

# Re-Designing Site Movements, Acceptable Controls & Verification Techniques

July 2023



Chris Wilson

# Strategy – Journey



# Resources

Traffic Management  
Guideline

Traffic Management  
Plan

Traffic Management  
Mapping

## Guideline

### Traffic Management – QUARRIES

Scope: Hanson Group Australia  
Author: Quarry Ops \ Risk  
Owner: Ian Bradbury  
Issued: 29 July 2019  
Version: 2.2



# Traffic Mgmt. Plan

- Traffic mgmt. plan re-development
- Clear expectations set
- Aligned for the end user
- Establishing clear triggers on when to review the TMP i.e. Infrastructure upgrades, New equipment, Stockpiling changes etc.
- Evolving document continually meeting site development.

## Glasshouse Quarry (3559)

Mt Beerwah Rd, Glasshouse Mountains 4518

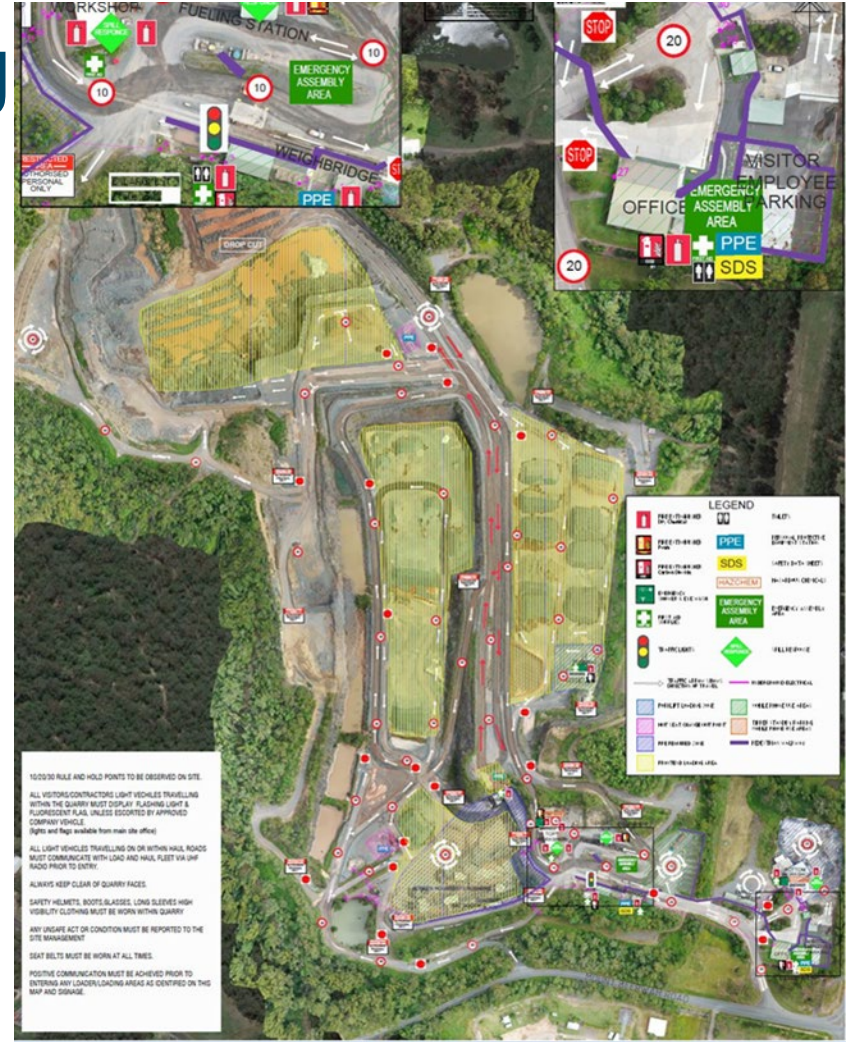
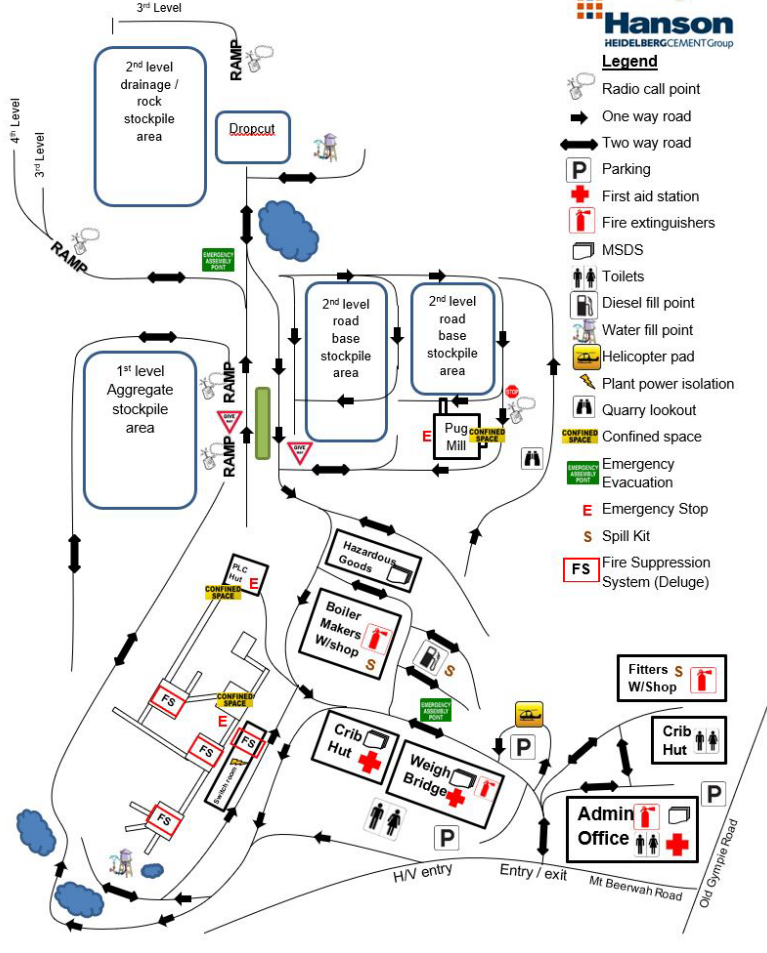


Version No:	1.5	Last Review Date:	02/12/2022
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This document cannot be modified without the approval of the NR Quarry Operations or Regional Risk Manager This document is UNCONTROLLED once printed			



# Traffic Mgmt Mapping

## Glasshouse Mountains Quarry



15:00/30 RULE AND HOLD POINTS TO BE OBSERVED ON SITE.

