the management and retention of skilled resources during this time.

This paper describes some of the challenges faced on the project and how the team were able to overcome these with some initiatives and innovations that drew on experience from the region and lessons learnt from similar greenfield projects.

The technical section of this paper details how the project achieved some challenging construction tolerances primarily through detailed planning while also being able to demonstrate flexibility in an impacted programme.

The success of the project is a testament to the hard work and dedication that the members of the project team and support teams demonstrated throughout the life of the project and hopefully some of the innovations and ideas can be broadly accepted in the rail industry.

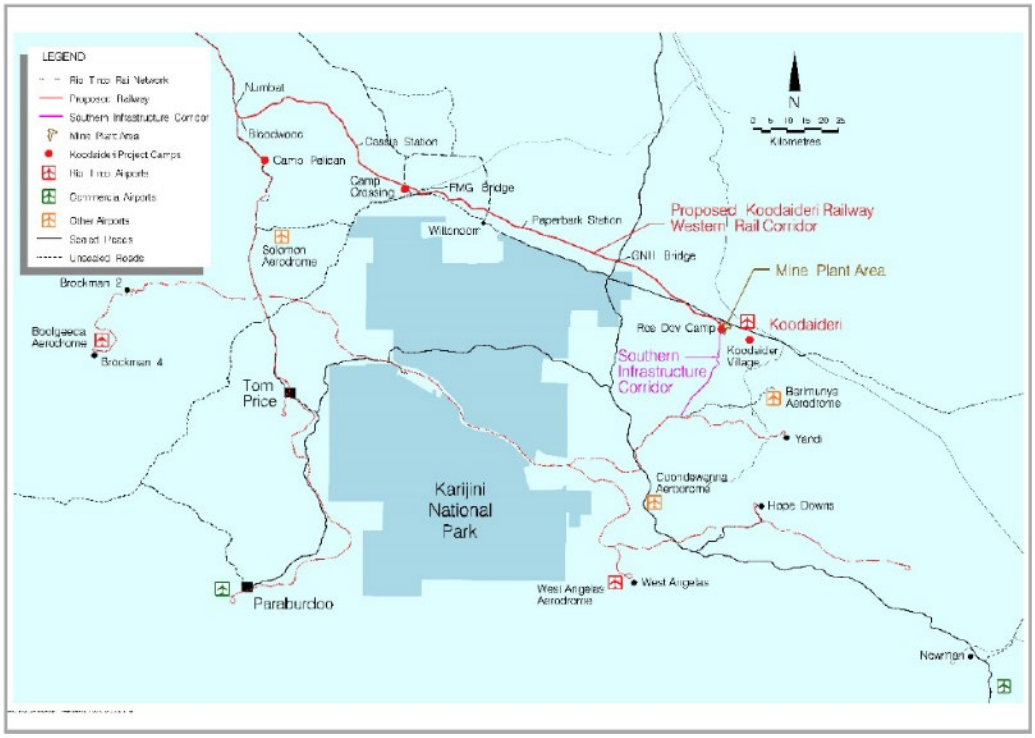

Figure 1 - Gudai-Darri proximity to nearby Pilbara towns

5. Relevance to Permanent Way

The Gudai-Darri Project is a 180km greenfield rail project for Rio Tinto Iron Ore (RTIO) connecting the Gudai-Darri mine to the existing Tom Price mainline and on to the ports in Dampier and Cape Lambert. The railway alignment (Figure 1) is located along the Fortescue Valley, immediately to the north of the Hammersley Range and south of the Fortescue River and parts of the railway pass through an area around the former Wittenoom Asbestos Management Area (WAMA).

For this project, I was the Construction Manager for John Holland, and we were responsible for all track construction. This project faced many challenges and overcame them through collaboration and some innovative ideas. Given the level of investment in the rail industry now, there will be future greenfield works in the Pilbara and across Australia where we can adopt some of the innovations and lessons learnt from this project. This paper is a step towards increasing knowledge sharing while also paying tribute to some of the good work completed on the project.

6. Difficulties Overcome

6.1. COVID-19 and Border Closures

Working away from home comes with great expense to one's personal life, and an added WA Government border closure compounded the issue dramatically. For many personnel on the Gudai-Darri Project (and other projects in WA) who were from interstate returning home regularly was not an option. Depending on the risk classification of your home state, you may have been able to travel to your home state for your R&R, but you might not have been able to return to WA at all, and if you could, you may have to do 14 days quarantine in a hotel. In my experience travelling to/from WA from March 2020 through to July 2021 when I finished up on the project and accepted a role back in Sydney, I only travelled home 5 times for a total of 6 weeks with my longest stay in WA lasting for 4 months. Being raised in Perth, I was fortunate enough to have family and friends to spend time with during my time off. However, my Perth-born wife was not so fortunate as she was in Sydney the whole time and had no family support.

It has taken me a long time to really reflect on the challenges we experienced and like most men in construction, initially it was easier for me to bury the issue and ignore it rather than confront it. However, given some reflection time and looking back on the project with a clearer mind, there were a few things that I did, and the project did to help those on the project who were in similar circumstances.

Having a support group – many of our staff (primarily supervision and engineers) were unable to travel to their home states for their R&R. I naturally gravitated towards these people and being in the Construction Manager role on the project, I felt it important to check up on these people regularly. Not only was it beneficial for those I was talking to, but also helped me to talk about how I was going being away from home. These chats occurred regularly, primarily after the daily afternoon supervisor meeting and was often held in the site offices where we could speak more freely.

Mental Wellbeing Experts – a good initiative rolled out on the project was regular visits by a mental wellbeing expert. At John Holland we used Ben Broadbridge from Beyond All Bounds, but Rio Tinto also had some of their internal resources that were available to the project and visited all camps. The feedback we received from the project team on the visits from Ben were very positive. He would start with a group briefing during one of our daily pre-starts but would then be escorted down the track and talk to each team individually while also offering one-on-one sessions on site plus also back in

camp if required. Ben was widely accepted by the site crews, who requested he return monthly where possible.

Figure 2 - Ben Broadbridge at a Gudai-Darri Pre-start

Employee Assistance Program – Anyone who works for John Holland has free access to the Employee Assistance Program which is a program that provides people with professional and confidential mental health and relationship support for when they need it. This was regularly promoted at our pre-start meetings, and we had several supervisors who were advocates for it. I personally used the program and spoke to them during Christmas in 2020 when I was at home and was feeling severe anxiety about returning to work without any idea about when next the borders would be open, and I would be able to return home.

Although I didn't use the program fully, it prompted me to reach out and commence talking to a psychologist about how I was feeling about work and being away from home. I don't think it was until I started speaking with my psychologist that I realised how "not OK" I was. I can still recall my wife saying to me during that Christmas break in 2020 that I just wasn't myself and seemed to be elsewhere in my mind. This was fairly accurate of where my headspace was and although I was happy being home, I couldn't shake thoughts in my head telling me I was missing out on life. Equally on the other spectrum I also felt the strong urge to remain on the project and repay those who had shown faith in me to allow me a chance to do the CM role.

Working through this with my psychologist brought me to the conclusion that although I wanted to see out the project, I needed a plan to get home. Shortly after returning to WA and quarantining one last time, I met with my Operations Manager and talked him through my desire to get home. Although it did take some months to execute this plan, I was happier in the knowledge it was coming to an end. Even though it took some time to repair the relationship with my wife including countless hours talking with my psychologist, I'm happy to divulge that both myself and my wife individually and together as

a couple are doing better. I couldn't have done any of this without taking that first step and talking to one of the psychologists through the EAP.

