ROWE GROUP

DEVELOPMENT APPLICATION

COTTON GIN PROCESSING FACILITY

VARIOUS LOTS, KUNUNURRA

OUR REF: 9301 7/09/2022

1. INTRODUCTION

Rowe Group acts on behalf of Kimberly Cotton Company Ltd (KKC), the developers of a proposed cotton ginnery processing facility and associated areas of laydown (the proposal) at Lot 501 (No. 131) Mulligans Lagoon Road, Lot 510 (on Deposited Plan 421305), Lot 402 (on Deposited Plan 423057) and Lot 794 (on Deposited Plan 28988), Kununarra (the subject site). In this regard, it is noted all development and operation of the facility will occur on Lot 510 only, and Lots 501, 402 and 794 are required to provide access to the proposed development.

This report includes a description of the following matters:

- Location of the subject site;
- Description of the existing land use;
- Overview of relevant planning and design issues;
- Detailed explanation of the proposed development; and
- Justification for the proposed development.

2. DESCRIPTION OF SITE

2.1 LOCATION

The subject site is located in the Municipality of the Shire of Wyndham-East Kimberley (Shire). The subject site is located approximately 11.3 kilometres north of the Kununurra town centre.

Refer **Figure 1 – Regional Location**.

The subject site is situated in the locality of Kununurra and bound by Mulligans Lagoon Road to the southeast and Weaber Plain Road to the west.

Refer **Figure 2 – Local Location**.

2.2 CADASTRAL INFORMATION

The subject site comprises four (4) land parcels, being:

- Lot 501 on Certificate of Title Volume 2951, Folio 263;
- Lot 510 on Certificate of Title Volume LR3173, Folio 202;
- Lot 402 on Certificate of Title Volume 4022, Folio 512; and
- Lot 794 on Certificate of Title Volume 2684, Folio 205.

The land the subject of the development proposal has a total land area of 164.54 hectares (i.e. the application area), with frontages of approximately 2,150m to Mulligans Lagoon Road and 507m to Weaber Plain Road.

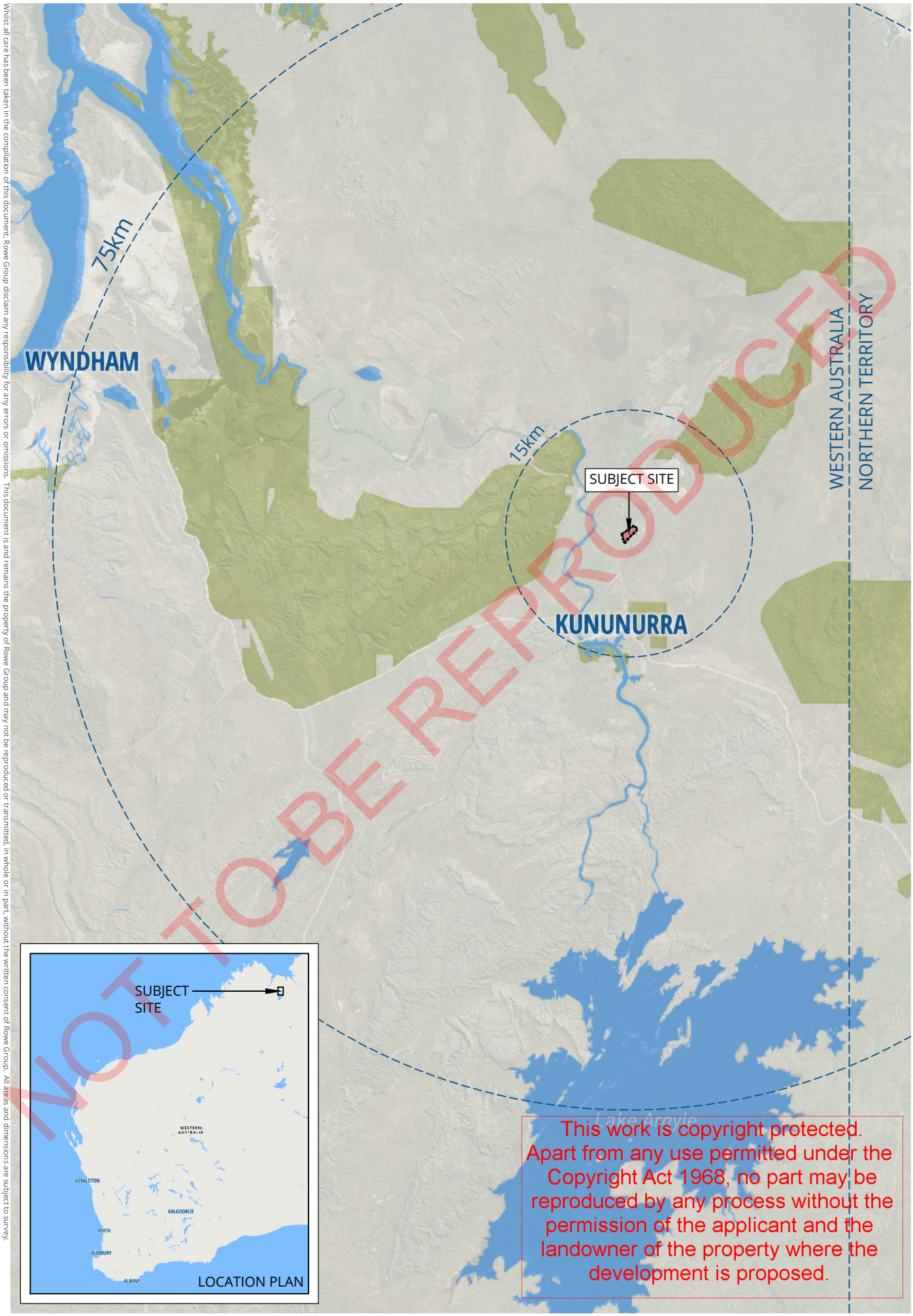
Refer Figure 3 – Site Plan and **Attachment 1 – Certificates of Title**.

2.3 EXISTING IMPROVEMENTS

The processing facility component of the proposal will be located on the most south-western potion of Lot 510, adjacent to Mulligans Lagoon Road. The remainder of Lot 510 is currently vacant and contains significant amounts of vegetation.

Lot 501 and 794, which are proposed to be utilised as access only, contain an industrial development for a processing plant.

Lot 402 which is also proposed to be utilised for access only, contains a residential dwelling, a large warehouse and areas of storage and laydown.



N:\TOWN PLANNING\9000-9999\9301\DRAFTING\A-CAD - WILLIAM CLEMENTS - 2021.09.09

9301_FIG04A_20210908 Kununurra (Regional) - DRAWN:**WILLIAM CLEMENTS** - DATE CREATED: **2021.09.08** - PROJECTION: **MGA52** GDA94 - CADASTRE: LANDGATE -

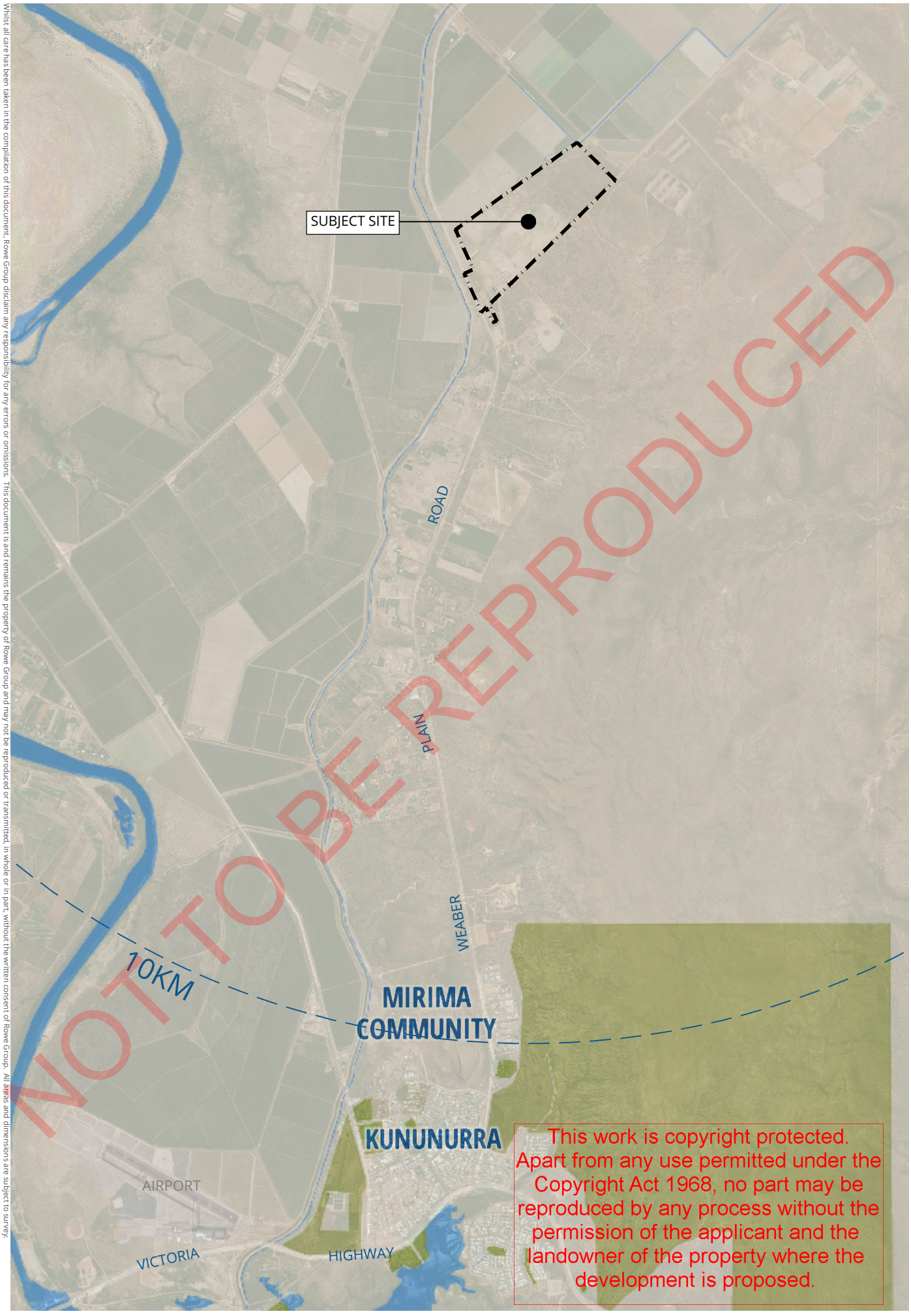
0 15000 m

SCALE @ A4: 1:600,000

N

FIGURE 1

REGIONAL LOCATION



N:\TOWN PLANNING\9000-9999\9301\DRAFTING\A-CAD - WILLIAM CLEMENTS - 2021.09.09

9301_FIG05A_20210908 Kununurra (Local) - DRAWN:**WILLIAM CLEMENTS** - DATE CREATED: **2021.09.08** - PROJECTION: **MGA52** GDA94 - CADASTRE: LANDGATE -

0 1500 m

SCALE @ A4: 1:60,000

N

FIGURE 2

LOCAL LOCATION

N:\TOWN PLANNING\9000-9999\9301\DRAFTING\A-CAD - JAMIE STRUDWICK - 2022.09.05

9301_FIG06B_20220822 Kununurra (Site Plan) - DRAWN: JAMIE STRUDWICK - DATE CREATED: 2022.08.30 - PROJECTION: MGA52 GDA94 - CADASTRE: LANDGATE -

0 312.5 m

SCALE @ A4: 1:12,500

N

FIGURE 3

SITE PLAN

3. DESCRIPTION OF PROPOSAL

The key components of the proposal are to be developed on a portion of Lot 510. That is, Lots 501, 794 and 402 are proposed to provide access to Lot 510 only.

The key components of the proposal to be developed at the subject site are summarised as follows:

- Road train access roads;
- Gin Shed and associated carparking;
- Bale shed;
- 10,000 tonne cotton seed storage shed;
- 3.0ha cotton trash yard; and
- A Laydown area.

The proposed development area for all infrastructure is approximately 4.5 hectares in size. Primary access to the development is proposed to be taken via an entry point from Mulligans Lagoon Road to Lot 402 that traverses Lot 794 and 501 to provide access to the site via an easement.

Rowe Group has been advised by the Applicant that the "long-term" access plan is to have the Mulligans Lagoon Road and Weaber Plain Road intersection upgraded to meet road train access requirements. It is our understanding, the Shire has provided "in principle" support, however, the Shire is yet to secure funding to accommodate the "long term" access plan.

3.1 STAGING AND OPERATION DETAILS

KCC anticipate that the facility will be constructed in two (2) primary stages. Stage 1 will involve installation of a three-stand cotton gin with a processing capacity of approximately 60 bales per hour. Stage 1 is to include all buildings identified on the plans and the module yard area.

Stage 2 will involve installation of two (2) additional ginning stands and associated equipment within the gin building. This will allow the facility a design capacity of 120-bales per hour of lint cotton.

The proposed operating hours are presented in the table below. The intent is to operate the cotton gin on a 24-hour basis from the second week of the cotton ginning season until all cotton is processed. KCC aim to allow truck access to the subject site between 5:00am – 7:00pm, for standard operating times during the ginning season. This would align weighbridge hours with local working hours for farming operations in the Kimberley region.

ACTIVITY	MON-FRI	SATURDAY	SUNDAY AND PUBLIC HOLIDAYS
Ginning Operations	24-hours	24-hours	24-hours subject to weekly maintenance
Weighbridge hours for receival and despatch of trucks	- 5:00am to 7:00pm during ginning season - 7:00am to 4:00pm outside of ginning season (Mon-Fri) - Extended weighbridge hours – 24/7 for initial receival of cotton modules until module yard is filled (3-4 week period in June).		

ACTIVITY	MON-FRI	SATURDAY	SUNDAY AND PUBLIC HOLIDAYS
Maintenance of plant and equipment during non-ginning system	7:00am – 5:00pm	7:00am – 1:00pm	-

A cotton gin aims to operate on a 24-hour basis so that the cotton delivered to the site is processed in the shortest time possible. Unprocessed cotton which is stored in the module yard area or remains on-farm in round bales, is exposed to weather. Rainfall and dust could contaminate the cotton and therefore result in downgrades of cotton quality, resulting in reduced prices for the cotton products. Raw wet cotton can result in mouldy cotton which is more difficult to process and will result in downgrades in colour of the cotton from the pure white cotton which the gin aims to produce.

With respect to staff numbers, approximately 30 staff will be employed at the subject site at its peak capacity. The processing plant will operate 24 hours a day with two (2) 12-hour shifts. That is, there would be a maximum of 15 staff at the subject site at any one time.

Refer **Attachment 2 – Development Application Plans.**

3.1.1 COTTON GINNING PROCESS

The cotton ginning process ultimately separates the cotton seed, cotton staples and gin motes. The three (3) products can then be processed into a range of products (i.e. used in vegetable oil, cosmetics, yarn for clothing etc.). The processes occur at the subject site can be summarised as follows:

- **Unloading**: The incoming cotton arrives at the subject site in round bales (approximately 4.3 tonnes each). The round bales will initially be stored in the module yard and then carried into the module feeder bay for processing. The module feeding system removes the wrapping on the bales then utilises high speed spiked cylinders to separate the cotton bolls. The automatic air suction control pulls the cotton bolls into the conveyance system.
- **Drying and Pre-cleaning**: After unloading, the seed cotton is subjected to a multistage drying and pre-cleaning treatment process. The first drier is sized to provide a specified ratio of heated air which enables the maximum drying capacity of the seed cotton. The heated air stream moves onto the inclined cleaner where the heat further opens the cotton and cylinder spikes remove the smaller trash. The secondary cleaner then removes the larger trash such as sticks and leaves.
- **Distribution and Overflow:** A specially designed trough conveyor delivers the cleaned and dried cotton to the hoppers which are mounted above the feeding system.
- **Feeding and Ginning:** The main component in the ginning process, the gin stand is where the lint and seed are separated. The feeder enables the gin stand consistent input so maximum throughput can be achieved. The gin stand is comprised of a bank of saws which rub against a bank of ribs to pull the lint away from the seed. The bank of ribs allows the lint to fall through, and blocks the seed.