ALL VISITORS/CONTRACTORS LIGHT VEHICLES TRAVELLING WITHIN THE QUARRY MUST DISPLAY FLASHING LIGHT & FLUORESCENT FLAG UNLESS ESCORTED BY APPROVED COMPANY VEHICLE.

(Lights and flags available from main site office).

ALL LIGHT VEHICLES TRAVELLING ON OR WITHIN HULL ROADS MUST COMMUNICATE WITH LOAD AND HULL RULER VIA JUMP ROAD PRIOR TO ENTRY.

ALWAYS KEEP CLEAR OF QUARRY FACES.

SAFETY HELMETS, BOOTS, GLASSES, LONG SLEEVES HIGH VISIBILITY CLOTHING MUST BE WORN WITHIN QUARRY.

ANY UNKARE ACT ON CONDITION MUST BE REPORTED TO THE SITE MANAGEMENT.

SEAT BELTS MUST BE WORN AT ALL TIMES.

POSITIVE COMMUNICATIONS MUST BE ACHIEVED PRIOR TO ENTERING ANY LOADER/LOADING AREAS AS DEFINED ON THIS MAP AND SIGNAGE.

**NSS** National Survey Solutions

**Legend**

SCALE: 1:5000

DESIGNED BY: DCP  
CHECKED BY: A/E  
DATE: 26/03/2021

Hanson HEIDELBERGCEMENT Group

TRAFFIC MANAGEMENT, SAFETY HAZARD &

# Objectives



- Clear view over actual site imagery.
- Displayed in several locations around site in A0 sizing.
- Use of pictographs/grams, purely functional, clear images that everyone agrees on and familiar.
- Easy ability to review and amend.
- Layered annotations to provide flexibility and clarity on specific functions i.e. Electrical services.
- Delineate clear zones for positive communications.



# Hazard & Exposure Identification

## Pugmill, Office/Weighbridge & Plant Area

Hotspot Workshops

Hazard reporting,  
Near misses,  
Incident/accident  
investigations

Industry Guidance,  
Best Practice &  
Innovations





# Hazard & Exposure Identification

## Traffic Management - Glasshouse Quarry 3559

### Hot Spot 2

Current Vehicle and Pedestrian Movements



Planned - Long Term Design



Levels of control

Current	HoC Level	Acceptable
Transport parking and access	5	No
Fitter workshop Access	5	No
MCC and Crusher Hut access	5	No

Interim	HoC Level	Acceptable
Sean re transport box for document scanning	5	No
Discussion at drivers toolbox regarding areas		

Long Term	HoC Level	Acceptable
Full separation achieved, stop points at	3	Yes

Approved by: Operations Manager

Date:

LEVEL OF CONTROL		How are PEDESTRIANS in the area protected from VEHICLES ?
ELIMINATION	1 Optimal	Removal of activity (Pedestrians do not go into area / vehicles do not access area)
SUBSTITUTION	2 >5m space created between pedestrian traffic and vehicles	Safety in design - people and vehicles have no need to interact due to ample space and plan layout allowing for >5m separation at all times, separate entrances / exits to site and operational areas, delineation in place and all supported by admin controls and monitored through Safety Conversations and near hit reporting process
ISOLATION	3 (hard controls in place that allow <5m or more of separation)	Hard (impenetrable) barriers implemented (example - Armco railing), defined walkways and roadways implemented, automated boom gates that prevent interaction (eg - level crossing situation at railway stations), location monitoring devices that set off alarm within vehicles in place, all controls supported by admin controls and awareness training
ENGINEERING	4 (hard controls in place that creates <3m of separation)	Methods of slowing vehicles down introduced (eg - speed governors, speed humps), reverse and forward motion beepers introduced, flashing lights on moving vehicles in area, Pedestrian walkways identified and painted, stop lights in place giving right of way, gates and barriers implemented to stop access to vehicle areas - supported by admin controls
ADMINISTRATIVE CONTROLS - BEHAVIOURAL	5 <b>(requires sign off by RGM)</b>	Exclusion zone rules introduced, right of way rules agreed upon and communicated, speed limits in place, PPE to be worn by all and all people trained in these rules. Checks on compliance conducted through Safety Conversations
PPE	6 <b>(not an acceptable level of</b>	High visibility clothing worn by all who enter area <b>(not an acceptable level of control on its own)</b>

# Hazard & Exposure Identification

## Traffic Management - Glasshouse Quarry 3559 Hot Spot 3

Current Vehicle and Pedestrian Movements



Planned - Long Term Design



Levels of control

Current	HoC Level	Acceptable
Office and staff Caprark interaction with Fitter workshop	5	No

Interim	HoC Level	Acceptable
Creat plans and consult with all involved to	5	No
make sure we have thought of all		



Long Term	HoC Level	Acceptable
Remove garden and maximise space allowing designated areas, clear signage and segregation	3	Yes

Approved by: Operations Manager  
Date:

LEVEL OF CONTROL		How are PEDESTRIANS in the area protected from VEHICLES ?
ELIMINATION	1 Optimal	Removal of activity (Pedestrians do not go into area / vehicles do not access area)
SUBSTITUTION	2 >5m space created between pedestrian traffic and vehicles	Safety in design - people and vehicles have no need to interact due to ample space and plan layout allowing for >5m separation at all times, separate entrances / exits to site and operational areas, deliniation in place and all supported by admin controls and monitored through Safety Conversations and near hit reporting process
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# Hazard & Exposure Identification