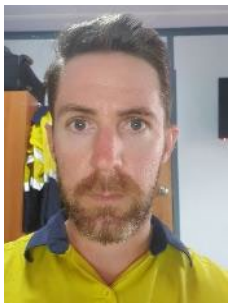

Figure 3 - Selfie of me I thought I was still OK

6.2 The Pilbara Heat vs. a "Green" workforce

Working in the Pilbara can be a challenge at the best of times as they are some of the harshest working conditions in Australia. Not only do you have extreme heat during summer where the average temperature for December and January is 40+ degrees (Figure 4), but you also have the risk of cyclones which bring with it torrential rain and high winds. These are challenging conditions even for those who have worked in the Pilbara for several years.

Average Number of Days with Temperatures

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
≥ 40.0°C	19.6	11.7	7.0	0.5	0.0	0.0	0.0	0.0	0.1	2.8	10.8	19.8	72.0
≥ 35.0°C	28.0	23.1	23.3	12.3	1.2	0.0	0.0	0.3	5.3	20.8	25.4	29.2	168.8
≥ 30.0°C	30.3	27.2	29.3	26.0	12.6	1.1	1.4	8.1	20.0	28.8	29.2	30.3	243.6
≤ 2.0°C	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
≤ 0.0°C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 4 - Average Number of Days with Recorded Temperatures for Paraburdoo 1997 – 2022 (Data: Weatherzone)

Another one of the challenges we faced on the Gudai-Darri Project was an inexperienced workforce. Due to border closures and concurrent rail projects in the Pilbara region (FMG's Eliwana Project – also constructed by John Holland) the project had a very inexperienced workforce and the majority of which were new to rail and as a result were also new to the harsh Pilbara conditions. In the planning stages prior to the project commencing, it was discussed at length the best way to manage the heat and what could be provided to the workforce to help combat heat related illness. There were the obvious things like education through inductions, enough resources for job rotation and having "cool zones" on site which were designated vehicles that were allowed to stay running as a respite from the hot weather.

Despite these controls and many others, we found that at the beginning of the project the workforce was still suffering heat related illnesses. Through the investigations conducted by the HSE team, we found that most people suffering from the effects of heat related illness were all new to the Pilbara conditions.

To overcome this challenge, we came up with a new initiative for all new starters, and not just those that had started in the Pilbara for the first time. We decided the best way to acclimatise to the Pilbara conditions was to limit the exposure of new starters to the heat. To do this, we decided to spread the new starters "induction day" over 4 days instead of the usual 1 day. This way we could still have the new starters getting acclimatised to the conditions for 8-9 hours a day but would be back in the office during the hottest part of the day doing inductions and any other required training. Further to this, we also conducted hydration testing using refractometers throughout the day; prior to pre-start, mid-morning, and afternoon to educate new starters about their hydration levels. Once these controls were put in place, we had minimal heat related illnesses for the rest of the project.

6.3 Delays from Earthworks

Throughout the duration of the project the track construction works were regularly impacted by the earthworks contractors not meeting their handover dates. This had a substantial impact on our team being able to meet our deadlines with sleeper laying and rail laying activities impacted the most.

The project programme was based on a rail train every week delivering 8 track kilometres (i.e., 16km rail) and all other activities following this had targets of 8km/week. To add to this challenge the project had to ensure that we didn't unnecessarily demobilise workforce as the concern was that they would find work elsewhere and we may have been forced to replace them with inexperienced personnel.

To overcome the impacts to sleeper laying and rail laying activities, the management team had to become flexible in our planned works and reallocate work crews to other activities like Flashbutt welding (FBW), level crossings and turnouts and corrections/clean-up. Although this was often frustrating for the workforce, it was the best way of keeping the team busy and more importantly employed on the project.

Throughout this process, we worked closely with the Client to ensure they were across not only the impacts to our works but also the mitigation measures. The Client did their best to open new work fronts, primarily for turnout and level crossing construction, to ensure that we were mitigating any further delays.

7. Amount of Innovation

Throughout the duration of the Gudai-Darri Project we had several innovations that focussed on two key areas: making our rail unloading process more efficient and mitigating/minimising manual handling associated with day-to-day track activities.

The project team worked closely with our internal Plant Department to come up with some of the following innovations that we hope can be used on future projects. John Holland is currently working extensively on our Knowledge Management System that will make it easier to share innovations like the below.

7.1. Pettibone Rail-Grab Attachment

There are several different methods for track laying for greenfield rail projects, via the use of the mechanised track laying machine (e.g., Harsco's New Track Construction – NTC Machine) or track laying via an excavator with octopus attachment and a rail train. For the Gudai-Darri Project we had the second method that involved a rail train supplied weekly by the Client.

The rail train was delivered to Numbat siding (see Figure 5) on a Monday morning and needed to be back in Numbat by COB Friday. From there it would travel to 7-mile in Karratha Friday night to be reloaded and return to Numbat Sunday night.

As the project progressed, the rail train had to commence travelling back to Numbat earlier and earlier often at speed restricted sections that had yet to be ballasted and tamped. This meant less time to unload the train and would be limited to 3-4 days rather than 5 which we had at the start of the project. This meant unloading 40 x 400m rail strings as efficiently as possible to get the rail train travelling back to Numbat.

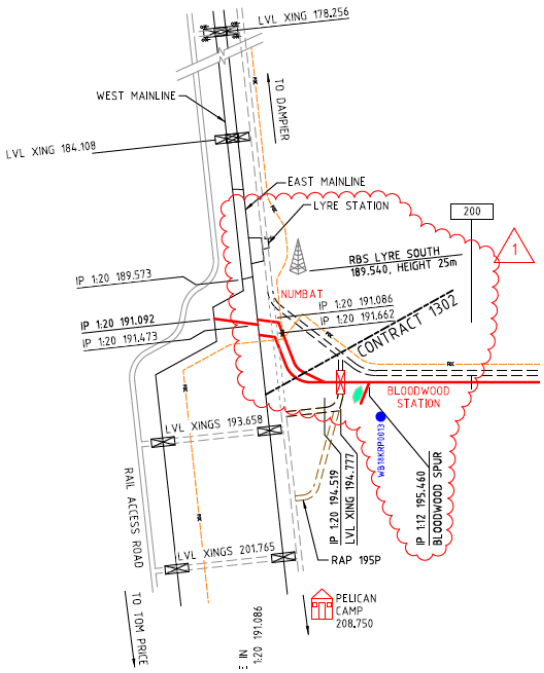

Figure 5 - Numbat Siding at approx. chainage 191.100km

The Pettibone rail crane (Figure 6) has been used extensively over the years to move and unload rail on other projects. Our main concern with using the Pettibone was unloading one rail at a time, and we wanted to find a more efficient way to unload the rail and we knew the Pettibone had additional towing/pulling capacity.

Figure 6 - Pettibone Rail Crane

With the aid of the John Holland Plant Department, we devised a dual rail grab attachment (Figure 7) that would attach to the Pettibone's existing crane attachments that also had the added benefit of being able to slew as required to assist in rail unloading around curves. With the information provided by the project on rail size, formation gradients, curve radius, etc. the Plant Department were able to

calculate the required pull force on the Pettibone and where it sat within the machine's capacity considering safety factors. This grab worked successfully throughout the duration of the project and the most rail strings unloaded in any one day was 32 out of 40.

Figure 7 - Dual Rail Grab Attachment

7.2. Rail Rollers

Some methods of track laying rely on the use of rollers to unload rail either directly onto the formation or directly onto sleepers. For the Roy Hill project we used loaders to pull the rail from the NTC directly onto formation rollers and then the NTC would feed the rail onto the sleepers. For Gudai-Darri we laid the rail directly onto sleepers from the rail train using the Pettibone described above. This meant we needed rollers that would sit directly and securely onto the RTIO 40 TAL (Tonne Axle Load) sleepers (see Figure 8).