- **Lint Cleaning:** Following the separation of the lint and the seed, the lint requires additional cleaning to ensure all contaminants are removed. First stage lint cleaning is through a centrifugal cleaner which uses centrifugal force to spin away the contaminants. The cleaning technology does not cause any damage to the fibre as there are no moving parts which the lint could get caught on. The final stage of cleaning is a gentle saw cleaner which combs out the lint.
- **Condensing and Moisture Restoration:** The condenser takes the single fibres of lint and presses it into a blanket like layer or batt. At this point moisture is reintroduced to the fibre, up to 7.5%, which enhances the compressibility of the cotton fibre.
- **Pressing and Bale Handling:** The final step in the ginning process requires the clean lint to be compressed into bales of 227kg. The bales are weighed and strapped to contain the product before being moved into bale warehousing.

4. TOWN PLANNING CONSIDERATIONS

4.1 ZONING

4.1.1 SHIRE OF WYNDHAM-EAST KIMBERLEY LPS 9

Under the provisions of the Shire of Wyndham-East Kimberley Local Planning Scheme No. 9 (LPS 9), Lot 510 (i.e. the land subject of the proposed development and use) is within the 'Agriculture – State and Regional Significance' Zone.

The objectives of the 'Agriculture – State and Regional Significance' Zone, as stated in LPS 9, reads:

- *to identify land of State, regional or local significance for agricultural and food production purposes;*
- *to retain priority agricultural land for agricultural purposes;*
- *to limit the introduction of sensitive land uses which may compromise existing, future and potential agricultural production.*

The zoning of Lots 501, 402 and 794 is not considered relevant to this application as these Lots are being used for access only to the 'Agriculture – State and Regional Significance' Zone.

Refer **Figure 4 – LPS 9 Zoning Plan**.

4.1.2 LAND USE PERMISSIBILITY

The cotton ginnery processing facility falls within the use class of 'Industry – Primary Production', which is defined in LPS 9 as (underlining is Author's emphasis):

Industry – primary production means premises used –

a) to carry out a primary production business as that term is defined in the Income Tax Assessment Act 1997 (Commonwealth) section 995-1; or

b) for a workshop servicing plant or equipment used in primary production businesses.

Under the *Tax Assessment Act 1997*, 'primary production business' is defined as follows:

"primary production business": you carry on a primary production business if you carry on a business of:

a) cultivating or propagating plants, fungi or their products or parts (including seeds, spores, bulbs and similar things), in any physical environment; or

b) maintaining animals for the purpose of selling them or their bodily produce (including natural increase); or

c) manufacturing dairy produce from raw material that you produced; or

d) conducting operations relating directly to taking or catching fish, turtles, dugong, bêche-de-mer, crustaceans or aquatic molluscs; or

e) conducting operations relating directly to taking or culturing pearls or pearl shell; or

f) planting or tending trees in a plantation or forest that are intended to be felled; or

g) felling trees in a plantation or forest; or

h) transporting trees, or parts of trees, that you felled in a plantation or forest to the place:

i. where they are first to be milled or processed; or

ii. from which they are to be transported to the place where they are first to be milled or processed.

Table 4 – Zoning Table of LPS 9 lists 'Industry – Primary Production' as a discretionary ('D') use in the 'Agriculture – State and Regional Significance' Zone.

The proposed facility aligns with the definition of 'primary production business' as defined in the *Tax Assessment Act 1997*, meaning the proposal falls within the LPS 9 use class on 'Industry – Primary Production'.

4.2 DEVELOPMENT STANDARDS

Table 9 of LPS 9 contains the following development standards applicable for the land use of 'Industry – Primary Production':

MINIMUM SETBACKS			PARKING	BICYCLE PARKING	LANDSCAPING
Front	Side	Rear			
9m	5m	5m	1 bay for every 100 sqm NLA	N/A	10% minimum coverage of the site area

4.2.1 SETBACKS

The proposed development exceeds the minimum front, side and rear setback requirements with the Gin Shed and Bale Shed setback approximately 150m from Mulligans Lagoon Road and the side and rear setbacks greatly exceed the minimum requirement as outlined in Table 9 of LPS 9.

4.2.2 CAR PARKING

Provision for 30 car parking bays has been made at the subject site adjacent to the proposed office. Based on the requirements of LPS 9, with approximately 4,143m^2 of NLA the proposed development requires 41 car parking bays.

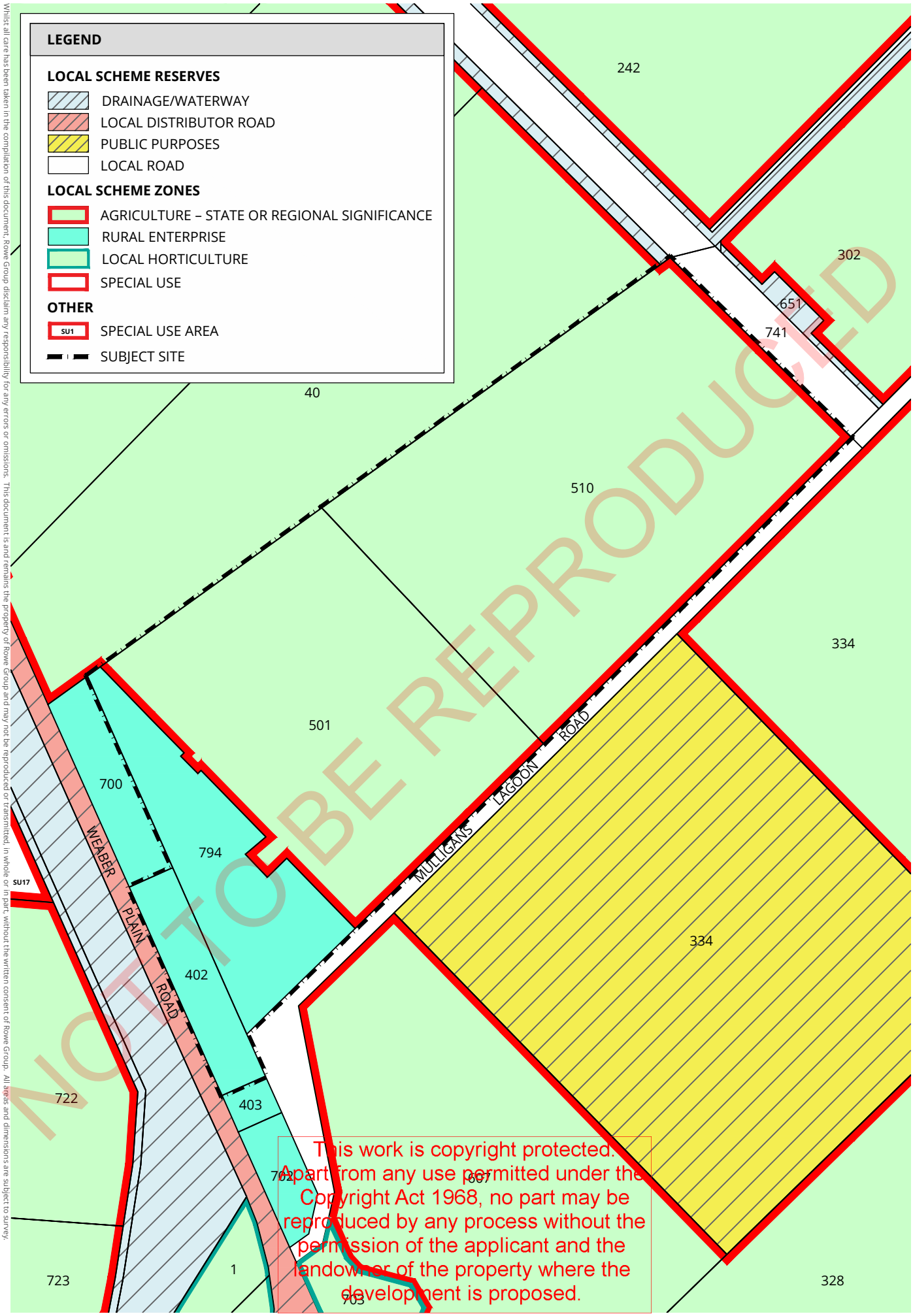
Notwithstanding the above, it is noted that the development is anticipated to have a maximum of 15 staff at the subject site at any one time. That is, only 50% of the light vehicle car parking bays will be occupied by the staff at any one time.

On this basis, the proposed development provides a surplus of bays to service the facility and adequately cater for the land use.

4.2.3 LANDSCAPING

No formal areas of landscaping are proposed within the development site boundary although the subject site does form part of a strategic agricultural production area. As such, the subject site is not in an urban or settlement context meaning landscaping would not enhance the amenity of the locality. Furthermore, the subject site is surrounded by agricultural landscapes and land uses meaning that landscaping exists in the form of agricultural production (i.e. crops and associated landforms).

It is therefore considered that landscaping of the subject site, commensurate to the requirements of LPS 9, is not necessary or appropriate given the site's location and context.



N:\TOWN PLANNING\9000-9999\9301\DRAFTING\A-CAD - JAMIE STRUDWICK - 2022.09.05

9301_FIG07A_20210908 Kununurra (LPS) - DRAWN: JAMIE STRUDWICK - DATE CREATED: 2022.08.30 - PROJECTION: MGA52 GDA94 - CADASTRE: LANDGATE - MAP DATA: DPLH

0 312.5 m

SCALE @ A4: 1:12,500

N

FIGURE 4

LOCAL PLANNING SCHEME No. 9 ZONING

5. ABORIGINAL HERITAGE CONSIDERATIONS

A search of the Department of Planning, Lands and Heritage ('DPLH') Register of Aboriginal Heritage Sites database, identifies that the following Registered Aboriginal Sites have mapped boundaries that partially overlap the subject site:

- Registered Aboriginal Site 14903 – Morung; and
- Registered Aboriginal Site 14905 – Kununurra Shelter.

In this regard, it is noted that KCC has actively liaised with Yawoorrong Miriuwung Gajerrong Yirreb Noong Dawang Aboriginal Corporation as the Traditional Owners of the land. Traditional Owners attended the subject site on 29 July 2022 and are aware that no heritage site will be impacted by the proposed development. The Traditional Owners have advised that the subject site was previously utilised as a camping ground and if there were Jimbilang (spear heads) or any artefacts found in the construction process, these are to be collected and given to the Miriuwung Gajerrong Aboriginal Corporation.

Notwithstanding, in accordance with the *Aboriginal Heritage Act 1972,* if any human remains or artefacts are found, all development will cease and Miriuwung Gajerrong Aboriginal Corporatio will be contacted.

Refer to **Attachment 3 – Heritage Clearance.**

6. ENVIRONMENTAL CONSIDERATIONS

The following section of this Report summarises the various environmental reports/considerations that have been prepared to inform and support this development application.

Reporting has been undertaken with respect to the following environmental considerations:

- Waste Management;
- Stormwater Management;
- Dust Management; and
- Noise Management.

6.1 WASTE MANAGEMENT

A Waste Management Plan ('WMP') has been prepared by SMK Consultants which outlines measures to manage and mitigate waste generation and resource consumption during the operation of the development. The WMP includes details on the following:

- The types and quantities of waste generated during construction;
- Procedures to collect and dispose of waste;
- Measures that will be implemented to minimise waste generation associated with the development; and
- A program for monitoring the effectiveness of these measures.

The WMP is designed to support a sustainably based management approach underpinned by adaptive management principles to encourage increased diversion of waste from landfill and fire risk mitigation.

It is anticipated the recommended waste management procedures outlined within the WMP will be implemented for the life of the facility. In this regard, KCC is committed to complying with the industry best practice guidelines such as:

- Waste materials will be reduced, reused and recycled where possible;
- General wastes will be disposed of through available disposal schemes within Kununurra;
- All septic wastes will be disposed onsite through an onsite wastewater disposal system designed to sustainably dispose of waste from the peak daily wastewater production during cotton ginning.
- Residual materials that cannot be reused or recycled will be disposed of at an approved waste management facility.

Refer to **Attachment 4 – Waste Management Plan.**

6.2 STORMWATER MANAGEMENT

A Stormwater Assessment has been undertaken by SMK Consultants to identify requirements for stormwater generated from the subject site during construction and operation. The impacts considered include:

- Volume of stormwater;
- Potential contaminants in the stormwater; and
- Proposed measure for onsite capture of stormwater for reuse purposes and potential discharge points.

The subject site currently slopes to the north / northwest with all drainage flowing to the northwest boundary and draining in a northeast direction. A channel associated within the Ord River Irrigation Area ('ORIA') drainage network adjoins the northern boundary of the subject site and provides for the outlet for the runoff from the subject site.

In this regard, excess drainage from the subject site will be directed into the same system. That is, the runoff will be circulated in the ORIA network, and the existing pipe structure will be used as the discharge point for the development.

In order to manage the discharge of water into the ORIA drainage network, KCC intends to construct a stormwater settlement pond which will provide a source of water for dust management during the ginning season. This will also provide a secondary source of water as the development will have direct access to ORIA water. The purpose of the detention pond is to capture silt and other organic debris that may be contained in stormwater, prior to being released under controlled conditions.

Civil design work is yet to be undertaken for the subject site and therefore no preliminary calculations are available to determine the volume of fill needed from the retention/detention ponds to be constructed on this site. Preliminary pond capacity will therefore be adopted for a 10% annual exceedance probability storm event. The by-wash will need to carry a peak discharge of 2.05 cubic metres per second and the pond capacity will need to be a minimum of 16.42 megalitres.

Refer to **Attachment 5 – Stormwater Assessment.**

6.3 DUST / AIR QUALITY MANAGEMENT

An Air Quality Assessment has been undertaken by SMK Consultants to identify the likely impact of air emissions during construction and operation of the cotton gin facility. The impacts assessed include dust emissions from the cotton ginning process and dust generated by internal traffic during construction and operations.

It is anticipated that a large portion of the dust will be generated by the gin cyclones as part of the ginning process and dust from internal traffic and bare earth areas. In this regard, it is noted that cyclones are an essential part of the cotton ginning operations.

Below is a summary of the proposed mitigation measures for the two (2) main sources of dust emissions being, traffic and module areas, and operation emissions.

6.3.1 TRAFFIC AND MODULE AREAS

As outlined above, potential sources of dust within the facility would consist of vehicle movements generating road dust and wind erosion from bare earth or gravel. These activities involve:

- Construction traffic accessing the site for civil construction works and delivery of ginning equipment and buildings;
- Inbound and outbound road train movements occurring daily with the transfer of cotton modules from trucks to cotton storage pads during the ginning seasons;
- Front-end loaders or moon buggies;
- Trucks hauling ginned cotton and cotton seed from the site; and
- Staff vehicle movements.

With respect to the traffic areas, the internal haul roads will not be sealed, but consist of gravel pavements. Module areas where trucks are loaded, including the cotton bale and seed sheds, will be concreated or bitumen sealed to ensure stability.

As part of the standard daily operations, a watering truck will be used to wet the regularly used access roads to avoid dust and potential traffic conflict and minimise road dust emissions. Another dust mitigation measure to reduce road dust emissions includes having trucks stop at another location (before entering a bitumen road from the farm) to drop the dust collected from the cotton gin farms.

6.3.2 COTTON GINNING EMISSIONS

Cotton ginning emissions will consist of air being exhausted from the cotton gin cyclone system. The emissions will generally be limited to lighter dust and some cotton fibres. The dust and cotton materials removed by the cyclones are referred to as “cotton trash”. The cotton trash from the cyclones is augured to the adjoining trash house. The cotton trash is stored in an overhead storage hopper bun and then trucked to the trash storage site. The trash shed is sealed when a truck is loaded to prevent the escape of dust and cotton material.