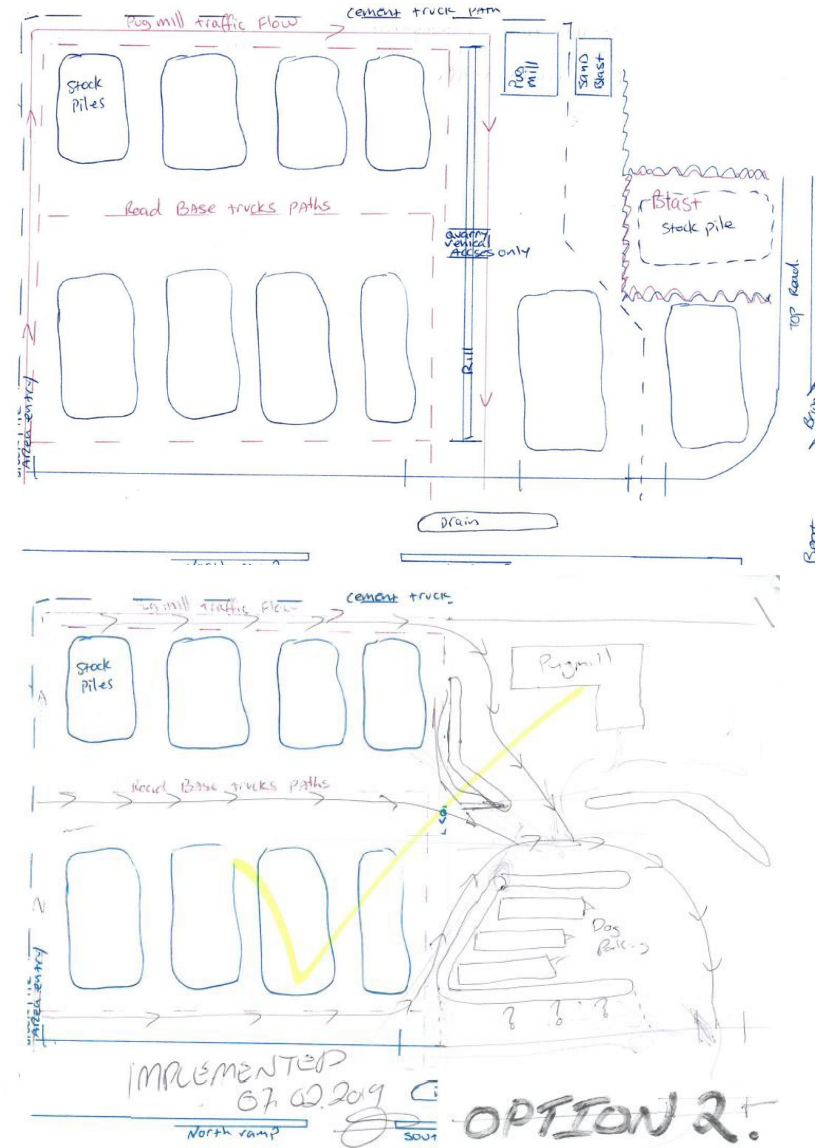
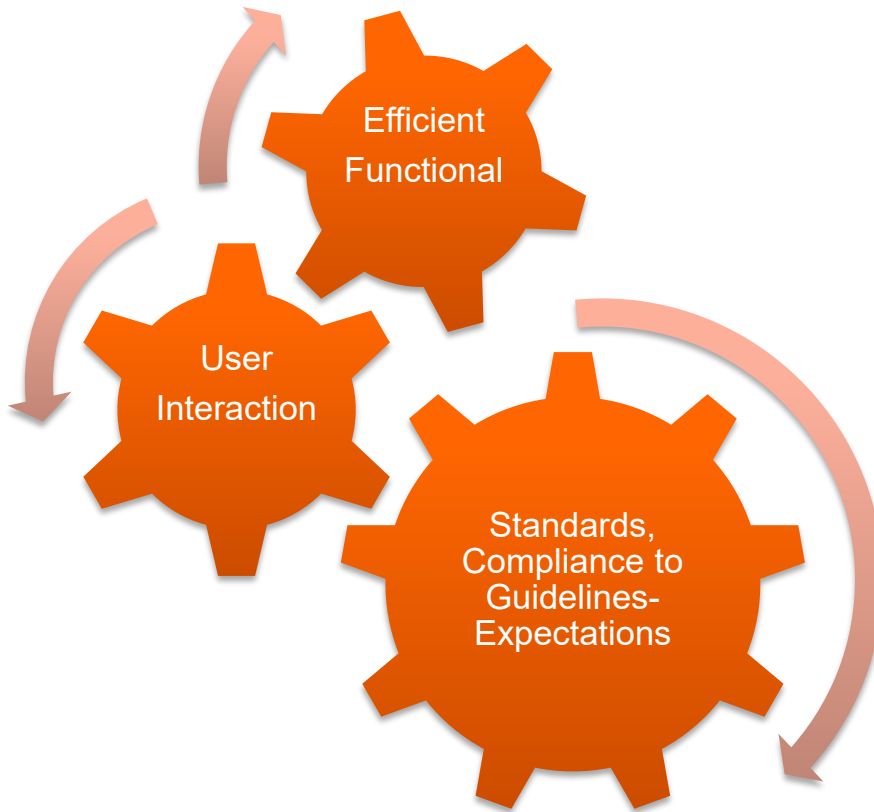
## ICAM incident event executive summary