Figure 8 - Revised Roller sitting on RTIO Sleeper

There were a few considerations when designing the rail rollers. Firstly, we needed to ensure they could support 68kg/m rail at 10m (15 sleeper) intervals, sat flat and were stable during the unloading process. As the rollers would be placed and removed from sleepers manually, we also needed to take OHS considerations into account and ensure that the rollers were as light as possible while keeping their durability. Our design was as lean as possible, and we managed to shave 45% of the weight off the previous Roy Hill roller design with the new rollers weighing just over 15kg.

We also wanted to ensure the removal of the rollers was as easy as possible and didn't rely on the workforce having to lean into the four foot to lift the roller up from both handles as this would be excessive force on the back that we didn't want our team to endure. To overcome this, we welded some 30x5 Flat bar (No.6 in Figure 9 below) on an approx. 45-degree angle so that the rollers could be pulled with one hand and would slide over the sleeper lugs without getting caught. This meant that the workforce would not need to lift the rollers to remove them and could simply pull them with minimal force.

These initiatives dramatically minimised the risk of any back related injuries while also being easy in their setup and removal allowing the rail unload process to work efficiently.

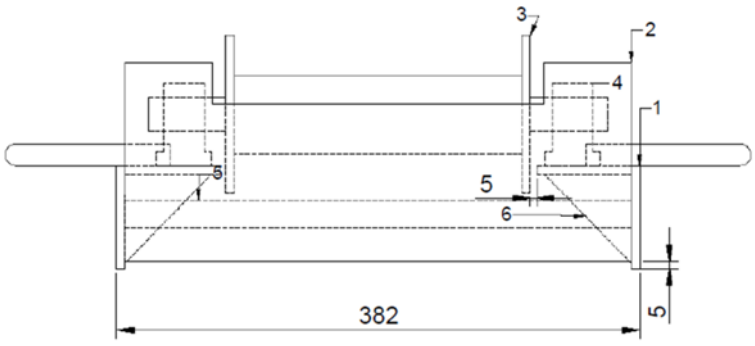

Figure 9 - New Roller Design

7.3. Pettibone Wheel Extension

The challenge we needed to overcome was the overall width of the Pettibone which was 2.59m from outer edge of wheel to outer edge of wheel. We needed the Pettibone to be able to be wide enough to sit outside the width of the 2.6m RTIO 40TAL sleepers so it required an extension. Working again with the Plant Department there were a few considerations for the design of the wheel extensions. The Pettibone needed to be able to navigate around curves without contacting the sleepers, so we had to give 200mm clearance from the edge of sleeper to the inside of the Pettibone tyres. The extension also needed to be limited to 4.0m from outer tyre to outer tyre to ensure that the Pettibone

could cross the FMG Overbridge plus also get down the access ramps as required for maintenance. Another consideration was ensuring that the extension also had enough lift so the Pettibone could drive over the rail as required (Figure 10).

Figure 10 - Pettibone with Wheel Extensions

With all the extension and lift taken into consideration, the Pettibone capacity needed to be checked to ensure that it could unload 2 x 400m lengths of rail with the gradient and curve considerations along the alignment. The Plant Department put together their Pettibone Modification Design Report taking all modifications into consideration for the wheel extension plus the unloading process and the Pettibone was deemed compliant and successfully worked throughout the duration of the project.

Figure 11 - Pettibone performing rail unloading on Gudai-Darri

7.4. Trolley Jacks

On Gudai-Darri there were sections of track on high embankments or deep cuttings where access for plant was limited. To limit manual handling efforts, we primarily used an excavator with rail grab to

lift the rail so that rollers could be removed. Where access was limited for the excavator, we needed an alternative method for lifting the rail and this is where we came up with the idea of using trolley jacks. However, this jack needed to be modified to have larger wheels to ensure the jack could reach and lift the rail while still complying with all relevant Australian Standards (i.e., AS1418). Again, working with the Plant Department, we sent all relevant modification requirements and well as loads to ensure that the jacks were modified and complied with all relevant standards. These jacks worked effectively and efficiently during the rail unloading process (Figure 12).

Figure 12 - Trial of Trolley Jacks on Gudai-Darri

8. Ongoing Benefits to the Rail Industry

On a macro level the $3.5b Gudai-Darri iron ore mine will provide huge economic benefits to the WA and Australian economy and will feature innovative technology that RTIO are well known for including autonomous trucks, trains, and drills. On a micro level, the Project provided valuable opportunities for both blue-collar and white-collar workers to gain valuable rail experience that they would take to future rail projects. Within the rail team alone, we completed nearly 560,000-man hours constructing the railway, inducting 250 blue-collar workforce onto the project of which approximately 50 had never worked in the rail industry before. The number of hours worked and number of new starters in rail are invaluable for the future of the industry moving forward with the amount of rail projects in the pipeline.

The challenges overcome and innovations rolled out on the project should benefit John Holland and the wider rail industry in the future. At John Holland, we are seeing a greater focus on mental health and wellbeing with a new focus on flexible working as being the “new norm” plus also providing additional “John Holland Days” which are extra annual leave that all staff can use at any time of the year. The approach to acclimatisation and heat related fatigue will be more widely adopted for John Holland’s remote projects where harsh conditions are expected and will hopefully be adopted into our

fatigue management policy. Innovations and learnings from the project are transferrable to all rail projects, in particular projects in regional areas.

9. Technical Excellence

Throughout the Gudai-Darri Project there was technical excellence delivered on multiple fronts. Being able to deliver the project to tight construction tolerances given some of the challenges faced (highlighted in Section 6) which included constant earthworks delays is a testament to the hard work and dedication of the project team. Being able to also deliver on innovations, some of which were highlighted in Section 7, contributed to the successful delivery of the project, and demonstrated technical excellence.

Permanent Way Institution

JOHN HOLLAND

Young Achiever Award Submission

Technical Paper

"Tracking through a Pandemic"

Author: Chris Wills
Date: 10 June 2022

1. Abstract

The Gudai-Darri Project Phase 1 is a 180km regional greenfield rail project connecting the Gudai-Darri mine to the existing Tom Price mainline and on to the ports in Dampier and Cape Lambert. The railway alignment is located along the Fortescue Valley, immediately to the north of the Hammersley Range some 1200km+ Northeast of Perth. I was the John Holland Construction Manager for the rail construction works and was responsible for managing superintendents, supervisors, engineers, and blue-collar workforce to ensure the successful completion of the scope.

I was part of a team who were constantly adapting to change amid an ever-changing COVID-19 climate inclusive of regular border closures. As an east coast-based resource, I had my own personal challenges with these closures and worked with the project team to come up with solutions to help those who were impacted. The project while impacted by these challenges was able to still demonstrate technical excellence and achieve a positive outcome for both the Client and the Contractor.

This report explores the importance of innovative thinking and applying lessons learnt from previous projects and experiences to overcome challenges and deliver a successful project. It highlights the importance of planning and flexibility required in the rail construction industry, as well as the need for effective change management when challenging situations occur.

2. Project Overview

2.1. Scope Introduction

The Gudai-Darri Project Phase 1 construct only contract for John Holland consisted of the following scope:

- Construction of plain track from chainage 193.270 to 365.087km including passing tracks, back tracks, and spurs in according with design drawings.
- Construction of turnouts, catchpoints and derailers in situ on concrete bearers.
- Distribution of all materials including turnouts, catchpoints, derailers, ballast, sleepers, fastening and other materials.
- Unloading of 400m Rail strings from the rail train and Flashbutt welding of all joints to form CWR including destressing of track.
- Aluminothermic welding at turnouts.
- Ballasting inclusive of track lifting via Harsco Track Lifter.
- Surfacing including dynamic track stabilisation.