Furthermore, the cyclone rack is to be located on the northern side of the development to limit the effect of the adjoining building on prevailing winds and dispersion of the emissions.

The assessment of the dust emissions from the ginning process suggests that dust emissions levels for the cyclone system is greater than the screening concentration adopted in the Department of Water and Environmental Regulation (‘DWER’) Guideline – Air Emissions. This assessment is based on preliminary calculations as the final design of the cotton gin emission system is not available at present.

With respect to the above, it is anticipated that a condition will be imposed on the development approval requiring a detailed dust and air quality assessment and management plan be prepared prior to the lodgement of a building permit.

Refer to **Attachment 6 – Dust and Air Quality Assessment.**

6.4 NOISE MANAGEMENT

A Noise Impact Assessment has been undertaken by SMK Consultants on the expected impacts of noise emissions from the proposed processing plant. The assessment considers impacts including the noise generated during construction, traffic noise on internal roads, and noise emissions from the cotton ginning process.

Based on the assessment, potential exceedances may occur when the gin commences operations at 5:00am. The period between 5:00am and 7:00am is deemed as a "night time period" under the *Environmental Protection (Noise) Regulations 1997* (the 'Noise Regulations'). In this regard, the Noise Regulations are largely based on metropolitan working hours, which would generally have residents remaining asleep during this period. This is unlikely to be the case for the subject site given the different work practices in the Kimberley region based on earlier sunrise times and climatic conditions (i.e. residents generally commence work in the Kimberley at sunrise to maximise the working day and to avoid heat issues).

The development will be managed to limit noise emissions during the period of 5:00am and 7:00am when it is intended to allow truck access to the subject site. Mitigation measures include:

- Limiting speed or trucks to less than 20 km/h;
- Avoid all revving;
- No exhaust brakes to be used onsite;
- All trucks and equipment to use selected roads at an acceptable distance from noise receptors by remaining on the southern internal road loop;
- Obtain round bales from the closest module bays during the hours of 7:00pm – 7:00am; and
- Maintain internal roads in a smooth condition to avoid excess noise from trucks travelling empty.

With respect to the ginning operations, most equipment will be housed within the gin building. The exception to this, is the fan bay and the cyclone / dust management system which is proposed to be located on the north side of the gin building. The gin will be operated with closed doors to minimise dust or other contaminants from the internal ginning equipment.

Notwithstanding, the specific noise emission identified to cause potential exceedances is the noise generated from the fan bay and dust management system of cyclones. Based on the data available and calculations undertaken using standard noise attenuation equations, the cotton ginning operation will need to adopt specific noise mitigation measures to be compliant.

As outlined within the Noise Assessment, it is recommended that a 3m high earth bund located at a distance of 100m from Receptor 3 and Receptor 4 be implemented to achieve the required noise attenuation.

It is anticipated that the implementation of the earth bund as recommended would also be suitably conditioned prior to the commencement of construction.

Refer to **Attachment 7 – Noise Impact Assessment.**

7. TRAFFIC CONSIDERATIONS

A Transport Impact Assessment ('TIA') has been prepared in support of the facility in accordance with the Western Australian Planning Commission ('WAPC') TIA Guidelines. The following is an extract from the report and summarises conclusions drawn from the TIA:

- *Traffic hauling cotton to the proposed facility will replace existing vehicle movements for haulage of product from the existing irrigation farms as cotton cropping replaces some other crops;*
- *The imposition of a truck driver code of conduct and regulations directing trucks to main sealed roads will reduce the impact on local roads where possible;*
- *Traffic frequency to and from the subject site will be limited to the ability of the weighbridge to process each truck as it arrives and as it leaves. The impact of four (4) trucks in and out per hour is considered to have a limited impact on traffic volume on Weaber Plain Road or other local roads, in relation to both road safety and road impacts.*
- *No trucks will use Mulligans Lagoon Road;*
- *The facility will utilise an existing intersection which has been designed and currently utilised by A-Triple trucks which is the largest truck size anticipated for use by the development; and*
- *Management of internal traffic is the subject of regulations.*

Overall, the impact of the proposed development upon the road network is considered minimal and the road network that has been developed for servicing the ORIA has been planned for extensive traffic generated from farm production. The traffic generated by the proposed development is therefore not considered to pose a significant risk to the amenity, safety, functionality or accessibility of the wider region.

Refer to **Attachment 8 – Traffic Impact Assessment.**

8. SUMMARY AND CONCLUSION

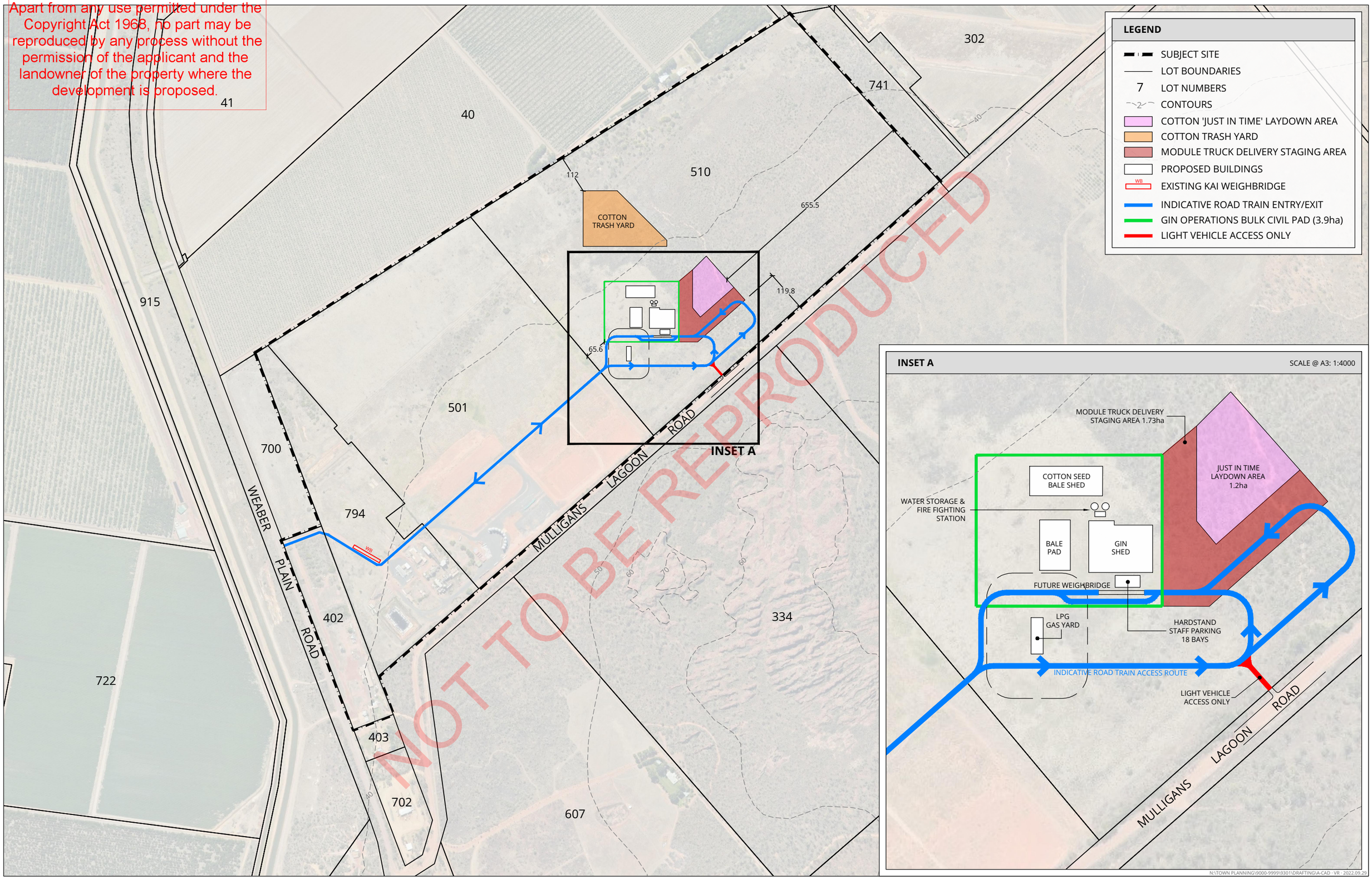
Development approval is sought for a proposed cotton gin processing facility at Lot 501 (No. 131) Mulligans Lagoon Road, Lot 510 (on Deposited Plan 421305), Lot 402 (on Deposited Plan 423057) and Lot 794 (on Deposited Plan 28988), Kununarra (the 'subject site'). As outlined within this report, the development and operations are to be undertaken on Lot 510 only, and Lots 501, 402 and 794 are required to provide access to the development.

The proposed development of a cotton gin processing facility at the subject site is considered appropriate and justified for the following reasons:

- The cotton gin processing facility ('Industry – Primary Production' use) accords with the objectives of the 'Agriculture – State and Regional Significance' Zone as contained in LPS 9.
- The proposal is compliant with, or has adequately justified variations to, the applicable development standards for the land use of 'Industry – Primary Production' (under the provisions of LPS 9).
- A Stormwater Management Plan has been prepared to address the construction and ongoing operational phases of the proposed development.
- Waste generated by the proposal, and the associated waste management measures that will be implemented for the processing facility, have been addressed.
- A Noise Assessment has been undertaken and the assessment has concluded that the expected noise emissions from the proposal can be managed in accordance with the *Environmental Protection (Noise) Regulations 1997*.
- A Transport Impact Assessment has been prepared for the proposal. No traffic safety issues have been identified in the TIA in relation to the proposed development, the nature of the vehicles proposed or access/egress to the subject site.

DEVELOPMENT APPLICATION PLANS

ROWE GROUP



SITE PLAN

VARIOUS LOTS, WEABER PLAIN ROAD AND MULLIGANS LAGOON ROAD
KUNUNURRA

N

0 250 m
SCALE @ A3: 1:10,000

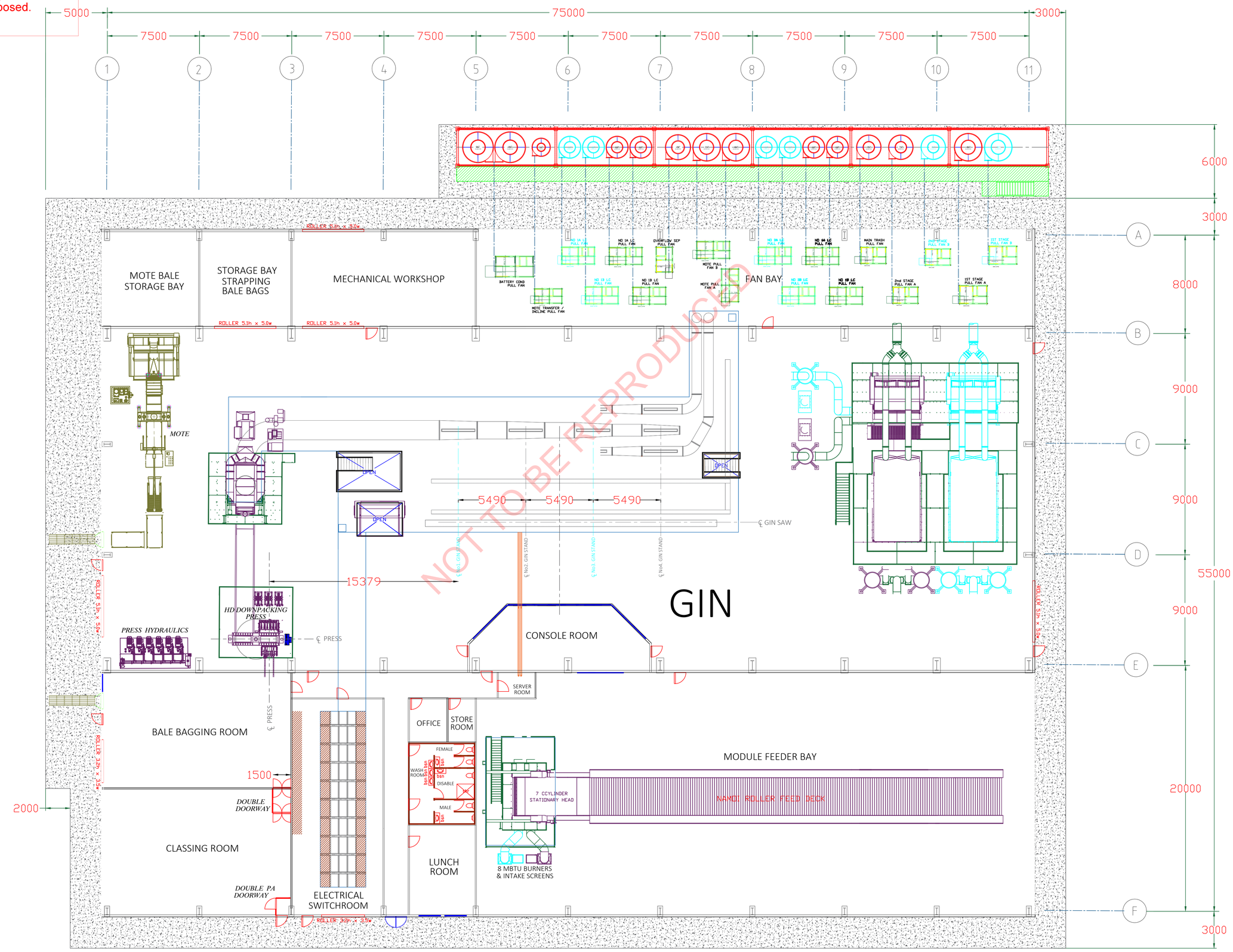
9301-FIG-03-F

DRAWN: VR
DATE CREATED: 2022.09.29
PROJECTION: MGA51 GDA94
CADASTRE: LANDGATE

ROWE GROUP

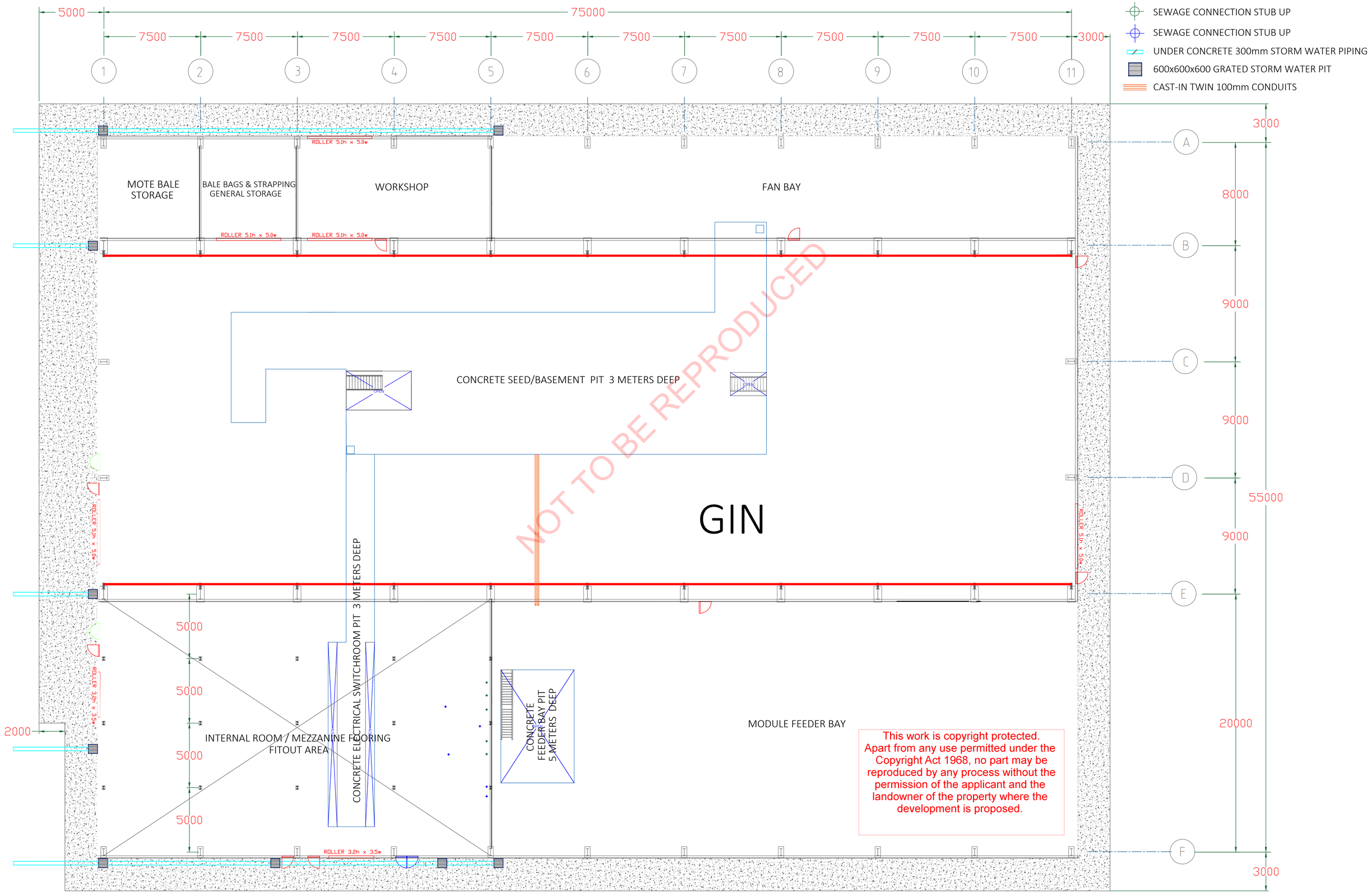
KCC PROJECT

CONCEPT GIN BUILDING LAYOUT REV1 16-03-2022
[2 LESS 1] LUMMUS TWO STAGE 12' DRYING & PRECLEANING LINES
[4 LESS 2] LUMMUS 170-SAW PLANT LINES WITH TANDEM 108 SENTINEL LINT CLEANING