Title	Description	Photograph
Event Type/Short Description	Light Vehicle / Loader (980H) interaction	 
Risk level	Actual Level: 4      Potential Level: 4	
Event Date & Time	12 Oct 2017: 13:07	
Prepared by:	Kristin Devlin	
IRIS Event Number	70020309	
Region, State and Function:	Northern Region Qld – Aggregates	
Location/ Plant number	Name: Glasshouse Quarry      No:3559	
Incident Description	<p>The Quarry Leading Hand was operating a light vehicle to take a Relief Loader Operator to the sales floor of the quarry to relieve the Loader Operator for a lunch break.</p> <p>As the light vehicle approached the CAT 980H loader the Leading Hand called over the radio that he was entering the loader's working area.</p> <p>The loader was stockpiling material from the plant and was pushing the stockpile up at the time the call was made. The Loader Operator did not hear the radio call. The Leading Hand proceeded to the stockpile area, parking approx. 12 metres behind the loader.</p> <p>The Loader Operator reversed down from the stockpile not knowing that the light vehicle was behind and to the left of the machine. As he got to the base of the <u>material</u> he articulated the machine to the left as he was <u>returning back to the plant</u> for more material. As the machine reversed, the Light Vehicle operator called to the loader operator to stop over the radio. <u>Fortunately</u> the Loader Operator heard the call and stopped the machine. Minor damage to the side mirror and driver's side door was sustained.</p>	
Contributing Factors	<ul style="list-style-type: none"> <li>• Complacency of light vehicle operator (leading hand)</li> <li>• Lack of a Quarry Manager over a long period of time has possibly influenced the organisational culture at the site</li> <li>• No formal light vehicle parking areas for shift change out.</li> <li>• Failure to implement the 10,20, 30 Rule for vehicle operations.</li> </ul>	
Root Cause (s)	<ul style="list-style-type: none"> <li>• Failure to gain positive communication between loader and light vehicle operator.</li> </ul>	



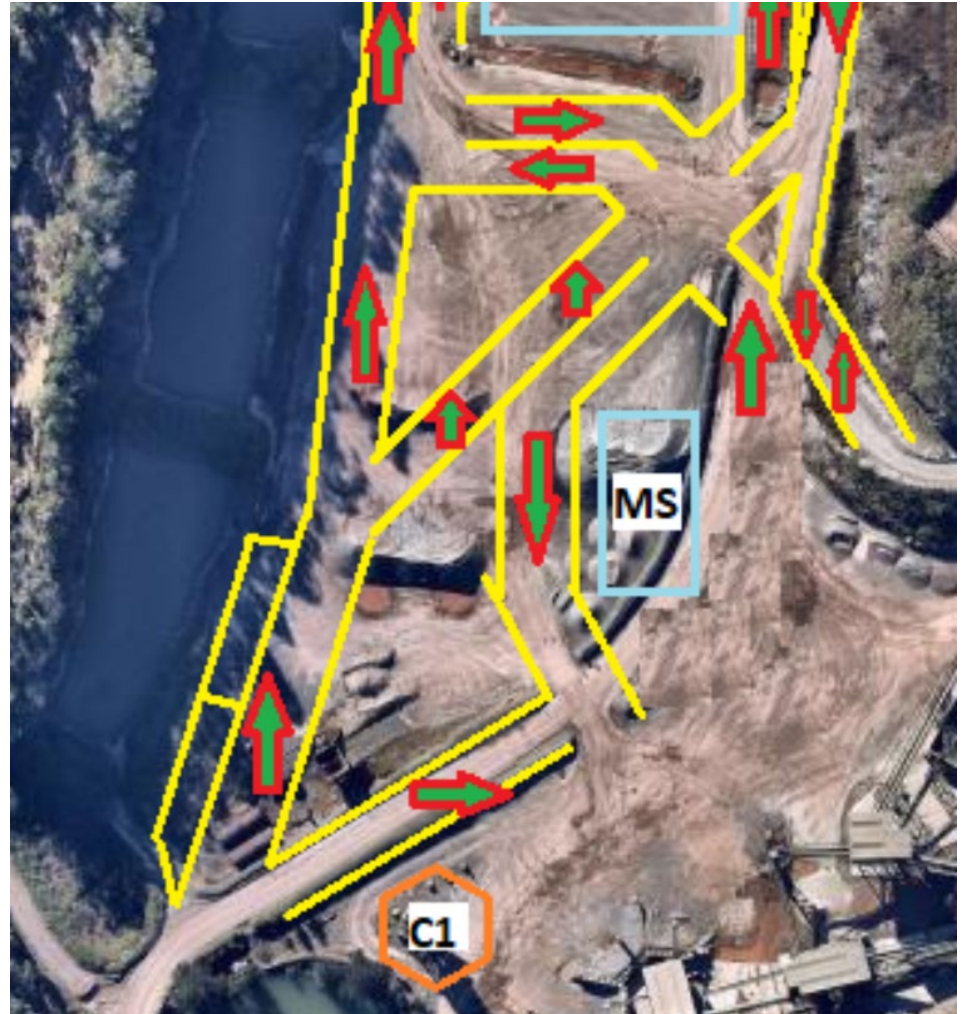
# Establishing Solutions

## Pugmill, Plant & North Ramp



# Establishing Solutions

- Groups work together to come up with options.
- Groups include LV, Tipper & HME Operators along with Maintenance crew.
- Often done with permanent marker on large laminated site maps.
- Machine, Tipper, vehicle, pedestrian interaction zones remain key focus
- Options then reviewed and often a preferred option or amalgamation of both is put forward to the teams.



# Ownership & Involvement benefits



Hanson Glasshouse Quarry

22 May 2021 · 🌐

Glasshouse team spent Friday afternoon discussing the achievements in in traffic management. Acknowledging further improvements and a clear path on what needs to be done moving forward. Some nibbles also topped the afternoon and safety week off!



[See Insights](#)

[Boost a Post](#)

  17

3 comments

 Like

 Comment

 Share

- Real wins have come from in house applications and ideas being put into play.
- Ownership of ideas fostered by our teams has resulted in a high level of traffic flow compliance.
- Staff are empowered to induct and inform external contractors etc. when they have queries, or new starters.
- Recognition and acknowledgement has really empowered the team to be involved.
- Increase in pro-active behaviours and reporting around potential hazards or near misses.
- ***The best solutions come from those living it day in day out***



# Implementation – North Ramp, Office/Weighbridge & Plant Area

Communicate agreed changes & timelines with stakeholders

Prepare area, mark out and confirm suitability

Rough in changes where possible to “set” expectations. Allow 1-2 weeks of feedback





# North Ramp Relocation



- North & South Ramps one lane, yet 2 way traffic – Lots of communication over 2 way causing congestion.
- Meet at top on level ground – terrible visibility onto main haul road, high exposure.
- Didn't meet Traffic mgmt. guideline spec's.