- Procurement and installation of all track signage and monuments.

To complete the required scope the teams were broken up into the following:

- Sleeper Distribution and Sleeper Laying.
- Track Laying - Rail Unloading and Flashbutt Welding.
- Ballasting.
- Surfacing.
- Destress and Final Grinding.
- Level Crossings, Turnouts and Miscellaneous (Monuments and Signage)

2.2. Project Tolerances

To complete the scope, the project team had to adhere to strict tolerances as detailed in the project specifications some of which are detailed below in Figure 13.

9.6.1 Horizontal Alignment

Criteria	At Construction	At Defects Liability
General finished tolerance from design	±4mm	
Maximum deviation in any 10 m of track	±4mm	±4mm

9.6.2 Vertical Alignment

Criteria	At Construction	At Defects Liability
Rail level – maximum deviation from design	±4mm	
Surface – maximum deviation within any 10 m	±4mm	±4mm

9.6.3 Cross Level

Criteria	At Construction	At Defects Liability
Tangent track from design	±4mm	
Max. rate of change over any 10 m of track from design	±4mm	±4mm

Figure 13 - Surfacing Tolerances in the Track Construction Specification

3. Project Planning

The successful delivery of a project comes down to critical planning and begins with the programme and milestones committed to during the tender phase of the project. The project calendar was based on a 6.5 day working week as the project was built on a continuous roster with all personnel entitled to a half day once a week to comply with the RTIO fatigue management guidelines.

The key driver for the Track works programme was based around the weekly turnaround of the 8km (40 x 400m rails) rail train requiring unloading. All activities following rail unloading also had an 8km

target per week. For Flashbutt welding this would require 40 welds, for tamping this would require 24km tamping per week based on 3 passes, etc.

Note: the bottom ballast design was 300mm and achieving this height was based on 5 passes/lifts: 2 with the track lifter up to 200mm max., and 3 passes with the tamper for the remaining 100mm.

The only activities that didn't follow the 8km/week target was Sleeper Distribution/Laying and Turnouts and Level Crossings. Sleeper Distribution and Laying was based around the formation handover dates and had a target of approx. 8.4km/week. Turnouts and Level Crossings targets were based on durations; 6 days for completion of a 1:20 turnout, 5 days for 1:12 turnout and 4 days for a level crossing.

Section 1 - Bloodwood Station the end of Cassia Station Ch. 193.270 to 237.800		136d	01-May-20	15-Sep-20
S1EW1300	S1: Handover Earthworks At Top Of Sub Ballast Capping	0d	01-May-20	
Section 1 - Sleeper Distribution		36d	29-May-20	04-Jul-20
S1SD13	S1: Sleeper Distribution - Numbat/Bloodwood Double Track Ch. 193.300 to 194.400	2d	29-May-20	30-May-20
S1SD13	S1: Sleeper Distribution - Main Line Ch. 194.500 to 237.747	32d	30-May-20	01-Jul-20
S1SD13	S1: Sleeper Distribution - Cassia Passing Track Ch. 234.983 to 237.747	2d	01-Jul-20	03-Jul-20
S1SD13	S1: Sleeper Distribution - Cassia Back Track Ch. 235.725 to 236.516	1d	03-Jul-20	04-Jul-20
S1SD13	S1: Sleeper Distribution - Cassia Spur Track Ch. 236.391 to 236.625	0d	04-Jul-20	04-Jul-20
Section 1 - Sleeper Laying		38d	01-Jun-20	08-Jul-20
S1SL13	S1: Sleeper Laying - Numbat/Bloodwood Double Track Ch. 193.300 to 194.400	2d	01-Jun-20	02-Jun-20
S1SL13	S1: Sleeper Laying - Main Line Ch. 194.500 to 237.747	33d	02-Jun-20	06-Jul-20
S1SL13	S1: Sleeper Laying - Cassia Passing Track Ch. 234.983 to 237.747	2d	06-Jul-20	08-Jul-20
S1SL13	S1: Sleeper Laying - Cassia Back Track Ch. 235.725 to 236.516	1d	08-Jul-20	08-Jul-20
S1SL13	S1: Sleeper Laying - Cassia Spur Track Ch. 236.391 to 236.625	0d	08-Jul-20	08-Jul-20
Section 1 - Rail Laying		43d	08-Jun-20	22-Jul-20
S1RL13	S1: Rail Laying - Numbat/Bloodwood Double Track Ch. 193.300 to 194.400	2d	08-Jun-20	10-Jun-20
S1RL13	S1: Rail Laying - Main Line Ch. 194.500 to 237.747	38d	10-Jun-20	19-Jul-20
S1RL13	S1: Rail Laying - Cassia Passing Track Ch. 234.983 to 237.747	2d	19-Jul-20	21-Jul-20
S1RL13	S1: Rail Laying - Cassia Back Track Ch. 235.725 to 236.516	1d	21-Jul-20	22-Jul-20
S1RL13	S1: Rail Laying - Cassia Spur Track Ch. 236.391 to 236.625	0d	22-Jul-20	22-Jul-20
Section 1 - Turnouts & Derailers		33d	29-May-20	01-Jul-20
S1TD14	S1: Turnout BL35 – 1:20 RH Bloodwood Passing Track South	6d	29-May-20	04-Jun-20
S1TD14	S1: Turnout CA22 – 1:20 LH Cassia Passing Track North	6d	04-Jun-20	10-Jun-20
S1TD14	S1: Turnout CA27 – 1:20 RH Cassia Passing Track	6d	10-Jun-20	16-Jun-20
S1TD14	S1: Turnout CA51A – 1:12 LH Cassia Backtrack North	5d	16-Jun-20	21-Jun-20
S1TD14	S1: Turnout CA51B – 1:12 RH Cassia Backtrack South	5d	21-Jun-20	26-Jun-20
S1TD14	S1: Turnout CASP - 1:12 LH Cassia Spur	5d	26-Jun-20	01-Jul-20
Section 1 - Level Crossings		4d	31-May-20	04-Jun-20
S1LC15	S1: Passive Level Crossing 194.8	4d	31-May-20	04-Jun-20
Section 1 - Ballasting & Surfacing		47d	17-Jun-20	05-Aug-20
S1BT15	S1: Ballasting & Tamping Completed To Finals Ch. 193.300 to 237.747	47d	17-Jun-20	05-Aug-20
Section 1 - Ancillaries		68d	08-Jul-20	15-Sep-20
S1AN15	S1: Destressing Checks Ch. 193.300 to 237.747	44d	08-Jul-20	22-Aug-20

Figure 14 - Excerpt from Gudai-Darri Tender P6 Programme

The critical path for the project was on the weekly rail train and the safe and efficient unloading of all 40 rails. Any missed rail trains or failure to unload a portion of the rail would add an additional rail train delivery to the programme and impact all activities following it. It was for this reason that during the pre-mobilisation phase of the project a great deal of time and effort was spent on innovations and initiatives in the rail laying process.

3.1. Programme Challenges

The project team had to overcome various challenges including delays to formation handover. Prior to mobilisation of the rail team, the programme was delayed from May 2020 to October 2020 (Figure 15). However, with the agreement of the Client, we were able to mobilise earlier than anticipated in

August 2020 to complete some early works which included construction of the temporary ballast siding at Bloodwood.