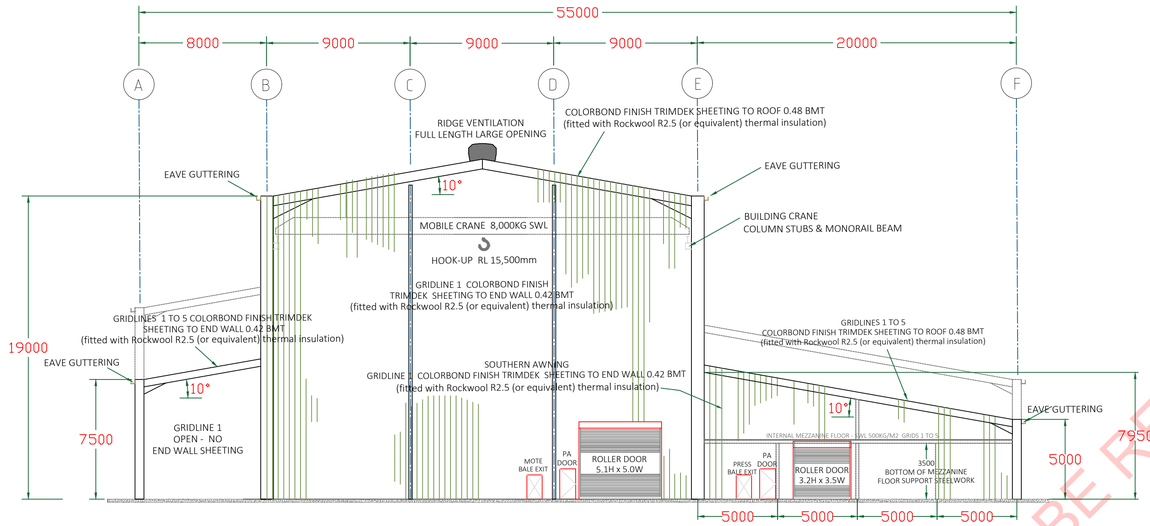
KCC PROJECT

CONCEPT GIN BUILDING LAYOUT REV1 16-03-2022
[2 LESS 1] LUMMUS TWO STAGE 12' DRYING & PRECLEANING LINES
[4 LESS 2] LUMMUS 170-SAW PLANT LINES WITH TANDEM 108 SENTINEL LINT CLEANING

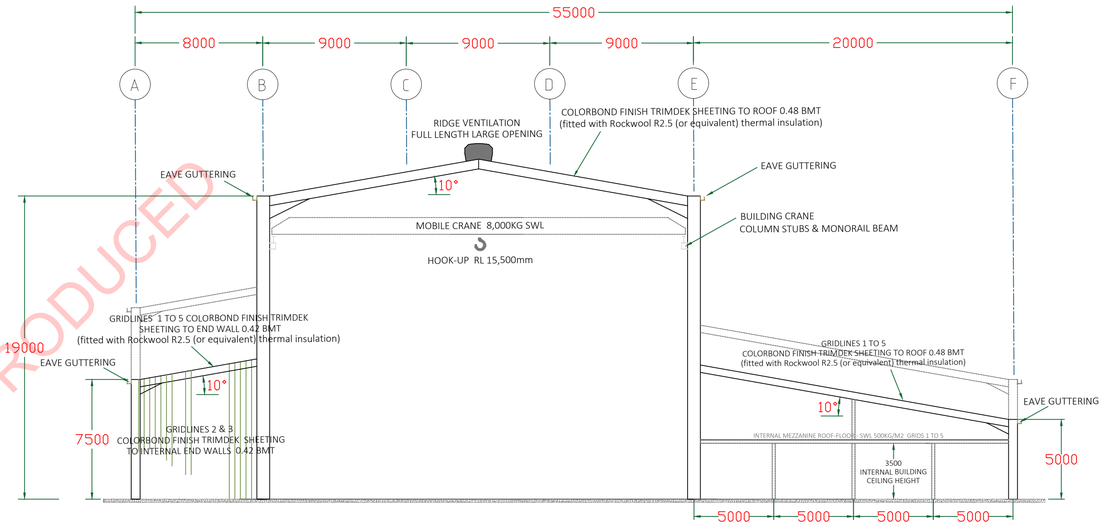


KCC PROJECT

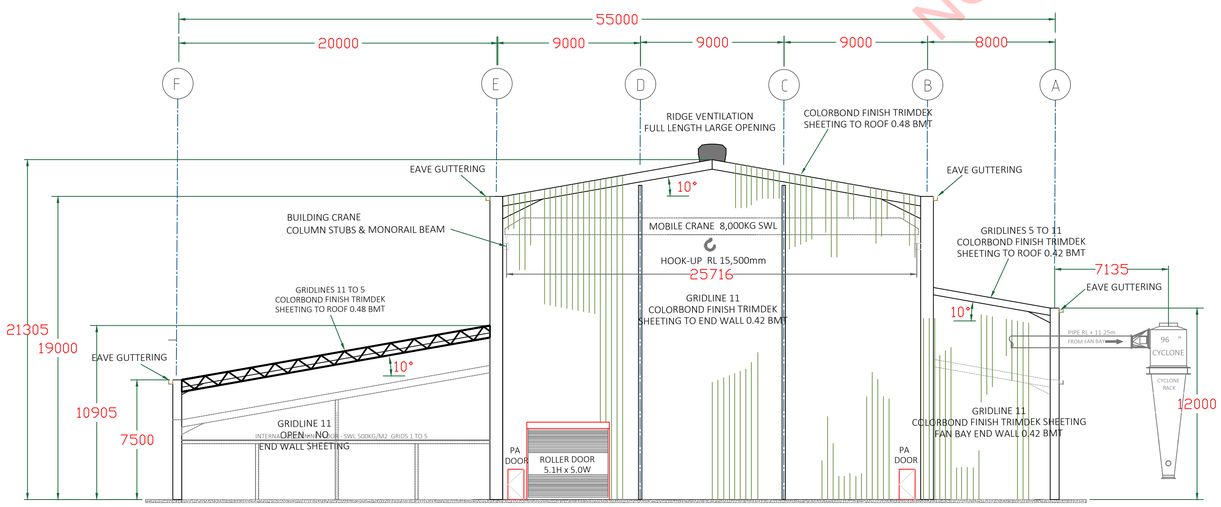
CONCEPT GIN BUILDING LAYOUT REV1 16-03-2022
[2 LESS 1] LUMMUS TWO STAGE 12' DRYING & PRECLEANING LINES
[4 LESS 2] LUMMUS 170-SAW PLANT LINES WITH TANDEM 108 SENTINEL LINT CLEANING



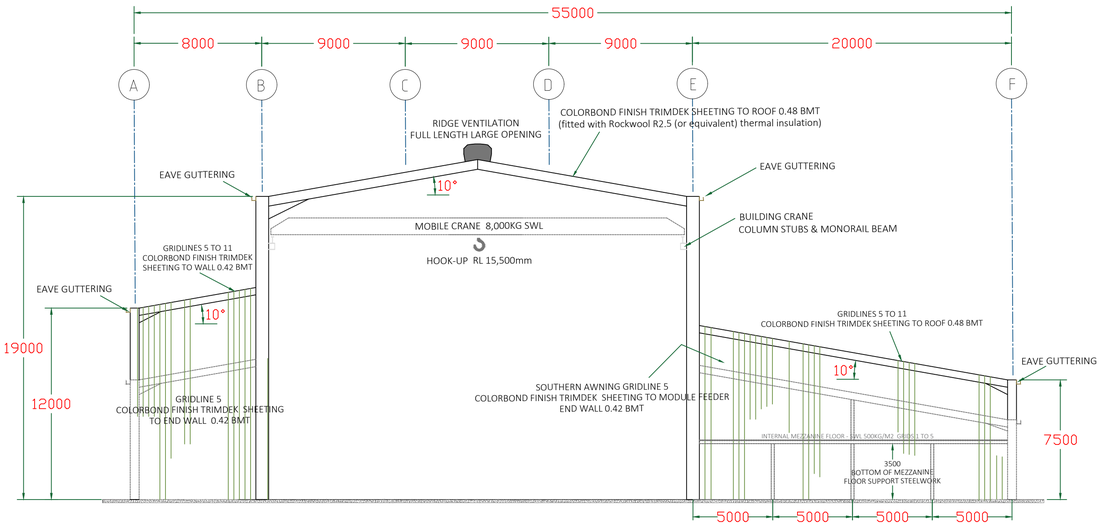
GIN BUILDING WESTERN ELEVATION GRID LINE 1



GIN BUILDING WESTERN ELEVATION GRID LINES 2 & 3



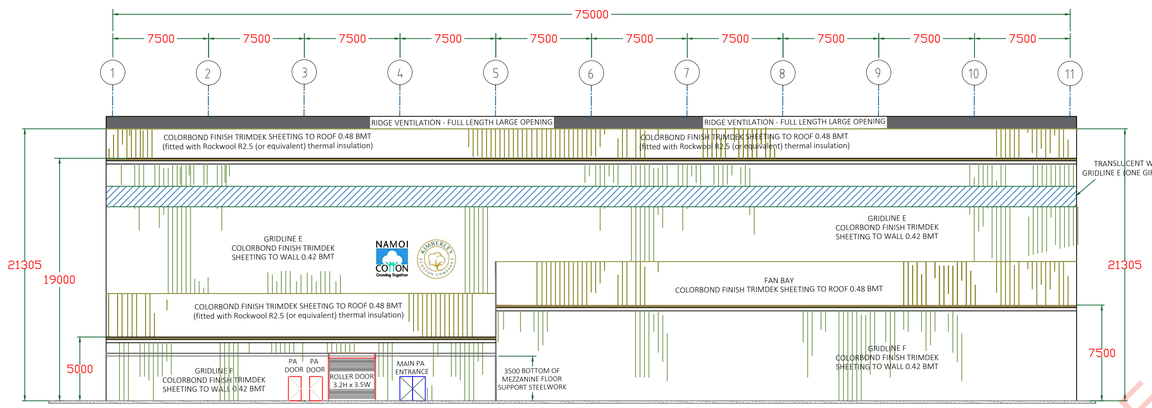
GIN BUILDING EASTERN ELEVATION GRID LINE 11



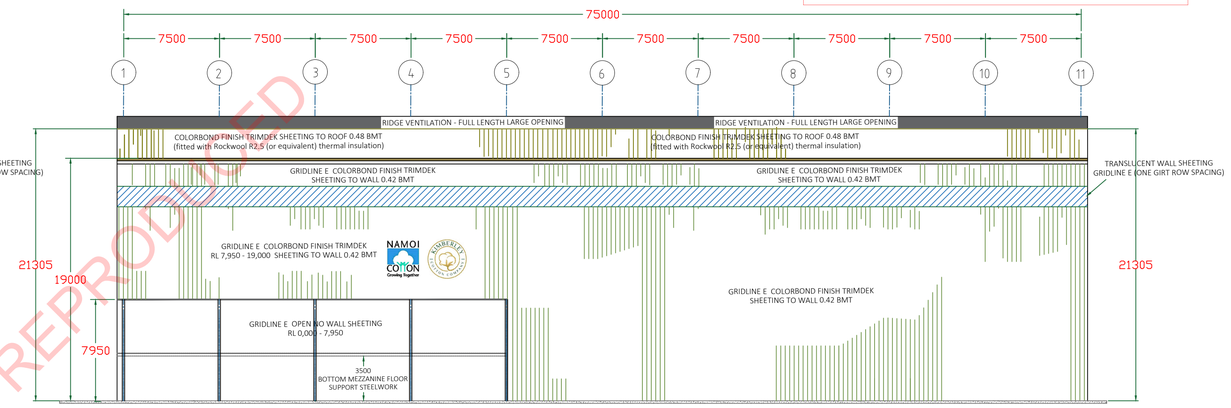
GIN BUILDING WESTERN ELEVATION GRID LINE 5

KCC PROJECT

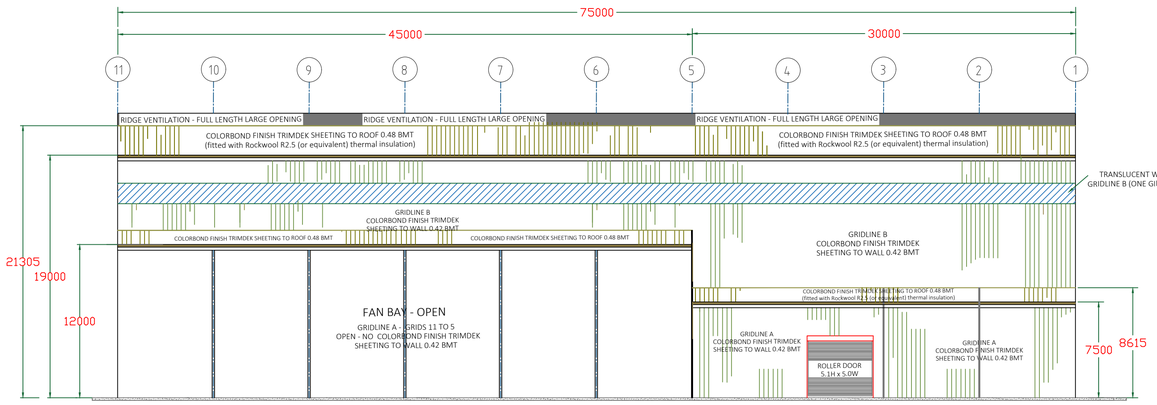
CONCEPT GIN BUILDING LAYOUT REV1 16-03-2022
[2 LESS 1] LUMMUS TWO STAGE 12' DRYING & PRECLEANING LINES
[4 LESS 2] LUMMUS 170-SAW PLANT LINES WITH TANDEM 108 SENTINEL LINT CLEANING