# North Ramp Relocation



- Reduction in 2 way radio traffic and elimination of 2 way traffic on ramp.
- Increased visibility at intersections and approaches in line with Traffic mgmt. guideline.
- Significantly reduced interactions on haul road.
- Removal of previous North ramp and replace in new location.

***Load and haul efficiency gain when expectation was actually to have increased L&H times.***



# North Ramp Relocation





# Office & Weighbridge



- **Lack of designated pathways**
- **Lack of segregation from Light/Heavy Vehicles**
- **Lack of lighting on pathways**
- **Poor quality of surface finishes (uneven ground) in some areas.**



# Office & Weighbridge



- **Designated pathways – marked, Handrails, Bunding or both where required**
- **Clear segregation defining walkways & pause points.**
- **Lighting installation to provide adequate vision**



# Office & Weighbridge





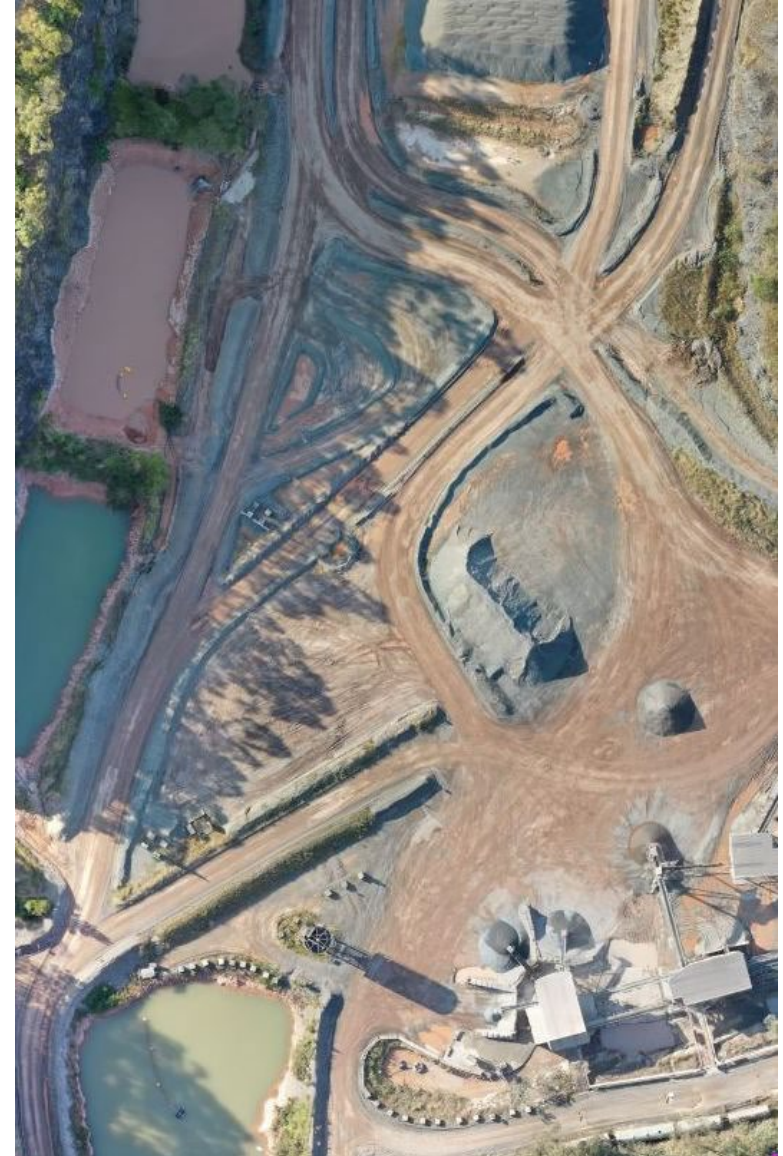
# Plant Area

- No clear roadways
- No pause points
- No effective positive communication
- No clear zone owner
- High interaction levels
- Multiple entry/exit points
- All tippers/vehicles entering quarry must pass through this area
- Stockpiles creating visual obstructions
- Plant operations either side of thoroughfare