Activity ID	Activity Name	Start	Finish
20200425 Rev 1 KOODAIDERI PROJECT PHASE 1 KD1/C/CC/1316 A112 - TRACK		22-Feb-19 A	10-Aug-21
Milestones		22-Feb-19 A	10-Aug-21
KTC-0900	Tender Closing date (22-Feb-19)		22-Feb-19 A
KTC-0920	Tender Validity period	22-Feb-19 A	27-May-19 A
KTC-0930	Notice of Award (06-Aug-19)		06-Aug-19 A
KTC-0940	Date of Agreement		06-Aug-19 A
KTC-0950	Confirmation of Acceptance of Award of Contract	16-Aug-19 A	
KTC-1000	Commencement Date	06-Aug-19 A	
KTC-1010	Access Date - Koodaideri site as defined by Contract Specification (1-May-20)	16-Jun-20*	
KTC-1100	Milestone 1: Construction of Mainline Track and Cassia Station up to CH237.800 (23-Sep-20)		07-Jan-21*
KTC-1200	Milestone 2: Construction of Mainline Track and Paperbark Station from CH 237.800 to CH 296.310 (24-Nov-20)		14-Mar-21*
KTC-1300	Milestone 3: Construction of the Works incl. final resurfacing (excl final survey as builts & commiss (30-Mar-21)		28-Jun-21*
KTC-2000	Practical Completion (Completion Date of all of the Works: 11-May-21)		10-Aug-21*

Figure 15 - Revised programme prior to mobilisation

However, the formation handover was due to be handed over in full from the 193.270km to the 365.087km, inclusive of the Mine Loop, by December 2020 based on the revised programme. This was not achieved, and the rail works were constantly impacted and were delayed by almost 7.5 months. As the handover was piecemeal this made it very difficult for the project to gain any momentum and with a fluid programme, the track team had to be flexible. It wasn't until approximately 8 months into the project that we were able to have the remaining formation handed over and have an uninterrupted programme. In the end we had to work collaboratively with the Client to accelerate the activities to achieve the revised milestone dates.

One of the biggest challenges with the delays was being able to keep the workforce busy. Due to COVID-19, border closures and other Pilbara projects running concurrently (i.e., FMG's Eliwana Project) it had already been difficult to find experienced workforce and retain them. We had mobilised a very "green" workforce due to these constraints and had spent a vast number of hours training everyone up and finding them a role in the teams. It was for this reason that we worked with the Client to try and reallocate resources from impacted activities like Rail Laying rather than demobilise personnel and risk them not returning. We were able to be flexible and reallocate some resources to Flashbutt welding and other activities, however, there are limits to team sizes and their efficiency. When this number is exceeded, the team does not work efficiently, and the costs go up. This issue was worked through with the Client and they did their best to open new work fronts.

4. Technical Challenges

4.1. Surfacing Tolerances

The surfacing tolerances in the Track Construction Specification as detailed in Figure 13 were extremely challenging. The absolute tolerances (i.e., variation to design) were similar to what is

required for slab track and don't allow for the variability in constructing ballasted track (e.g., variability in consolidation of ballast). To further complicate matters, the Track Construction Specification required a Dynamic Track Stabiliser (DTS) to be run prior to the first tamping pass i.e., after track lifter completes 2 passes, after each tamping pass and after final brooming/regulating. After various discussions with the Client, the process was eventually refined to remove the DTS pass after final tamp and post final brooming.

The construction team were also able to amend the absolute track tolerances in Figure 13 by providing evidence of common industry standards from similar networks, Roy Hill and FMG, where absolute tolerances are +/-10mm. To achieve these tolerances there were some factors to take into consideration. The first was the accuracy of the survey to ensure that the +/-10mm was achievable. The project opted to go for a survey track trolley option and utilised both the Amberg Trolley (GRP1000) and Gedo Trolley (Vorsys) (Figure 16). These trolleys were selected for their high level of accuracy (+/-5mm in Kinematic mode, +/-1mm in Stop/Go), speed (approx. 600-800m/hr) and versatility for use on plain line track and turnouts. The trolley systems also work directly with the Automatic Lining Control (ALC) system in the Plasser tampers. Unlike other survey methods where records are static and taken at regular intervals (e.g., 10m spacings), the trolleys record constantly (every 20mm), and this data can be fed into the tamper to provide more accurate results. In essence, the more data input the better output from the tamper.

Figure 16 - Gedo Trolley in Action on Gudai-Darri

The planning of the final tamp was also critical to the success of achieving the construction tolerances and a lot of it was based on survey data and previous experience with consolidation of ballast. Taking consolidation into account, we found that it is best to limit your final lift to 20-25mm as the track still settles approximately 5-10mm after this tamp. Prior to the final pass, we planned to have the track 15mm below design, allowing a 20-25mm lift which left the track on average around 0-5mm high and within tolerance. An example of the As-Built results is in Figure 17 below.

Chainage	Horizontal	Design RL Left Rail	Asbuilt RL Left Rail	Deviation Left Rail	Design RL Right Rail	Asbuilt RL Right Rail	Deviation Right Rail	Gauge Measured	Design Cant	Asbuilt Cant	Cant Deviation
245300	-1	417.861	417.862	0.000	417.861	417.864	0.003	1.435	0.000	0.003	-0.003
245310	-1	417.851	417.853	0.002	417.851	417.853	0.002	1.435	0.000	0.000	0.000
245320	0	417.838	417.842	0.004	417.838	417.840	0.002	1.436	0.000	-0.002	0.002
245330	-1	417.824	417.828	0.003	417.824	417.828	0.003	1.435	0.000	0.000	0.000
245340	-1	417.809	417.812	0.003	417.809	417.813	0.004	1.435	0.000	0.001	-0.001
245350	-1	417.792	417.797	0.005	417.792	417.796	0.004	1.436	0.000	-0.001	0.001
245360	0	417.773	417.777	0.004	417.773	417.778	0.005	1.436	0.000	0.001	-0.001
245370	0	417.753	417.759	0.005	417.753	417.759	0.005	1.436	0.000	0.000	0.000
245380	1	417.733	417.737	0.004	417.733	417.737	0.004	1.435	0.000	0.000	0.000
245390	0	417.713	417.716	0.003	417.713	417.717	0.004	1.434	0.000	0.001	-0.001
245400	1	417.693	417.698	0.005	417.693	417.698	0.005	1.436	0.000	0.001	-0.001
245410	0	417.673	417.678	0.004	417.673	417.678	0.005	1.435	0.000	0.000	0.000
245420	1	417.653	417.656	0.003	417.653	417.658	0.005	1.435	0.000	0.002	-0.002
245430	1	417.633	417.638	0.005	417.633	417.636	0.003	1.435	0.000	-0.001	0.001
245440	0	417.613	417.617	0.003	417.613	417.616	0.003	1.435	0.000	-0.001	0.001
245450	-1	417.593	417.598	0.005	417.593	417.599	0.006	1.434	0.000	0.000	0.000
245460	0	417.573	417.577	0.004	417.573	417.577	0.004	1.434	0.000	0.000	0.000
245470	-1	417.553	417.557	0.004	417.553	417.559	0.006	1.434	0.000	0.002	-0.002
245480	-2	417.533	417.536	0.003	417.533	417.539	0.005	1.434	0.000	0.003	-0.003
245490	-1	417.513	417.513	0.000	417.513	417.514	0.001	1.434	0.000	0.000	0.000
245500	-2	417.493	417.495	0.002	417.493	417.494	0.001	1.435	0.000	-0.001	0.001

Figure 17 - Example of As-Built Surfacing Report for MDR

Other considerations in achieving the tight surfacing tolerances are as follows:

- Establishment of secondary control – Set at 100m intervals to provide more accurate results plus minimising any potential impacts from heat shimmer (Pilbara heat) from the rail and curve radius. Note: surfacing and survey works completed primarily on night shift to mitigate weather impacts.
- Capability and capacity of tampers - we had two tampers in use on the project: an 08-475 Unimat for tamping turnouts and an 09-32 high-output tamper for tamping main line track.