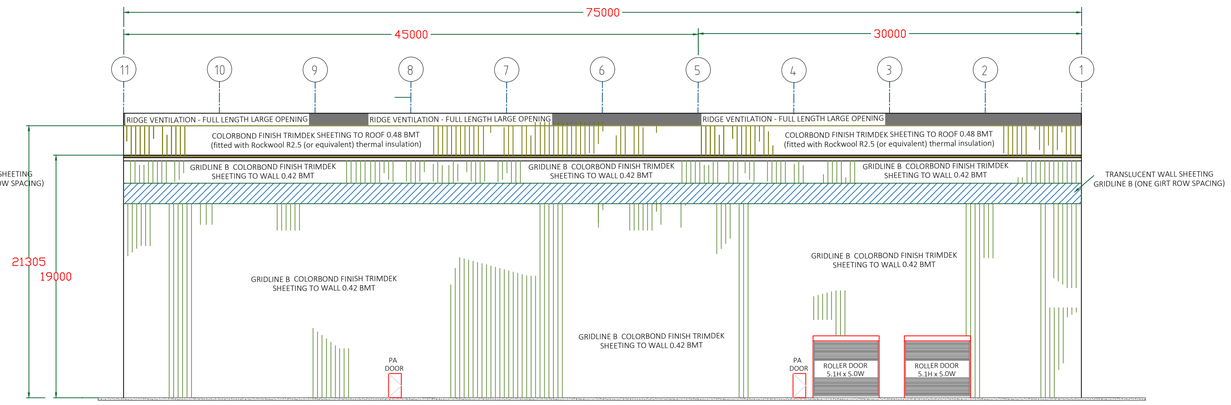
GIN BUILDING SOUTHERN ELEVATION GRID LINE F



GIN BUILDING SOUTHERN ELEVATION GRID LINE E



GIN BUILDING NORTHERN ELEVATION GRID LINE A



GIN BUILDING NORTHERN ELEVATION GRID LINE B

KCC PROJECT

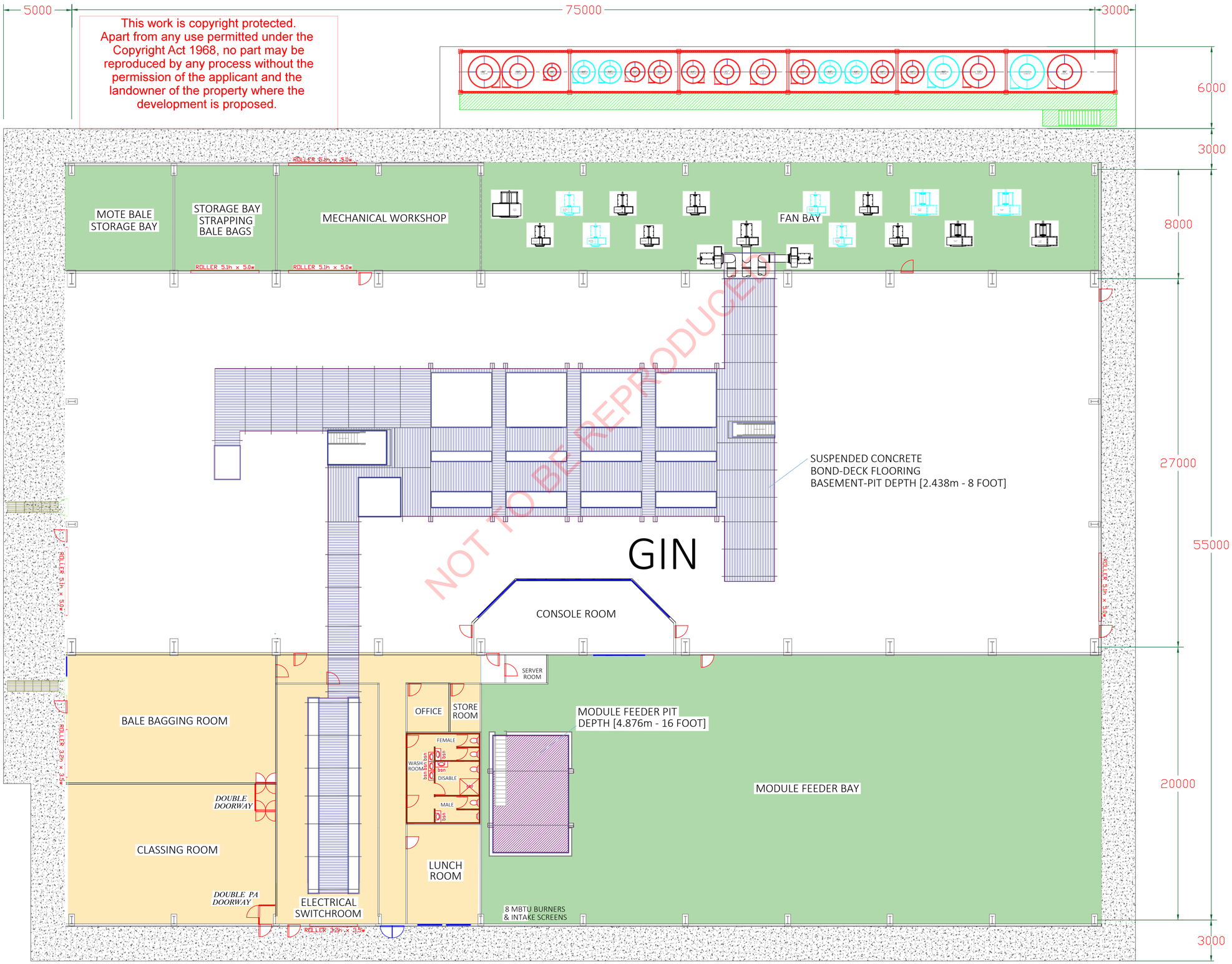
CONCEPT GIN BUILDING LAYOUT REV1 16-03-2022
[2 LESS 1] LUMMUS TWO STAGE 12' DRYING & PRECLEANING LINES
[4 LESS 2] LUMMUS 170-SAW PLANT LINES WITH TANDEM 108 SENTINEL LINT CLEANING

GIN BUILDING [4 LESS 2] LUMMUS 170-SAW PLANT LAYOUT - BUILDING DOORWAY SCHEDULE

DOOR DESCRIPTION	LOCATION AREA	PLACEMENT	No. Of.
ROLLER DOORWAY OPENING SIZE (5.1m H x 5.0m W) Colorbond Finish - colour same as wall sheeting Lockable all keyed alike Total No. Of. (x5) Heavy duty industrial, robust and of high quality. Opening & Closing by manual operated planetary geared chain drive.	Workshop - External Building Access	Grid 'A', placement C/L 3.4 meters East of Grid '3'	x (1)
	Workshop - Internal Building Access	Grid 'B', placement C/L 3.4 meters East of Grid '3'	x (1)
	Bags & Straps Storage Bay	Grid 'B', placement C/L 3.75 meters East of Grid '2'	x (1)
	Main Gin Building Western Wall	Grid '1', placement C/L 4.15 meters South of Grid 'D'	x (1)
	Main Gin Building Eastern Wall	Grid '11', placement C/L 4.5 meters North of Grid 'E'	x (1)
ROLLER DOORWAY OPENING SIZE (3.2m H x 3.5m W) Colorbond Finish - colour same as wall sheeting Lockable all keyed alike Total No. Of. (x2) Heavy duty industrial, robust and of high quality. Opening & Closing by manual operated planetary geared chain drive.	Press Bagging Room - External Access	Grid '1', placement C/L 7.79 meters South of Grid 'E'	x (1)
	Electrical Switchroom - External Access	Grid 'F', placement C/L 3.3 meters West of Grid '4'	x (1)
			x (1)
			x (1)
PA DOORWAY - EMERGENCY EXITS Door Size (940mm W x 2040mm H) BCA compliance as an emergency exit doors. Steel Construction, Colorbond Finish - colour same as wall sheeting Lockable from outside only Opening mechanism - Lever handle Single Handed downward action, no key/locking on the Egress (inside) of door permissible to prevent emergency exit Total No. Of. (x8)	Workshop Bay	Grid 'B', placement C/L 1.0 meters West of Grid '4'	x (1)
	Gin Building	Grid 'B', placement C/L 1.0 meters East of Grid '8'	x (1)
	Gin Building	Grid '1', placement C/L 0.85 meters South of Grid D	x (1)
	Gin Building	Grid '1', placement C/L 4.38 meters South of Grid E	x (1)
	Gin Building	Grid '11', placement C/L 1.25 meters South of Grid 'B'	x (1)
	Gin Building	Grid '11', placement C/L 1.25 meters North of Grid 'E'	x (1)
	Gin Building	Grid 'E', placement C/L 1.65 meters East of Grid '7'	x (1)
	Classing Room Southern External Wall	Grid 'F', placement C/L 1.0 meters West of Grid '3'	x (1)
	Electrical Switchroom - Southern External End Wall	Grid 'F', placement C/L 1.25 meters East of Grid '3'	x (1)
DOUBLE PA DOORWAY OPENING SIZE (2.115m H x 1.805m W) Door Size (1640mm W x 2040mm H) BCA compliance as an emergency exit door. Glass Pane construction Finish-colour same as wall sheeting Lock/Opening mechanism - Single Handed downward action, no key/locking on the Egress (inside) of door permissible to prevent emergency exit Total No. Of. (x1)	Main Gin Building DISABLED ACCESS COMPLIANT	Grid 'F', placement C/L 1.0 meters East of Grid '4'	x (1)
OPENING - BALE EXIT OPENING SIZE (1.8m H x 1.2m W) Colorbond Flashing - colour same as wall sheeting Total No. Of. (x2)	Press Room	Grid '1', placement C/L 2.89 meters South Grid 'E'	x (1)
	Mote Press Area	Grid '1', placement C/L 1.25 meters North of Grid 'D'	x (1)

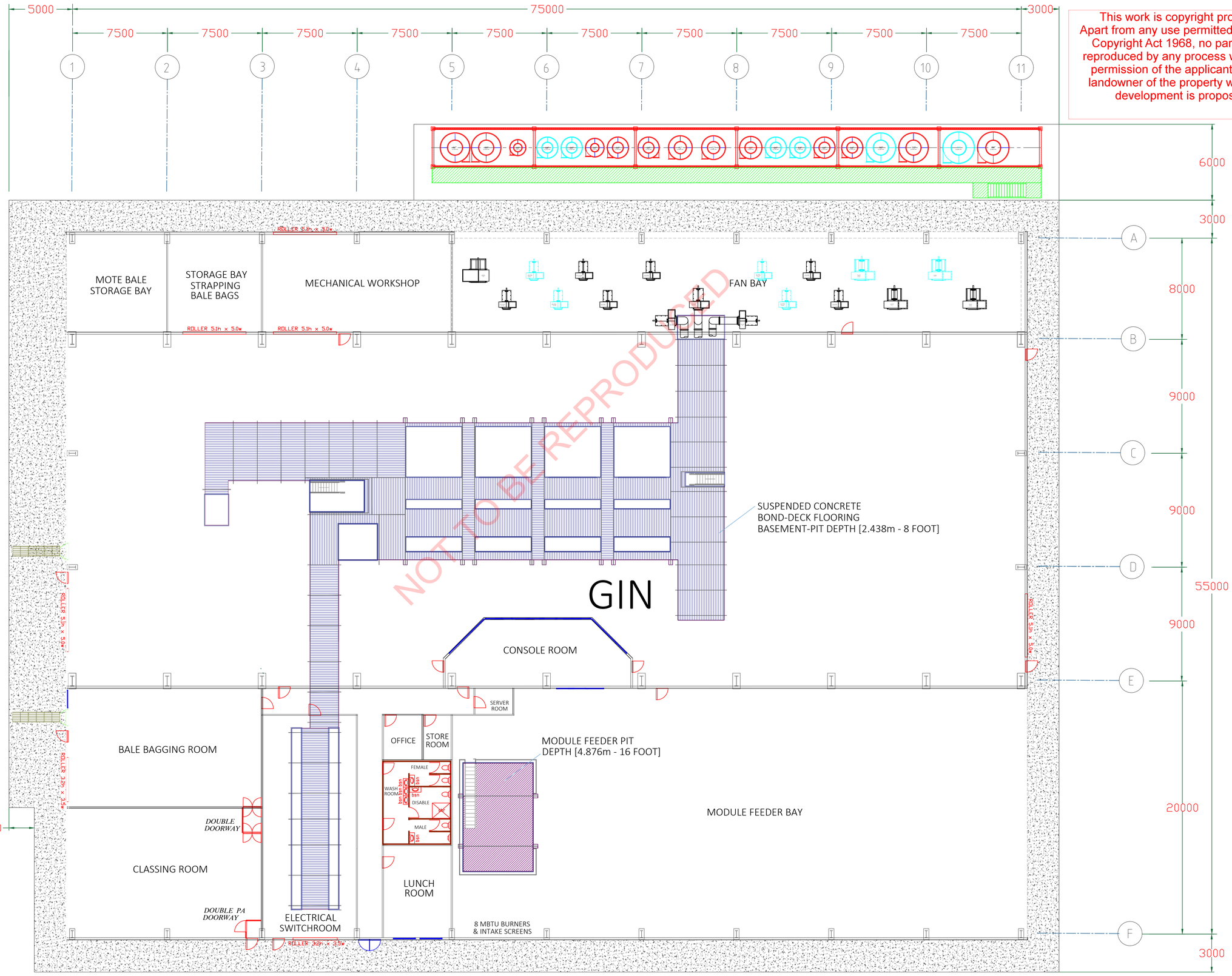
KCC PROJECT

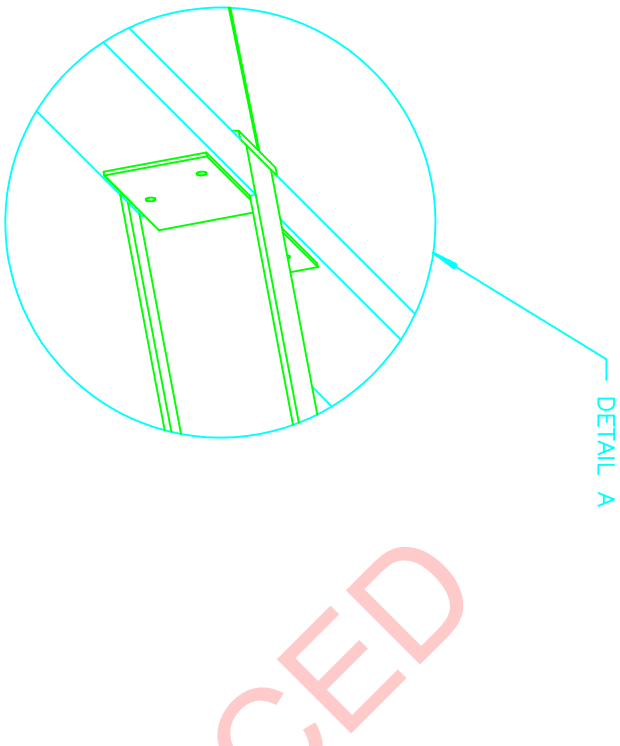
CONCEPT GIN BUILDING LAYOUT REV1 16-03-2022
[2 LESS 1] LUMMUS TWO STAGE 12' DRYING & PRECLEANING LINES
[4 LESS 2] LUMMUS 170-SAW PLANT LINES WITH TANDEM 108 SENTINEL LINT CLEANING