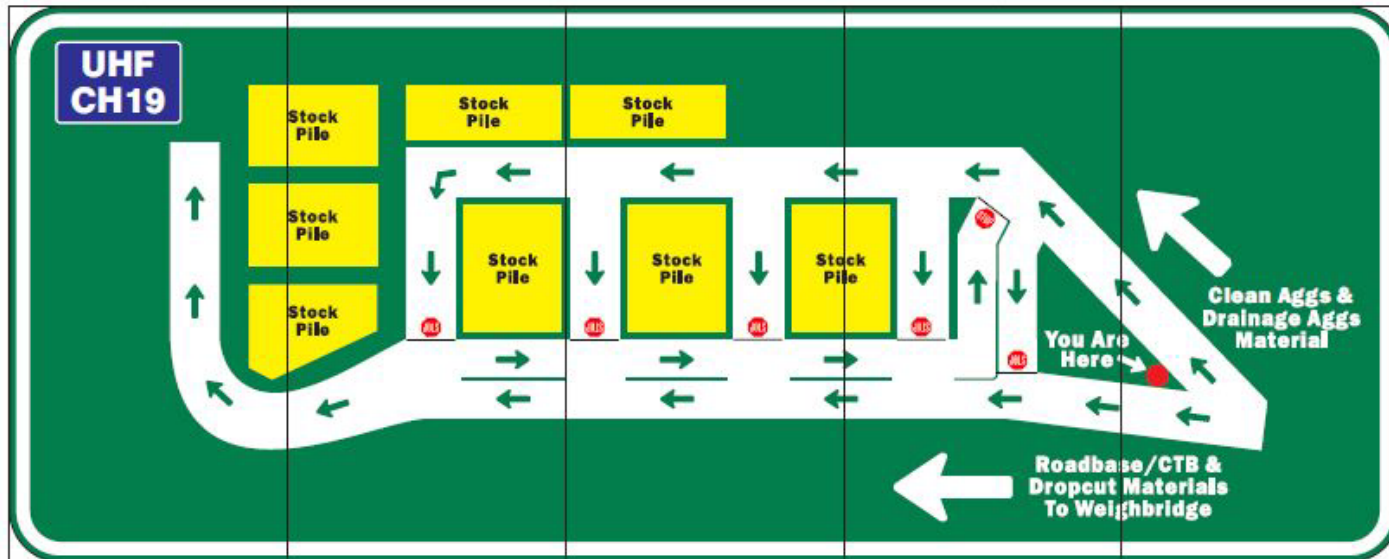
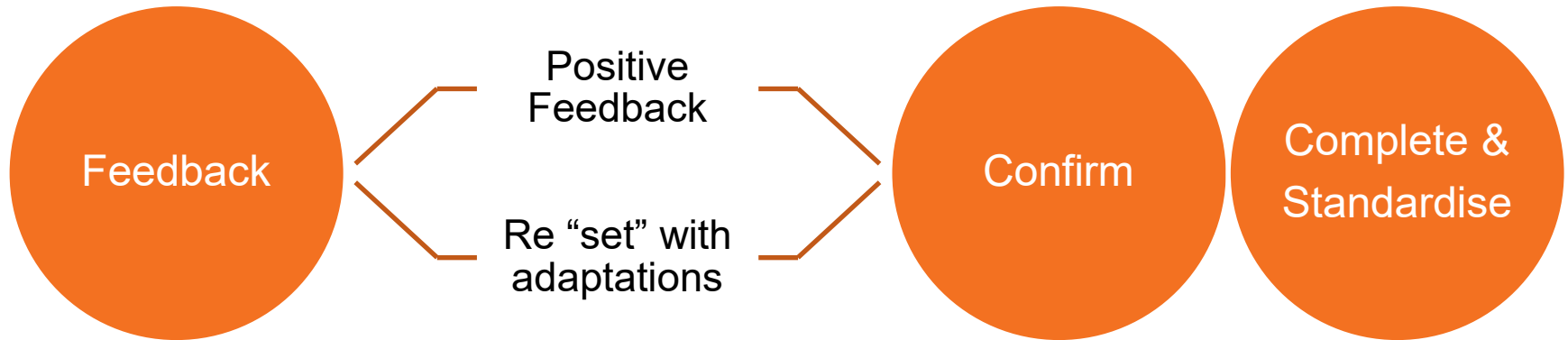
# Plant Area

- Clear roadways
- Pause points incorporated at entry points
- Positive communication process established
- Zone owner assigned to plant loader role
- Interaction levels reduced by diverting 85% of incoming traffic
- Multiple entry/exit points managed
- Only Tippers being loaded from plant now directed in by zone owner
- 1 stockpile remains, demarcated and diversion minimise risk
- Wash plant decommissioned





# Validate – Is this solution effective for the end users



# Validate – Have we met the brief?



Hanson Glasshouse Quarry



21 Aug 2019 · 🌐

This year traffic management has been a key focus on keeping our people safe. Some of the ways we are working to reduce our exposure is demonstrated in the photo below. Segregation is critical between pedestrians and all vehicles, along with dedicated road tipper lanes to reduce interactions with heavy machinery. One way traffic flow and good visibility in intersections is another area we are continually improving with feedback from operators, road tippers and light vehicles critical in getting it right!



- Feedback from all stakeholders using any area of our traffic mgmt. is critical.
- We request this in many formats such as toolboxes, ICARE's, CCC's, Online through our company workplace and also social media.
- We also encourage everyone to proactively advise anytime if they believe there are opportunities for us to do better.
- Once confirmed all site documents are reviewed to include amendments and expectations are set.

# Verification Techniques

## Rudimentary/On the Ground

- CCC – Critical Control Checks
- Edge protection quick reference gauge

## Technology

- Drone surveys
- TMG Gap analysis tool




# Critical Control Checks

## Site Specific High Risk Areas

- Ramps are free of loose rocks and in good condition (not rough and uneven).
- Rollovers in change out areas and parking zones are adequate and maintained.
- Speed signs in weighbridge/workshop zones always adhered to including low level speeds on raised LV only Ramps. LV only signs also in place a raised ramp.
- Clear communication at all call up points can be observed.
- High/rapid rainfall events are followed with an inspection of edge protection and drain functionality
- View primary hopper being reversed into appropriately and use of pugmill ramp if operational

- Developed to allow verification that controls are in place, adequate and effective.
- These cover off on core requirements of the business and traffic mgmt. guideline & plan.
- Site specific controls can also be added allowing for flexibility to regularly monitor any areas of the site or plan deemed necessary.
- Critical control checks are completed by onsite staff, and internal visitors to the site including the risk team.



## High Risk Work - Critical Control Check

### Traffic Management

This critical control check is to ensure that controls implemented to prevent injury or property damage are in place and working as required for Traffic Management  
E.g. Vehicle / Vehicle or Vehicle / Pedestrian interactions that occur at the Glasshouse Mountains Quarry - QLD.