Although the project had its challenges with regards to achieving the required tamping km per week due to issues like operator shortage (border closures), plant breakdown and scheduled maintenance, the project was able to achieve the absolute and relative tolerances while also achieving the revised milestones. A lot of this achievement can be attributed to planning and the selection of plant and survey technology for the project.

4.2. Welding and Final Grinding

On the Gudai-Darri project, there were more than 2000 Flashbutt welds completed which were a mixture of welds for Continuously Welded Rail (CWR), turnouts and destress. With each of these welds, we needed to ensure that the final geometry achieved post grinding was within the acceptable tolerances stipulated in the Specification.

One of the challenges with final grinding is completing it as efficiently as possible as it is completed towards the back end of the project both after track has been lifted to final design height and after destressing. The other challenge is welds being measured via 1m straight edge by different people will often produce differing results and can cause delays to sign-off of ITPs and the MDR. This had occurred on previous projects, and we wanted to take the variability out of the measurement of welds. It is for this reason that the project stipulated that all welds needed to be recorded via a digital straight edge.

Not only does the digital straight edge measure and produce graphs and tables demonstrating conformance (Figure 18) but it also measures ramp angle (in mRad) which has been previously measured manually with a P1 gauge.

The other advantage of the digital straight edge is that it through the app (e.g., Railstraight by Thermit) it produces results instantaneously on the phone for analysis. This means that any non-conformances can be identified, and targeted grinding can occur in the non-conformance areas. For example, as you have the 100mm increments listed on the x-axis you can easily identify a peak exceeding 0.3mm on the running surface and where it occurs, and you can mark the rail from this and target grinding only in this area. This decreases the grinding time substantially and overall resulted in a more efficient process for the Gudai-Darri Project.

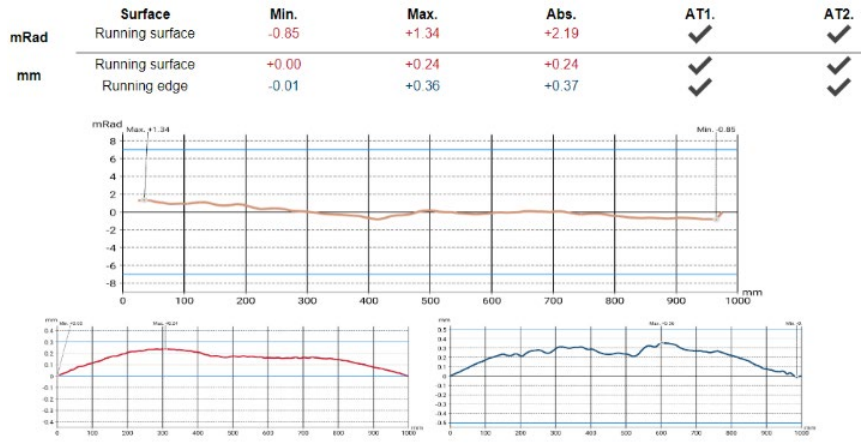

Figure 18 - Example output from Digital Straightedge

5. Innovations and Adopting Lessons Learnt

One of the things that the Rail industry is doing better at now is sharing of ideas and innovations. With most people utilising LinkedIn and Workplace it is becoming easier to share these ideas with a broad audience in the hope they might adopt them or even share some of their own lessons learnt.

At John Holland, we have completed various greenfield projects in the Pilbara and on Gudai-Darri we tried to draw on our experiences and some of the lessons learnt from these projects to come up with innovations that would improve the project regarding HSE, productivity, quality, etc.

One of the issues I recall from the Roy Hill Project was that we had several back related injuries from manual handling, some of which occurred from the lifting and placement of rail rollers on the formation. For the track laying on Roy Hill Project, we used loaders to pull rail from the NTC directly onto formation rollers that weighed around 28kg each. For Gudai-Darri we had to place rail rollers

directly onto the RTIO sleepers for the rail to be unloaded on from the rail train via the use of a Pettibone. This is a very repetitive and strenuous exercise, so we wanted to refine our design to ensure it was as light as possible while also still retaining its structural integrity and durability. Our design was as lean as possible, and we managed to shave 45% of the weight off the previous Roy Hill roller design with the new rollers weighing just over 15kg.

Not only did we save on weight and minimise the risk of back related injuries, but we also designed the rollers so they could be pulled with one hand and would slide over the sleeper lugs without getting caught. This was achieved by welding some 30x5 Flat bar on an approx. 45-degree angle so that the rollers could slide over the lugs and would not require lifting and could simply be pulled with minimal force.

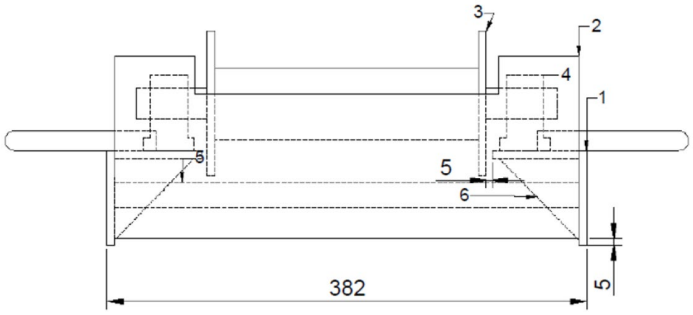

Figure 19 - Gudai-Darri Roller Design

Another lesson learnt adopted from previous project experiences was to ensure that all plant, inclusive of modifications, is checked against site conditions to ensure it is suitable. For our rail unloading process, we needed to modify the Pettibone for several purposes. Firstly, we needed to modify the crane part of it and fit it with a dual grab attachment to be able to unload two rails at the same time from the rail train for efficiency purposes. We also needed to modify the Pettibone and give it wheel extensions (and lift) to ensure that the Pettibone would straddle the RTIO sleepers plus also clear the rail if it had to drive back over the rail (Figure 20).

Reflecting on lessons learnt, we also had to ensure that there was enough clearance to the edge of the sleepers so that the Pettibone was not at risk of damaging them while also being able to steer and unload around curves. Other site conditions considered were the width of bridges and ramps that the Pettibone would need to get across or down as required. With all the above considerations in mind, we worked closely with our internal Plant Department to design the wheel extensions and the result was that we had no issues with the Pettibone capacity or clearance over the duration of the project.

Figure 20 - Pettibone with Wheel Extensions

6. Conclusion

All projects have their challenges, from retention of staff during an infrastructure boom to managing weather impacts on critical path activities. Greenfield rail projects in the Pilbara have always had their own regional challenges which often relate to extreme weather conditions and long-rotating rosters. On top of these challenges, Gudai-Darri had its own unique challenge with border closures and the management and retention of skilled resources during this time. At times during the project, I was responsible for over 140 personnel made up of staff and workforce many of whom were interstate based. It is often easy to become overwhelmed in situations like this feeling responsible for everyone, however, taking a step back I was able to ensure I worked collaboratively with the project team, the Client and John Holland support teams in Perth to overcome these challenges.

Even with an ever-changing COVID-19 climate and earthworks related disruptions, the project saw great initiatives and innovations as the team strived to achieve challenging construction tolerances as well as deliver technical excellence across the board. Applying lessons learnt from previous projects and being flexible and adapting to change were contributing factors to the success of the Gudai-Darri rail project.