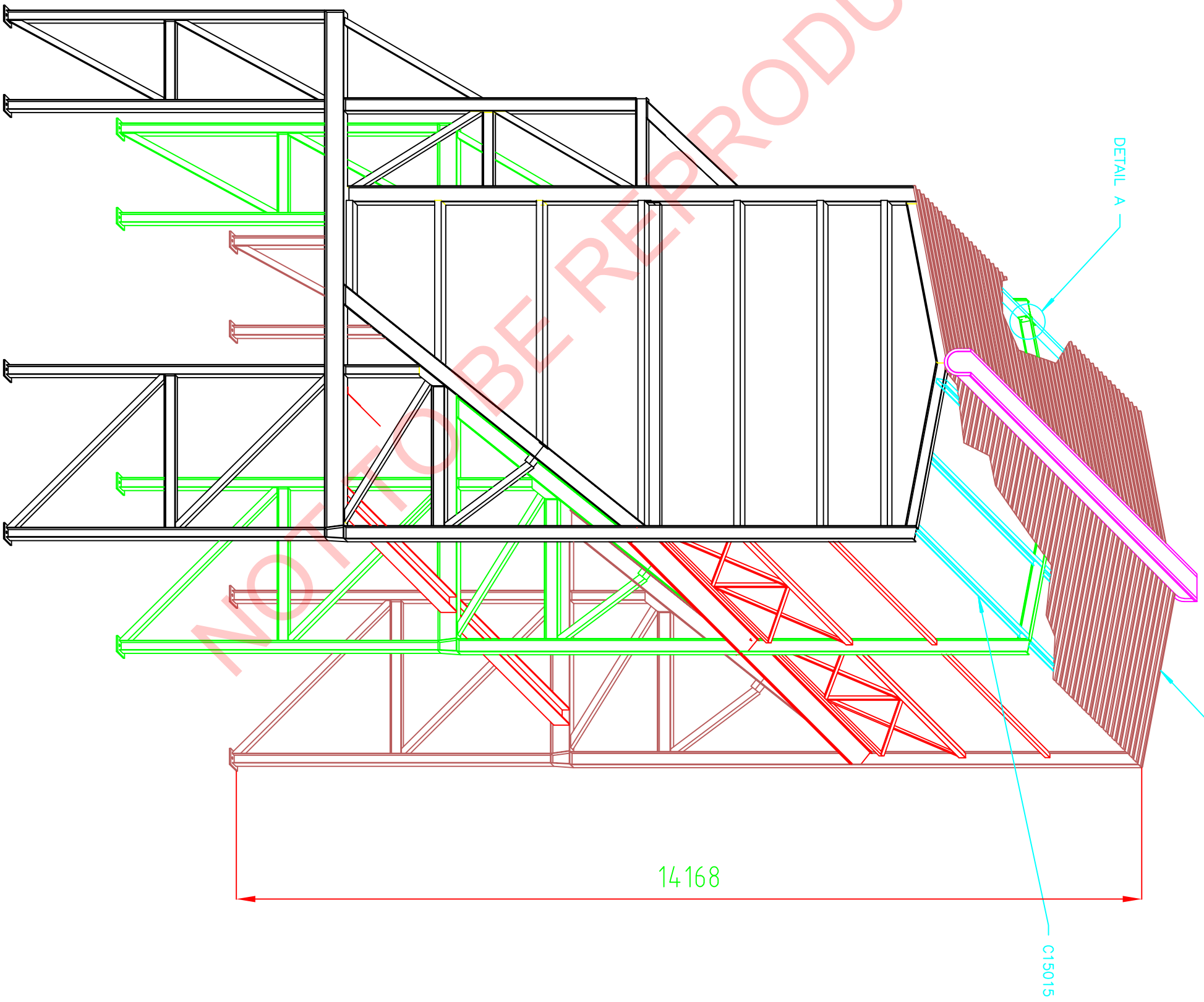


KCC PROJECT

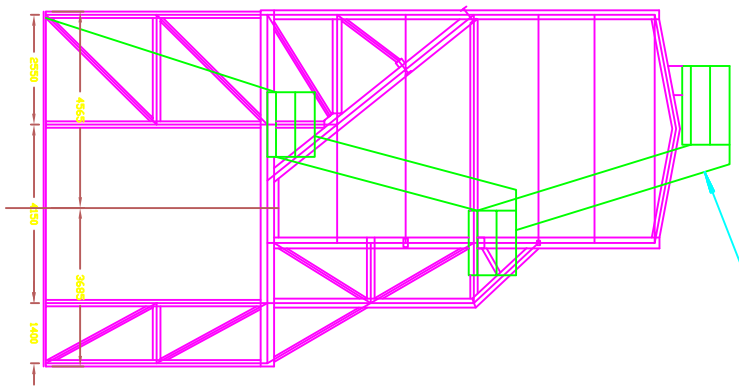
CONCEPT GIN BUILDING LAYOUT REV1 16-03-2022
[2 LESS 1] LUMMUS TWO STAGE 12' DRYING & PRECLEANING LINES
[4 LESS 2] LUMMUS 170-SAW PLANT LINES WITH TANDEM 108 SENTINEL LINT CLEANING







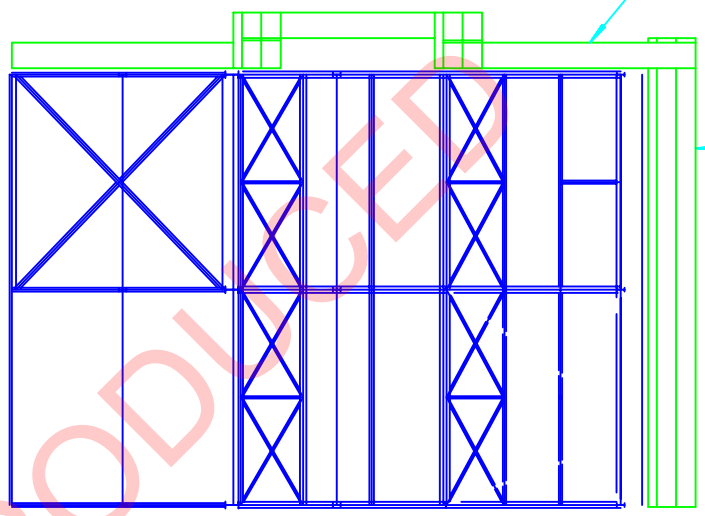
SOUTH ELEVATION.



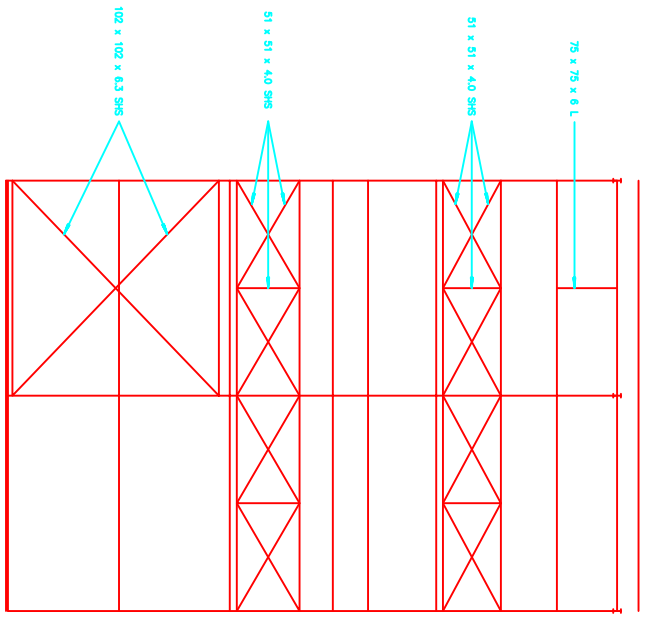
ACCESS LADDER WITH CAGE

RIDGE WALKWAY

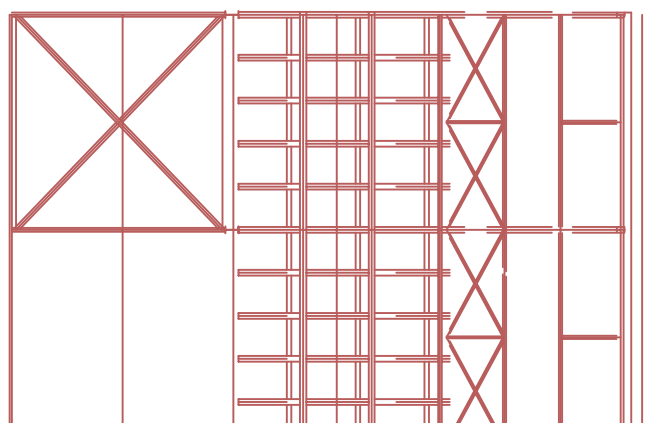
SECTION 1.



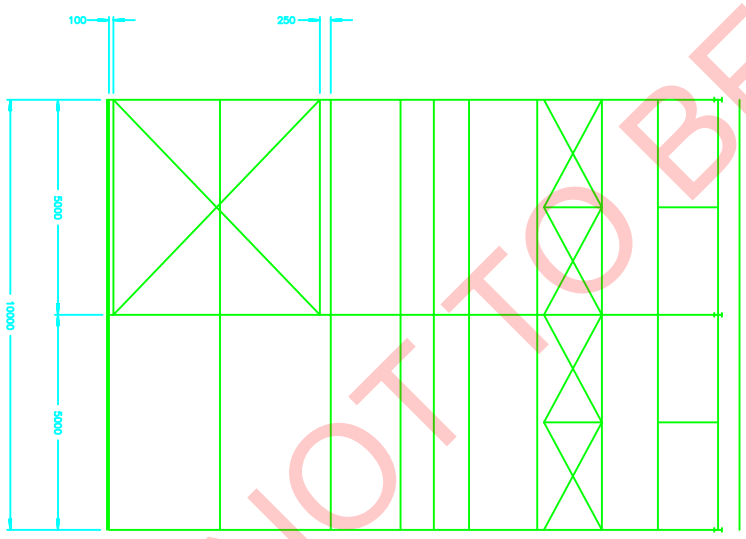
STRUCTURAL [C SECTION 1.



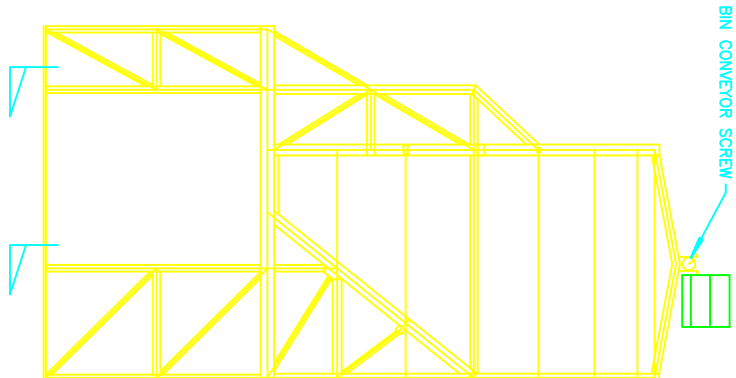
SECTION 2.



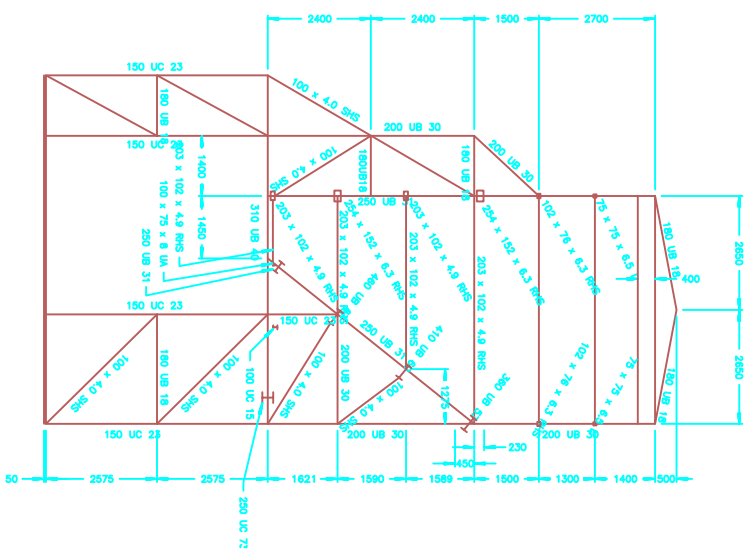
STRUCTURAL [C SECTION 2.

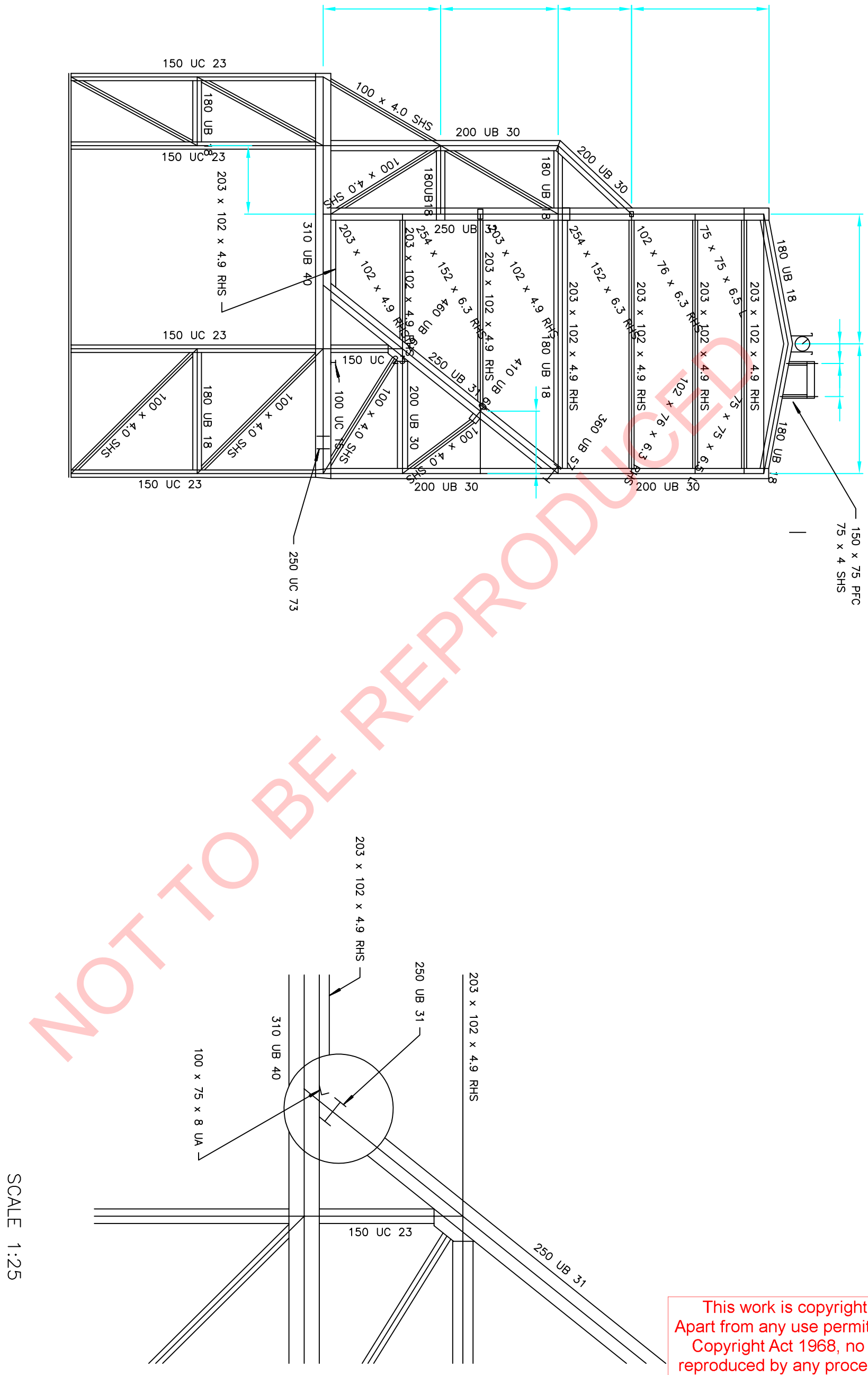


NORTH ELEVATION.