Name of person/s conducting Critical Control Check: \_\_\_\_\_

Date: \_\_\_\_\_ IRIS Event Number/s: \_\_\_\_\_

LIFE SAVING RULES	Compliant	Non-compliant
<ul style="list-style-type: none"> <li>All persons who operate a vehicle or piece of equipment on a Hanson site or for Hanson are licenced and competent to do so (including training on an enrolled log book).</li> <li>Seatbelts are worn at all times when mobile equipment / vehicles are being operated / driven</li> <li>Hand held devices such as mobile phones are not used while operating mobile equipment / vehicles</li> <li>All incidents and near hits between vehicle and vehicle and vehicle and pedestrian are reported</li> <li>Edge protection is in place along all potential fall points and is equal to / &gt; 1.5m high in all places</li> <li>Exclusion zone rules (10, 20, 30m) are in place at the site and these are adhered to</li> <li>Vehicles and pieces of mobile equipment are isolated when work is being conducted on them</li> </ul>	<div style="width: 20px; height: 20px; background-color: #90ee90; margin: auto;"></div>	<div style="width: 20px; height: 20px; background-color: #f08080; border: 1px solid white; border-radius: 50%; margin: auto; display: flex; align-items: center; justify-content: center;"> <div style="width: 8px; height: 8px; background-color: white; border-radius: 50%;"></div> </div>
<b>STOP the task, investigate the incident then create IRIS event and record the event number at the top of this page.</b>		

Critical Controls	Acceptable	Not-Acceptable
<b>Process controls – long term</b> <ul style="list-style-type: none"> <li>There is a Traffic Management Plan for the site</li> <li>Relevant aspects of the site traffic management plan are known by people conducting the task and others working in / around the area</li> <li>Site specific speed limits and traffic rules such as direction of traffic flow, parking requirements, give way processes etc are displayed through line markings and signage.</li> <li>Each piece of plant and equipment / vehicle has a risk assessment for its operation (SWM for routine tasks / JSA for non-routine tasks).</li> </ul>	<div style="width: 20px; height: 20px; background-color: #90ee90; margin: auto;"></div>	<div style="width: 20px; height: 20px; background-color: #f4a460; margin: auto;"></div>
<b>Process controls – on the day of CCC being completed</b> <ul style="list-style-type: none"> <li>If operation of plant and equipment is required outside of the risk assessment contents red inking occurs or a complimentary Risk Assessment (JSA or Take 1) is conducted</li> <li>All mobile plant &amp; trucks have a daily pre-start check completed</li> <li>Any faults found on pre-start check are reported and if any critical faults are identified the piece of plant is tagged out until the issue has been fixed</li> <li>Where a FEL is in a designated work zone, all other traffic is adhering to the procedures in place.</li> <li>Positive communication can be heard on 2 way radio channel 19</li> <li>Site traffic rules are known by personnel on site and all rules appear to be adhered to at all times</li> </ul>	<div style="width: 20px; height: 20px; background-color: #90ee90; margin: auto;"></div>	<div style="width: 20px; height: 20px; background-color: #f4a460; margin: auto;"></div>
<b>Plant usage and condition</b> <ul style="list-style-type: none"> <li>All plant and equipment is being operated safely and as per the manufacturer's instructions</li> <li>All vehicles, plant and equipment appear to be operated in a safe and controlled manner</li> <li>All vehicles and equipment appear to be fit for purpose</li> <li>All signage within the site is legible, does not contradict other signage and is adhered to at all times</li> <li>There are engineering solutions in place to keep pedestrians separated from mobile equipment and vehicles by time, distance and / or physical barrier</li> </ul>	<div style="width: 20px; height: 20px; background-color: #90ee90; margin: auto;"></div>	<div style="width: 20px; height: 20px; background-color: #f4a460; margin: auto;"></div>
<b>People</b> <ul style="list-style-type: none"> <li>Pedestrians use designated / marked walkways while on site (no short cuts)</li> <li>All site personnel have had instruction on the site traffic management processes through TBTs / site meetings / training / site orientation</li> </ul>	<div style="width: 20px; height: 20px; background-color: #90ee90; margin: auto;"></div>	<div style="width: 20px; height: 20px; background-color: #f4a460; margin: auto;"></div>
<b>Site Specific High Risk Areas</b> <ul style="list-style-type: none"> <li>Ramps are free of loose rocks and in good condition (not rough and uneven).</li> <li>Rollovers in change out areas and parking zones are adequate and maintained.</li> <li>Speed signs in weighbridge/workshop zones always adhered to including low level speeds on raised LV only Ramps. LV only signs also in place a raised ramp.</li> <li>Clear communication at all call up points can be observed.</li> <li>High/rapid rainfall events are followed with an inspection of edge protection and drain functionality</li> <li>View primary hopper being reversed into appropriately and use of pugmill ramp if operational</li> </ul>	<div style="width: 20px; height: 20px; background-color: #90ee90; margin: auto;"></div>	<div style="width: 20px; height: 20px; background-color: #f4a460; margin: auto;"></div>
Pause the job and rectify the issues before continuing the process. Provide details of action taken prior to the job restarting below. An IRIS report is to be raised when controls are noted as not in place or not adequate with the event number recorded at the top of this page.		
<b>Action</b>	Responsible Person	Completed by
Was Positive Feedback Given? (If yes provide Details below)	Yes	No

# Edge Protection Height Measuring Flag





# Edge Protection Height Measuring Flag



Hanson Glasshouse Quarry

16 Nov 2022 · 🌐

Massive congratulations to Barrie Dobson production supervisor at Glasshouse Quarry. Great to see an idea followed through and industry recognition! The edge protection inspection tool has certainly reduced our exposures and ensuring we maintain as safe workplace! Great work Baz 👍

- Site based innovation developed by supervisor Barrie Dobson.
- Intent to reduce pedestrian access to haul roads to confirm edge protection heights.
- Noted that measuring edge protection with a tape measure was not effective.
- Solutions being explored relied on technology and therefore were not cost effective.
- This was extremely cost effective and easily reproduced by any site and the sign writers.
- Significant exposure reduction and gives a very clear indication on edge protection compliance instantly.



# Drone Surveys

- Drone survey to confirm our edge protection compliance.
- Provides clear understanding of where any areas of concern are located.
- Each area assessed immediately and remediation work or barricading put in place.
- Determination between edge protection & segregation bunding.
- Formally noting in risk report results and actions including any anomalies which appear that may form drains etc.