Appendix A – Detailed CV

Chris Wills

Rail Staging Manager, Pre-Contracts

Qualifications and Memberships

- Bachelor of Civil Engineering – University of Western Australia
- Bachelor of Commerce: Major in Corporate Finance – University of Western Australia
- Engineers Australia

DOB: 31/01/1987

Nationality: Australian

Residency Status: Permanent resident

Address: 9/6 Bortfield Dr

Chiswick, NSW 2046

Phone: 0427 911 091

Email: Chris.Wills@jhg.com.au

Referees

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0438 264 858
Andy.Lovatt@jhg.com.au

Robert Hennessey
Operations Manager WA
John Holland Group
0428 025 303
Robert.Hennessey@jhg.com.au

Richard Brewer
Construction Manager
John Holland Group
0418 691 619
Richard.Brewer@jhg.com.au

Jonathan Slattery
Rail Systems Lead - WA
McConnell Dowell
0407 547 296
Jonathan.Slatter@mjalliance.com.au

Career Summary

Chris has over eleven years' experience in rail construction in Western Australia, South Australia and New South Wales having worked on iconic projects such as Sydney Metro Northwest and Roy Hill, and more recently on the RTIO Gudai-Darri Project Phase 1. He has been involved in an engineer's capacity with the installation and commissioning of track, civil and rail systems on major and minor projects.

Chris' foundation for project success is to understand the scope deliverables and methodology along with the Client's needs and ensure that project expectations are communicated to all project staff under his control. He takes personal responsibility for delivering quality projects and is committed to maintaining good relations with all project stakeholders.

Work History Summary

2021 – Present, Rail Staging Manager, JHG, Rail Pre-Contracts, NSW
2019 – 2021, Construction Manager, JHG, WA Rail Services, WA
2019 – 2019, Rail Delivery Manager, JHG, Rail Pre-Contracts, VIC

Relevant Project Experience

2020 – 2021

Construction Manager, JOHN HOLLAND GROUP – Gudai-Darri (Koodaideri) Project Phase 1, Rio Tinto, $147M, WA

A greenfield iron ore mine development for Rio Tinto Iron Ore in the east Pilbara mining region, including 180km track construction.

Responsibilities:

- Managed onsite engineering functions
- Project planning, forecasting and financial reporting
- Coordinated engineering team activities, programmed workloads, and provided technical and administrative guidance to the engineering staff to achieve project objectives
- Oversaw timely and within budget delivery of project engineering functions
- Liaised with clients, subcontractors, and suppliers to ensure satisfactory completion of structures and construction work

June 2019 – August 2019

Rail Delivery Manager, JOHN HOLLAND GROUP – North East Rail Line Tender, $110M, VIC

The project involves the upgrading of track between Melbourne to Albury to achieve a 'Victorian Passenger Class 2' track performance standard, allowing for faster and more reliable services.

Responsibilities:

- Developing methodologies for the project works
- Confirming resource requirements and durations for each activity
- Developing strategies for achieving Key Performance Indicators
- Assisting in the pricing of project works

July 2018 – June 2019

Senior Project Engineer / Project Manager, JOHN HOLLAND GROUP – Adelaide to Tarcoola Rail Acceleration Upgrade, ARTC, $64M, SA

Involves the upgrading of over 530km of 47kg/m and 53kg/m rail with new 60kg/m rail between Adelaide (Islington) and Tarcoola in South Australia.

Responsibilities:

- Monthly Project Reporting, including chairing monthly client meetings
- Financial reporting, including forecasting
- Management of all project staff

- Quality assurance
- Risk Management documentation
- Managing DPTI Permit process for Track Access (Dry Creek to Islington) and road closure requirements

2015 – July 2018

Project Engineer, JOHN HOLLAND GROUP – Sydney Metro North West, $3.5B, NSW

Chris was responsible for the piling and FRP works for 190+ OHW footings at the Sydney Metro Transit Facility; FRP works for 180+ footings on the viaduct; erection of structural steel on the viaduct and in the tunnel; FRP works and lift planning for bulk supply and traction substations.

Responsibilities:

- Financial reporting, including forecasting
- Quality assurance
- Procurement of all permanent materials
- Interface with other teams (i.e., stations, CSR, track)
- Risk Management documentation and design review

2015

Site Engineer, JOHN HOLLAND GROUP – Kalgoorlie to Leonora Track Upgrade Project, Stage 2, $VALUE, WA

The project involved upgrading 60km of existing track between Kalgoorlie and Leonora, changing the existing 1:4 steel sleeper pattern to a 1:2 pattern and replacing any life expired timber sleepers. Chris was also acting Project Manager as the Project Manager moved to part time involvement.

Responsibilities:

- Performing the duties of the Project Manager in his absence, including de-mobilisation planning
- Completing project forecasts, project financial reviews, project safety valuations and the project completing report
- Ensuring compliance with Scope of Works
- Surveying fixed points (Turnouts, Rail Platforms) to ensure compliance with track geometry and structural outline of rolling stock
- Track handover, including speed analysis using ALC software
- Conducting Hazard Identification Team Runs to capture hazards (physical, environmental, public interaction etc) and implement controls as part of the SQE process
- Promoting new method of tamping track to increase track machine capability and improve traceability
- Managing the Project Graduate Engineer

2014 – 2015

Site Engineer, JOHN HOLLAND GROUP – Roy Hill Iron Ore Project, Package 2 Trackworks, $VALUE, WA

The project involved 400km of new track construction between the Port Hedland and Roy Hill mine, working to a specified design.

Responsibilities:

- Managing the Flash-butt Welding Facility; ensuring compliance with Australian and AREMA standards for welding, and conducting daily inspections
- Managing Non-Destructive Testing for welding of rail and other on-track plant
- Lift planning; including the mobilisation of cranes, ground testing, and ensuring compliance with John Holland and Samsung C&T lifting specifications
- Ensuring compliance with the scope of work and contractual obligations, design, and technical specifications
- Participating in handover of earthworks from other contractors; organising joint survey pick up of formation and analysing results
- Construction and installation of track turnouts ensuring compliance with procedures; participating in joint inspections with the Client

- Developing procedures for track monument installation, as well as design of monument plaques using AutoCAD
- GEDO survey pick-up of newly constructed track and data analysis to ensure compliance with design
- Managing level crossings process; inclusive of installation of STRAIL panels and signage

Appendix B – Summary of Project/Paper

YOUNG ACHIEVER AWARD - ENTRIES

Tracking through a Pandemic

Chris Wills
Bachelor of Engineering (Civil) / Bachelor of Commerce (Corporate Finance)
John Holland Group

ABSTRACT

"Tracking through a Pandemic" is centred on the Gudai-Darri Project Phase 1 which is a 180km regional greenfield rail project connecting the Gudai-Darri mine to the existing Tom Price mainline and on to the ports in Dampier and Cape Lambert. The railway alignment is located along the Fortescue Valley, immediately to the north of the Hammersley Range some 1200km+ Northeast of Perth. I was the John Holland Construction Manager for the rail construction works and was responsible for managing superintendents, supervisors, engineers, and blue-collar workforce to ensure the successful completion of the scope.

I was part of a team who were constantly adapting to change amid an ever-changing COVID-19 climate inclusive of regular border closures. As an east coast-based resource, I had my own personal challenges with these closures and was working with the project team to come up with solutions to help those who were impacted. The project while impacted by these challenges was able to still demonstrate technical excellence and achieve a positive outcome for both the Client and the Contractor.

This report explores the importance of innovative thinking and applying lessons learnt from previous projects and experiences to overcome challenges and deliver a successful project. It highlights the importance of planning and flexibility required in the rail construction industry, as well as the need for effective change management when challenging situations occur.

Appendix C – Letter of Support

10/06/2022

RE: Letter of Support for Chris Wills, John Holland Construction Manager on Gudai-Darri Rail Project.

Chris has been a John Holland employee since 2011 when employed as graduate engineer and I have had the pleasure of working with Chris throughout his ever-evolving career as a railway professional.

I fully support Chris's nomination and recognition as a young achiever and can certainly attest to Chris's professionalism in all his roles especially in his more recent position as a senior leader in the role of Construction Manager on Rio Tinto's Gudai-Darri Rail Project.