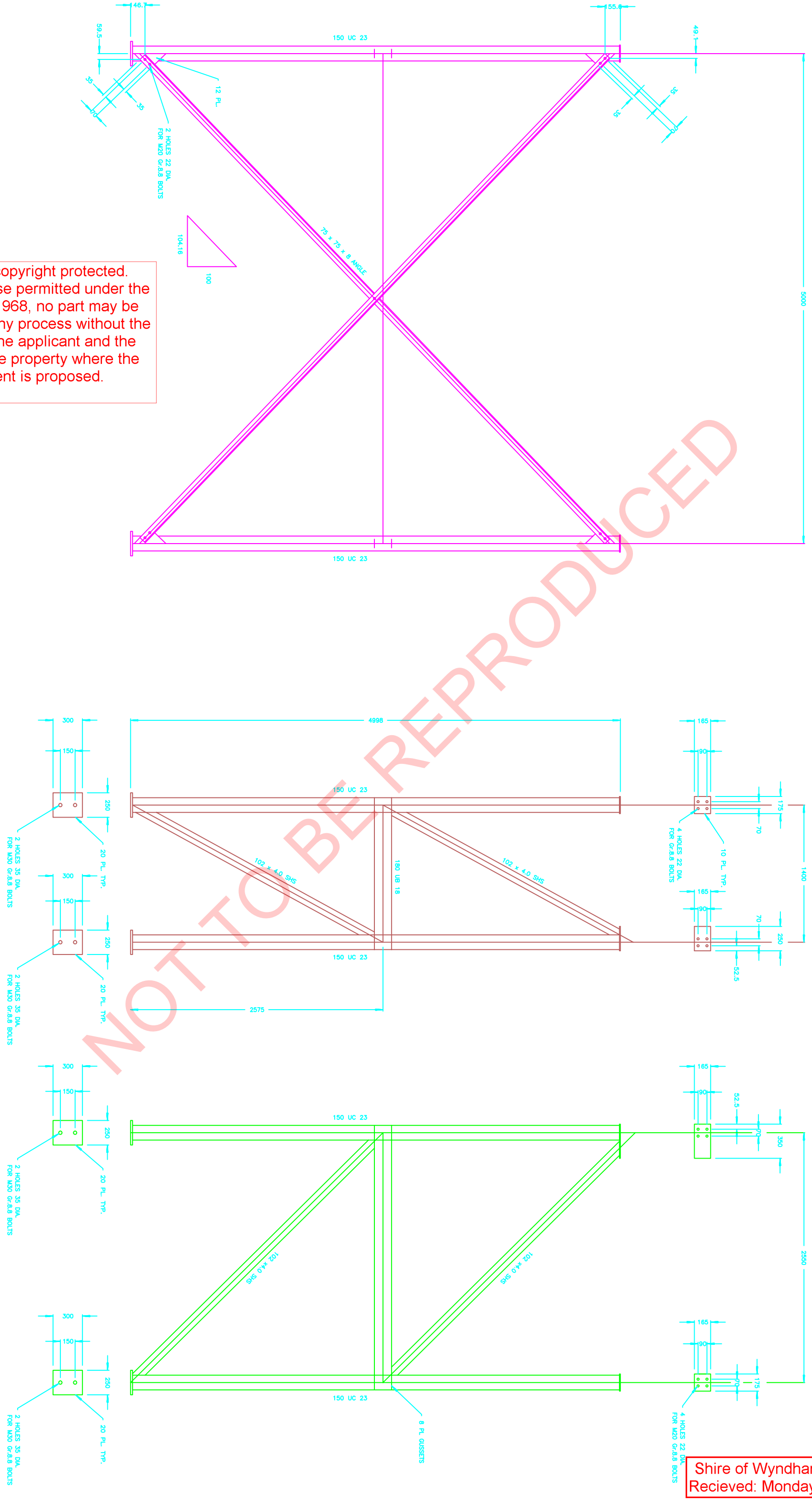


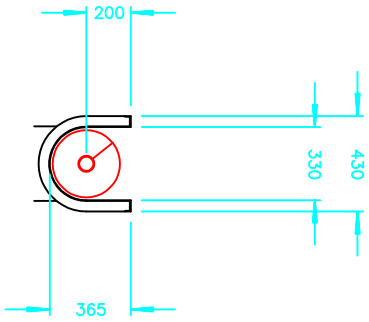
STRUCTURAL [C NORTH ELEVATION.