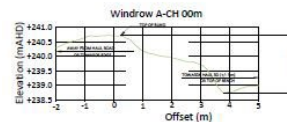
## Edge Protection

**Site**  
Glass House,

**Survey Data**  
Data supplied by: NSSdrones.com  
Date Captured: 29/09/2021  
Survey type: UAV survey  
Contours interval: 5m

**Assessment Details**  
Cross section interval: 20m  
Height Compliance measurement interval: 5m  
Height measured from crest to Horizontal 5m offset

## Windrow Height Measurement Example



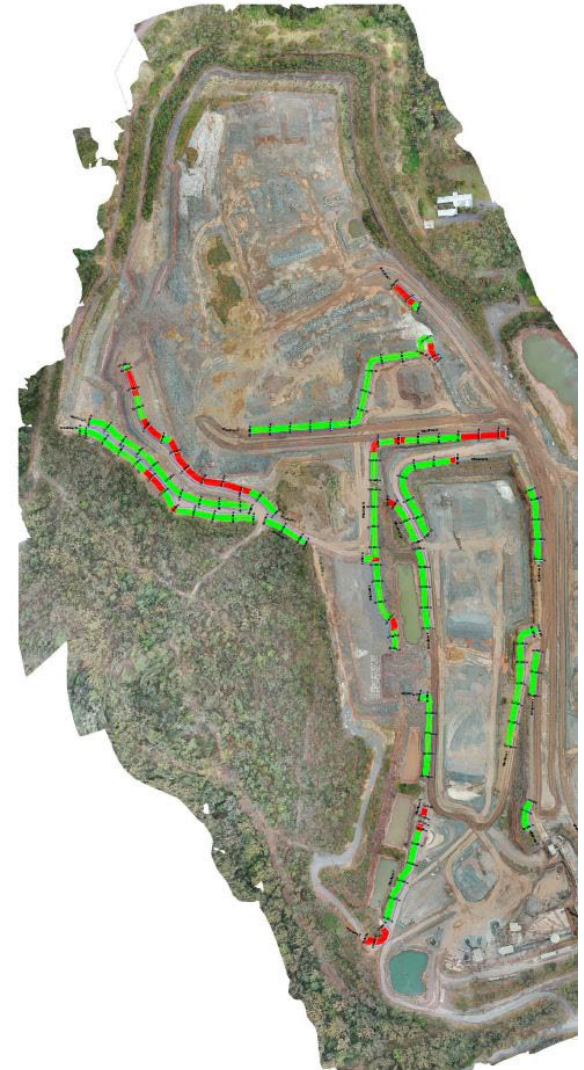
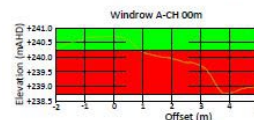
**Windrow Height and Compliance Key**  
NOTE: Height compliance measured at 5m intervals

- Less than 1.5m
- Greater than 1.5m

## Ledged

- Windrow Crest line
- Windrow Cross section location

## Windrow Height and Compliance Example

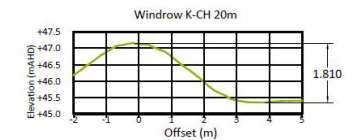
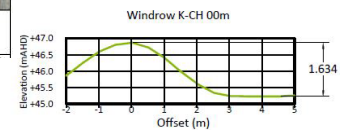
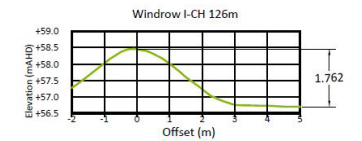
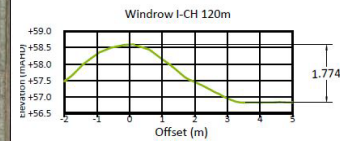
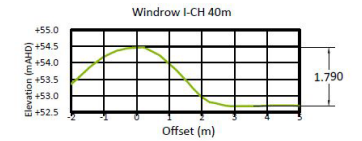
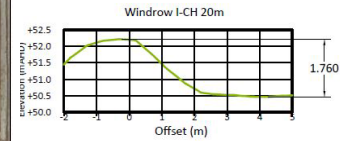
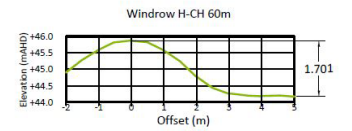
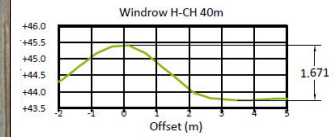
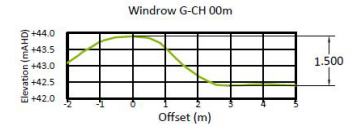
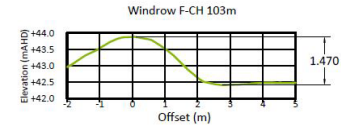




# Drone Surveys



PROJECT: **Glasshouse**  
TITLE: **Edge Protection - Compliance Map with ORTHO**



# Continued Evolution, Innovation & Adaptation

clean site  
safe site

## Key Outcomes

- Consultation, Collaboration between work groups.
- Piloting ideas, Being prepared to accept feedback and make changes.
- Continued conversations around traffic mgmt. onsite and what is/isn't effective.
- Where possible including team in construction & development of traffic mgmt. and celebrating milestones.
- Identifying zones and zone owners – providing ownership and accountability over each zone.
- Clear expectations of how each zone is maintained – acceptable levels of housekeeping.

### AREA HOUSEKEEPING STANDARD

HOUSEKEEPING OWNERSHIP:	
SITE: Glasshouse Mountains Quarry	
SITE OWNER: Chris Wilson	SITE DEPUTY: <u>B.Dobson, M.Fehlhaber</u>
AREA / ZONE: Stockpile/Sales area	
AREA / ZONE OWNER: Barrie Dobson	AREA / ZONE DEPUTY: <u>Sarah.W/Logan.W</u>

HOUSEKEEPING RULES OF THIS AREA:	INSPECTIONS FOR THIS AREA MADE TO PICTURED STANDARD BELOW:
<ul style="list-style-type: none"> <li>• Everything has a place</li> <li>• Signs to be kept clean and in position</li> <li>• Report any potential hazards</li> <li>• Keep roadways clear and swept.</li> <li>• All rubbish to be placed in bins</li> </ul>	<ul style="list-style-type: none"> <li>• Keep roadways swept</li> <li>• Everything placed in designated location</li> <li>• If you see a potential hazards please report</li> <li>• Equipment/Signs returned to dedicated location.</li> </ul>





# Thank you, Questions?