The Project itself was initially the construction of 180kms of New Heavy Haul Freight rail from a remote spur line connection to the new Mine Loop. Chris at this stage in his career has worked on a large catalogue of remote and regional upgrades and new builds in 3 different states (WA, SA & VIC) along with some major rail urban construction and infrastructure projects in NSW.

Chris was involved in the finalisation of the award of the project to John Holland and promoted into the position of Construction Manager on the merit of his previous achievements and took the challenges head on from the get-go (it should be noted this is business as usual for Chris).

All Projects of this type are difficult and contain challenges and Gudai-Darri was not different in that respect but Chris's experiences on previous similar scopes had him well prepared (as a Sydney resident) to face these difficulties with his team.

However, what was not foreseeable and was certainly new was the impact and emergence of the global pandemic COIVD and the knock-on impacts of this to Chris professionally and personally and that same impact to his team and their families.

Chris's excellent leadership at this time of national crisis is a testament to the leader Chris has become, his personal sacrifices and care for his colleagues, clients and subordinates gave Chris the ability to bring the team together so that they could face and overcome the challenges.

The challenges included: international supply chain overruns, international and state boarder restrictions, an already peaking and restrained labour and skills market, critical equipment and spares constrained supply chain, Fly-in-Fly-out (FIFO) camp constraints, an imploding airline industry, upstream, and downstream critical path delays and brand new COVID compliance measures that evolved in a live environment adjusting to Rio Tinto plus State and Federal Government requirements.

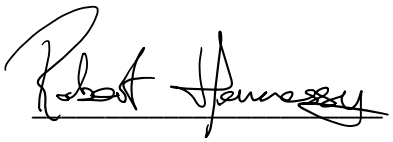
Chris displayed not only the ability to deliver in the face of the usual technical and construction issues but was also a leader in innovation in response to the new constraints and the impacts to our people (including suppliers) at the time. Chris through the support of his family in NSW remained present in WA for extended periods ensuring his people and their wellbeing were always a priority and led innovative initiatives to support their care like RnR activities, COVID support payments, Gifts

and Recognition for the families at home, additional mental well being support on site and the list goes on.

Chris not only challenged his own team on Gudai-Darri but the business within WA who was experiencing similar circumstances on other projects and worked closely with myself and the State leadership group on affecting positive changes to support and care for our people.

I thereby support this nomination and Chris's recognition as a Young Achiever who stood up at a most difficult time and reaffirmed his position as a professional leader in this industry now and for the future.

Yours sincerely,



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Appendix D – Reference Letters

Mr Robert Hennessy,
Operations Manager,
John Holland.

22 June 2022

Reference Letter for Chris Wills, John Holland Construction Manager on Gudai Darri Rail Project

Robert,

I am writing this letter as a means of reference for Chris Wills, who occupied the role of Construction Manager for John Holland Group on the Gudai-Rail Project in 2020 and 2021 with a package of works initially totalling $66 million. The Gudai-Darri Rail Project was an $800 million Greenfields rail construction project from 2019 to 2022 delivering a new 180.000 km rail infrastructure asset for Rio Tinto in the Pilbara of Western Australia.

On behalf of Rio Tinto, it was my responsibility as the Project Construction Manager to deliver the project and manage the interface across all functions and contractors on the Project including the rail construction scope of works delivered by John Holland and which enabled the working interface between myself and Chris to occur.

John Holland mobilised to site in June of 2020 at an immensely difficult time with the advent and subsequent uncertainty with Covid-19. Chris was responsible for managing the delivery of the rail construction activities on behalf of John Holland with and during what was a truly challenging time and did an exceptional job in his role on the project. At peak manning the project team had approx. 120 personnel under Chris's direction including superintendents, engineers, supervisors and blue collar workforce. Chris showed dedication to a level that was beyond noteworthy and one which should be recognised. At a time when interstate borders were closed Chris was unable to return to his home and family in Sydney for a period approx. 9 months and during this time worked tirelessly, diligently, calmly, and professionally to manage the construction in addition to the duties demanding of his role.

In a time when the management and retention of skilled labour presented an almost insurmountable challenge due to interstate border closures within Western Australia, Chris was able to successfully maintain progress on the construction workfront and manage his staff in a difficult period.

Chris was / is a pleasure to work with, he is the consummate young professional who always represented himself and his company with composure and professionalism regardless of the challenges we faced together as a project. If there was ever a time to test a person's ability to working under pressure and being able to adapt to continual challenges, then this was a time when Chris was able to display the skillset and capability to successfully achieve this.

Chris was respected amongst his team and peers and displayed an ability to innovate particularly when it came to safety initiatives and management of risk.

Throughout the project despite its challenges, Chris always displayed a positive approach, was calm, reassured, competent, composed, and conversant with the requires of the project program and management of his team safety and welfare.

Regards,

Jonathan Slattery

Construction Manager - Rail / Worley / Rio Tinto Projects (2020 – 2022)

Gudai-Darri (Koodaideri) Project| M: 0407 547 296

Worley
energy | chemicals | resources

22nd June 2022

To Whom it may concern,

RE: Chris Wills and Gudai-Darri Project

In my role as General Superintendent on Rio Tinto's Gudai-Darri rail project I had the pleasure of working with Chris Wills in the planning, organising and construction of a new 180km Iron ore rail spur in Western Australia's Pilbara region.

The project due to its location was a FIFO based job and due to several other major rail projects in the Pilbara region starting prior to the Gudai-Darri project local plant, labour and resources were quite limited.

Chris led the engineering team and helped develop innovative ideas for the project some of which included a lightweight rail roller system, modifications to machinery and a machine attachment for unloading 400m rails strings from a rail train.

The formation earthworks for the project were carried out by other contractors and they struggled to keep to program which continually caused delays for the track building crews.

Covid 19 and Western Australia's isolation rules impacted the project, FIFO workers on a 3 and 1 roster ran the risk of flying home and not being able to get a flight back or having to isolate for a week in Perth. The turnover of labour and operators was huge.

Chris proved throughout the project that he had an outstanding ability to plan, programme and resilience to implement a strategy to deliver a job under the most trying conditions.

Bruce Wilson

General Superintendent

John Holland Rail Division.

Appendix E – Overview of Nomination

YOUNG ACHIEVER AWARD – OVERVIEW OF NOMINATION

Name: Chris Wills
Address: Unit 9, 6 Bortfield Drive Chiswick, NSW 2046
Phone: 0427 911 091
Email: Chris.Wills@jhg.com.au

OVERVIEW OF NOMINATION – TRACKING THROUGH A PANDEMIC

"Tracking through a Pandemic" is centred on the Gudai-Darri Project Phase 1 which is a 180km regional greenfield rail project connecting the Gudai-Darri mine to the existing Tom Price mainline and on to the ports in Dampier and Cape Lambert. The railway alignment is located along the Fortescue Valley, immediately to the north of the Hammersley Range some 1200km+ Northeast of Perth. I was the John Holland Construction Manager for the rail construction works and was responsible for managing superintendents, supervisors, engineers, and blue-collar workforce to ensure the successful completion of the scope.

I was part of a team who were constantly adapting to change amid an ever-changing COVID-19 climate inclusive of regular border closures. As an east coast-based resource, I had my own personal challenges with these closures and was working with the project team to come up with solutions to help those who were impacted. The project while impacted by these challenges was able to still demonstrate technical excellence and achieve a positive outcome for both the Client and the Contractor.

This report explores the importance of innovative thinking and applying lessons learnt from previous projects and experiences to overcome challenges and deliver a successful project. It highlights the importance of planning and flexibility required in the rail construction industry, as well as the need for effective change management when challenging situations occur.