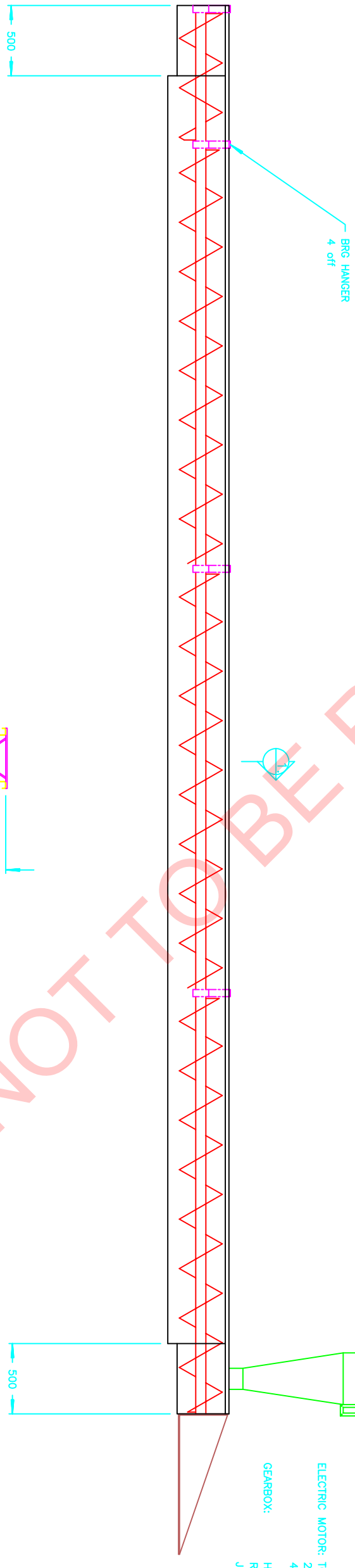


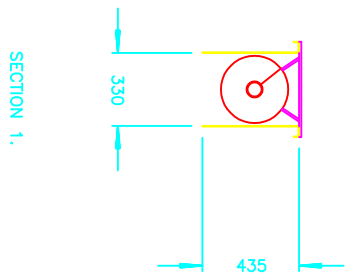


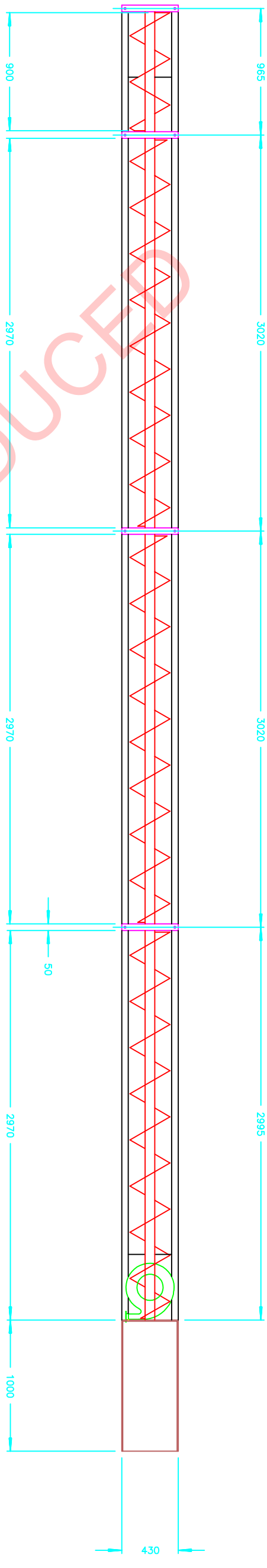
SCALE 1:25

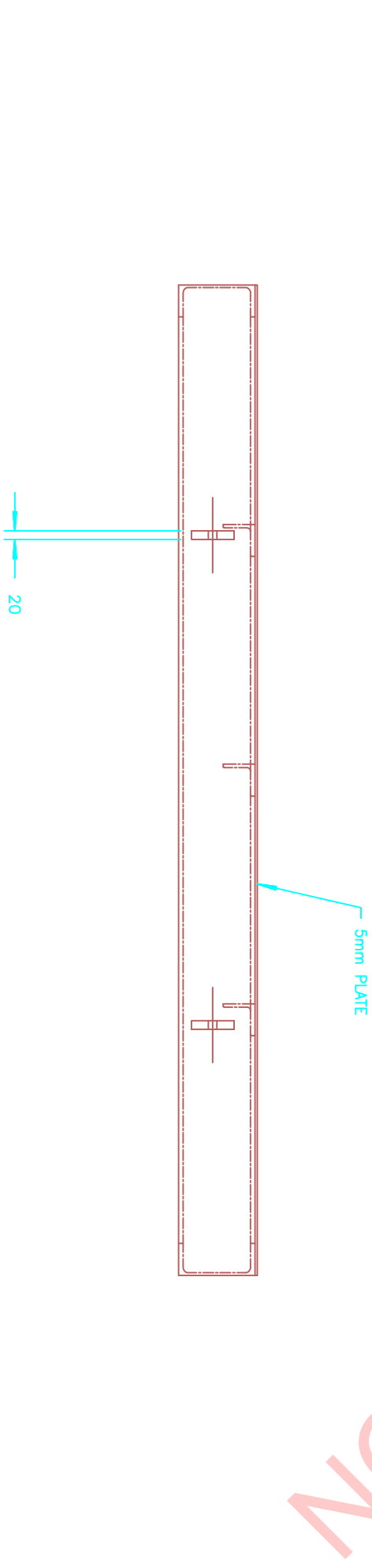


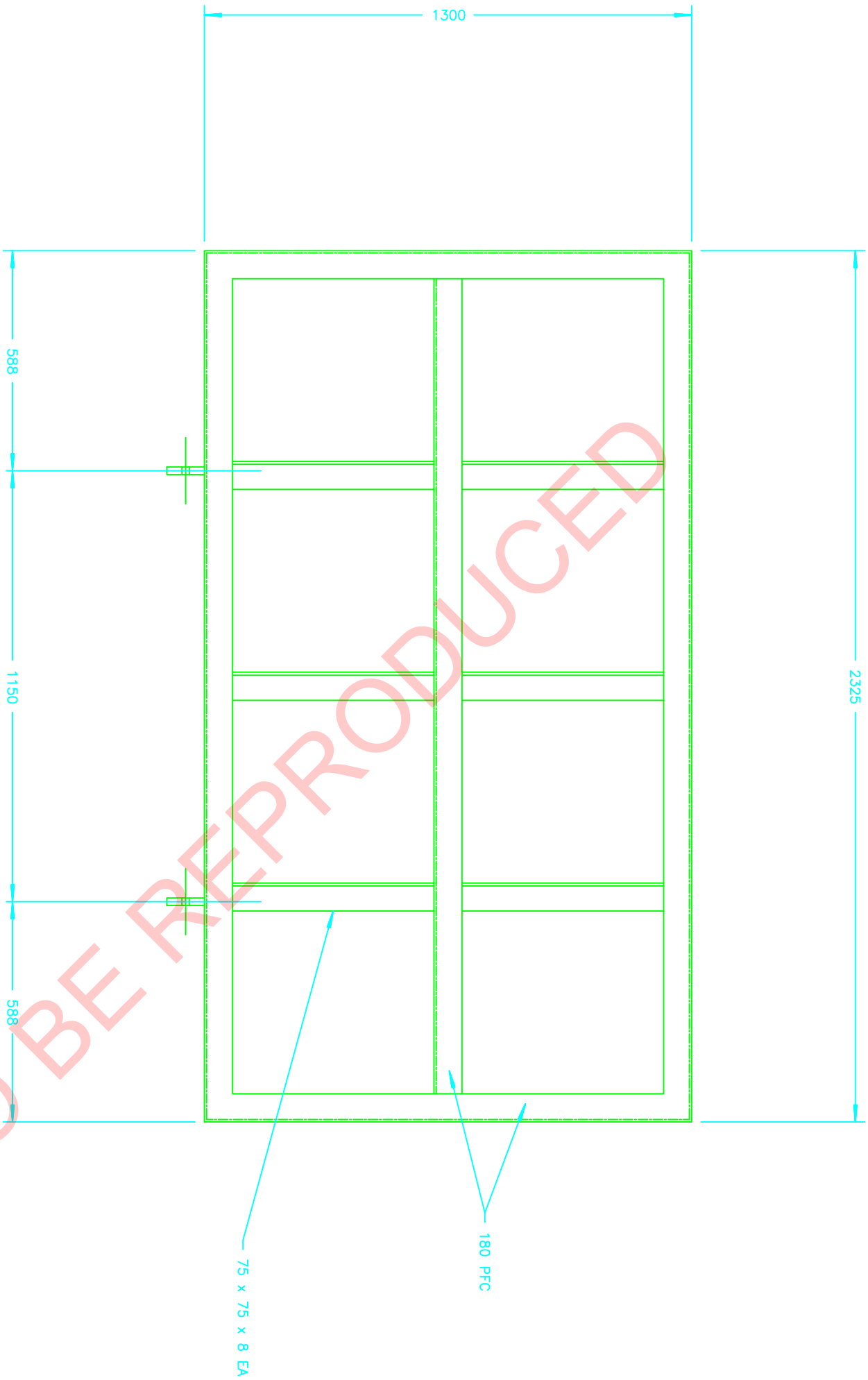


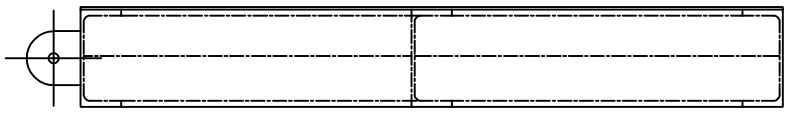


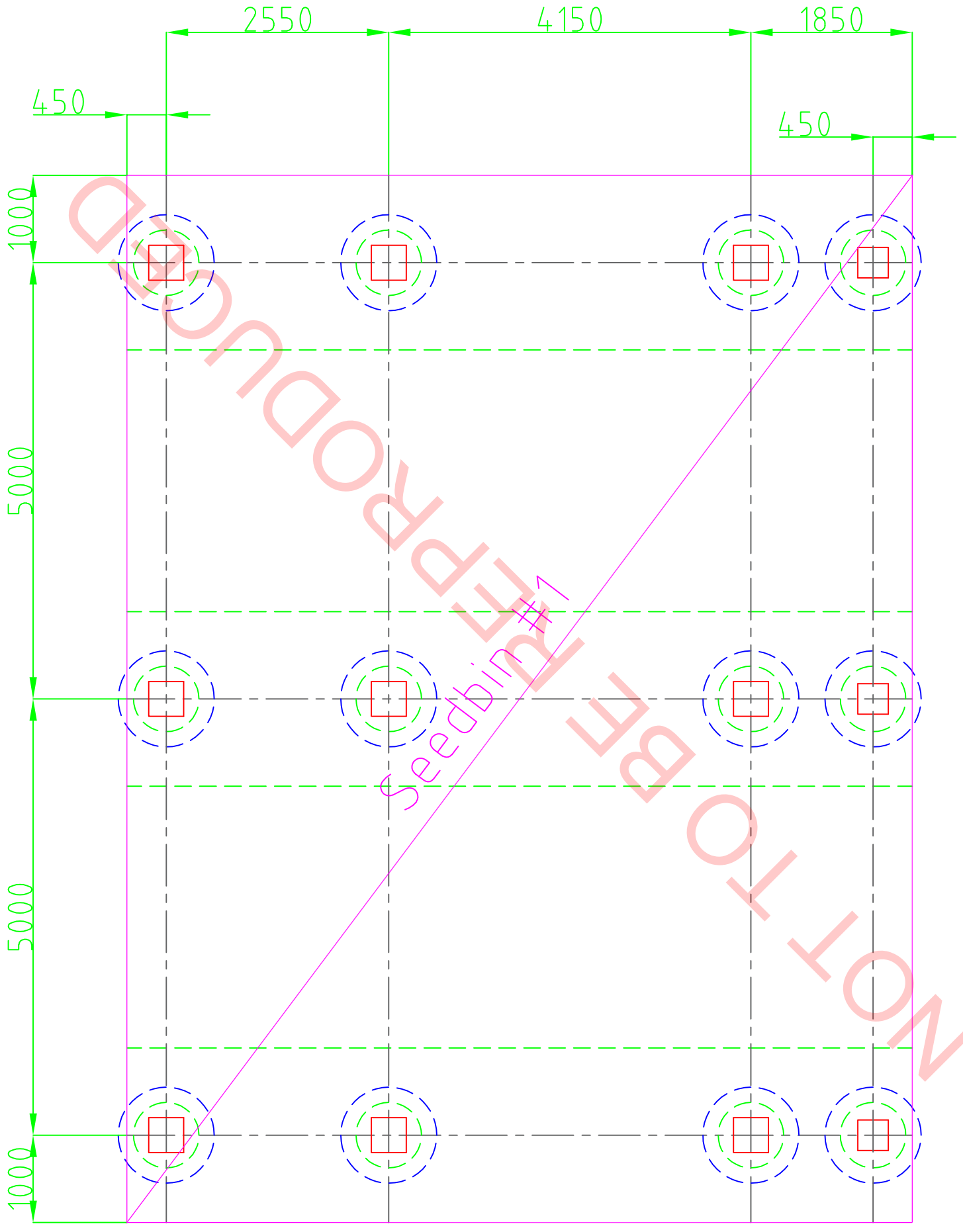












SLAB 150
N32/80/20
F82 TOP AND BOTTOM
25 MIN COVER

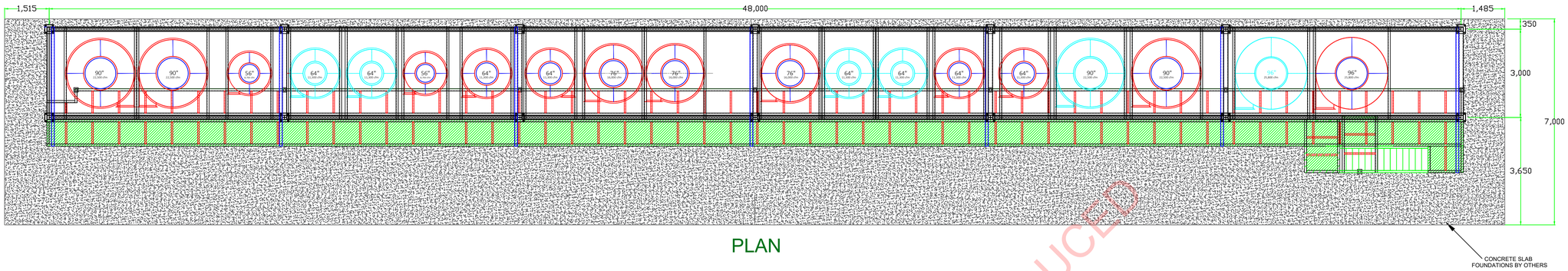
KIMBERLEY COTTON COMPANY

KUNUNURRA COTTON GIN PROJECT

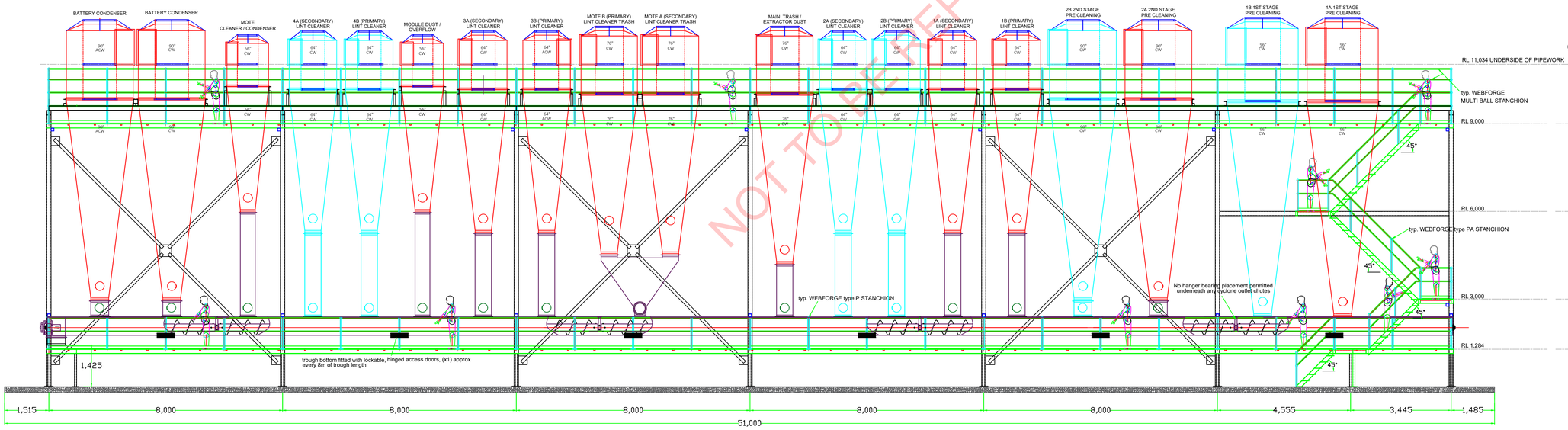
CYCLONE RACK: GENERAL ARRANGEMENT

STAGE #1 CYCLONES

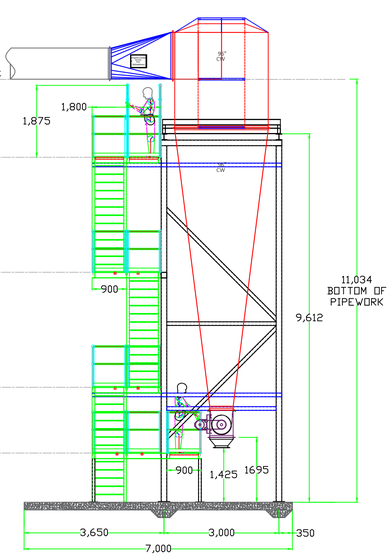
STAGE #2&#3 CYCLONES



PLAN



FRONT (SOUTHERN ELEVATION)

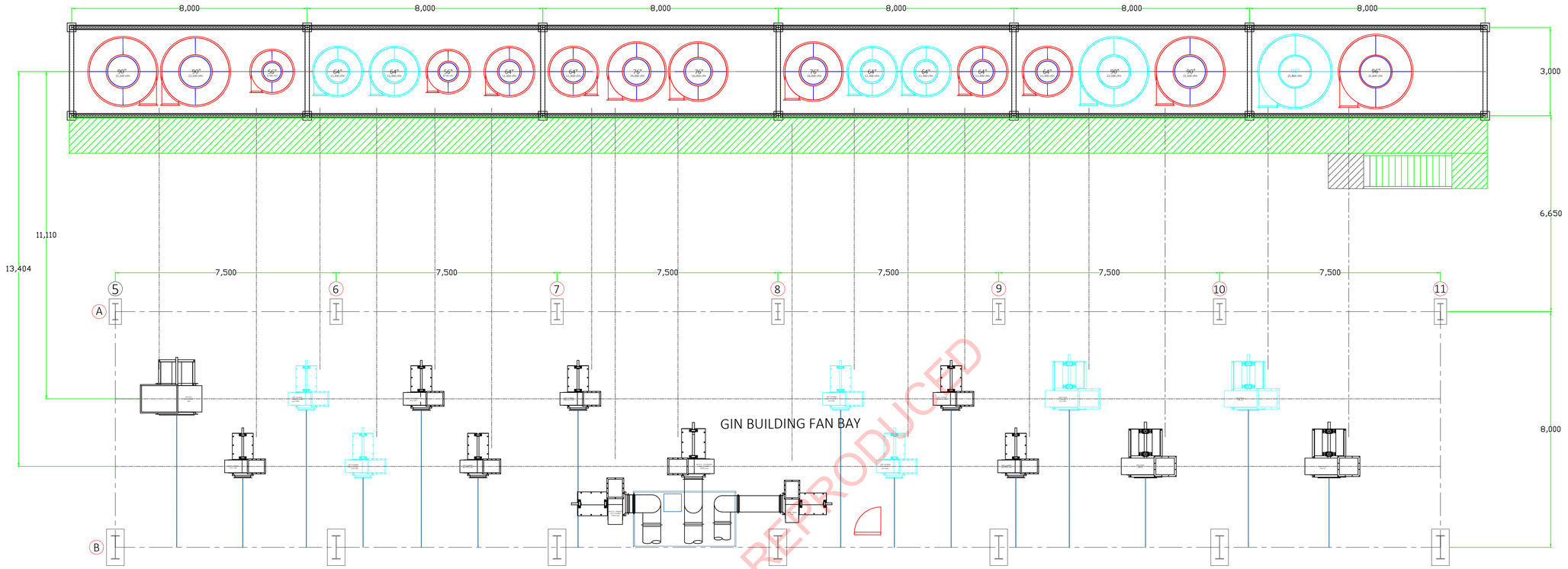


END (EASTERN ELEVATION)

KIMBERLEY COTTON COMPANY

KUNUNURRA COTTON GIN PROJECT

GIN BUILDING FAN BAY TO CYCLONE RACK GA



KCC KUNUNURRA COTTON GIN 12' PRECLEANING LINES, [4 LESS 2] LUMMUS 170-SAW PLANT WITH TANDEM 108 SENTINEL LINT CLEANING

AIRFLOW SPECIFICATIONS FAN & CYCLONE EQUIPMENT LISTING	FAN / AIRFLOW SYSTEM DESCRIPTION	CYCLONE SIZING	SYSTEM AIRFLOW CAPACITY (CFM)
	1st STAGE PULL FAN LINE A	x1 96" DIA. 1D-3D	25,600 CFM
	1st STAGE PULL FAN LINE B	x1 96" DIA. 1D-3D	25,600 CFM
	2nd STAGE PULL FAN LINE A	x1 90" DIA. 1D-3D	22,500 CFM
	2nd STAGE PULL FAN LINE B	x1 90" DIA. 1D-3D	22,500 CFM
	MAIN TRASH/EXTRACTOR DUST PULL FAN	x1 76" DIA. 1D-3D	16,000 CFM
	OVERFLOW/MODULE DUST EXTRACTION PULL FAN	x1 56" DIA. 1D-3D	8,700 CFM
	1A LINT CLEANER PULL FAN	x1 64" DIA. 1D-3D	11,300 CFM
	1 B LINT LINT CLEANER FAN	x1 64" DIA. 1D-3D	11,300 CFM
	2A LINT CLEANER PULL FAN	x1 64" DIA. 1D-3D	11,300 CFM
	2 B LINT LINT CLEANER FAN	x1 64" DIA. 1D-3D	11,300 CFM
	3A LINT CLEANER PULL FAN	x1 64" DIA. 1D-3D	11,300 CFM
	3 B LINT LINT CLEANER FAN	x1 64" DIA. 1D-3D	11,300 CFM
	4A LINT CLEANER PULL FAN	x1 64" DIA. 1D-3D	11,300 CFM
	4B LINT CLEANER PULL FAN	x1 64" DIA. 1D-3D	11,300 CFM
	MOTE A SECONDARY (L/C TRASH) PULL FAN	x1 76" DIA. 1D-3D	16,000 CFM
	MOTE B PRIMARY (L/C TRASH) PULL FAN	x1 76" DIA. 1D-3D	16,000 CFM
	MOTE CLEANER CONDENSER PULL FAN	x1 56" DIA. 1D-3D	8,700 CFM
	BATTERY CONDENSER PULL FAN	x2 90" DIA. 1D-3D	45,000 CFM
	SEED BLOWER LINE (SEED BIN INLOADING)	x1 34" DIA. 1D-3D	3,200 CFM
	SEED BLOWER LINE (SEED SHED INLOADING)	x2 34" DIA. 1D-3D	3,200 CFM
	TRASH HOUSE TRANSFER PULL FAN	x1 46" DIA. 1D-3D	5,800 CFM

N

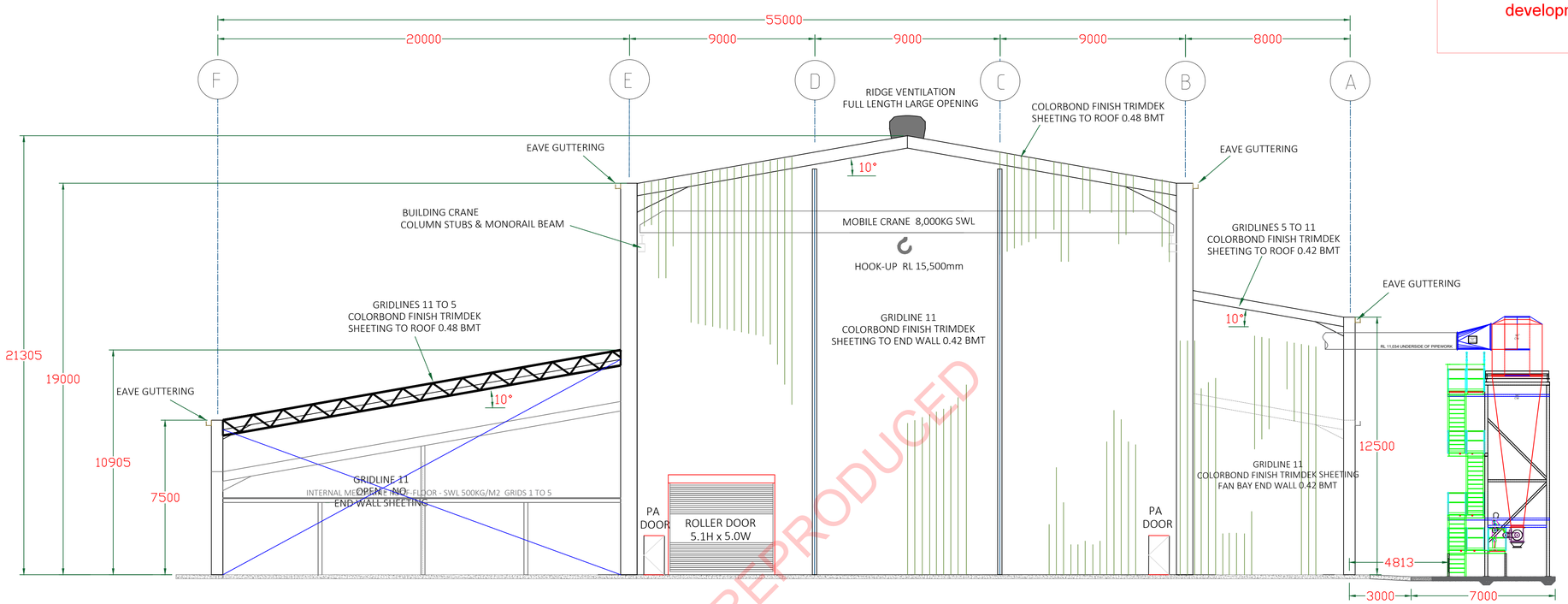
STAGE #1 CYCLONES

STAGE #2&#3 CYCLONES

KIMBERLEY COTTON COMPANY

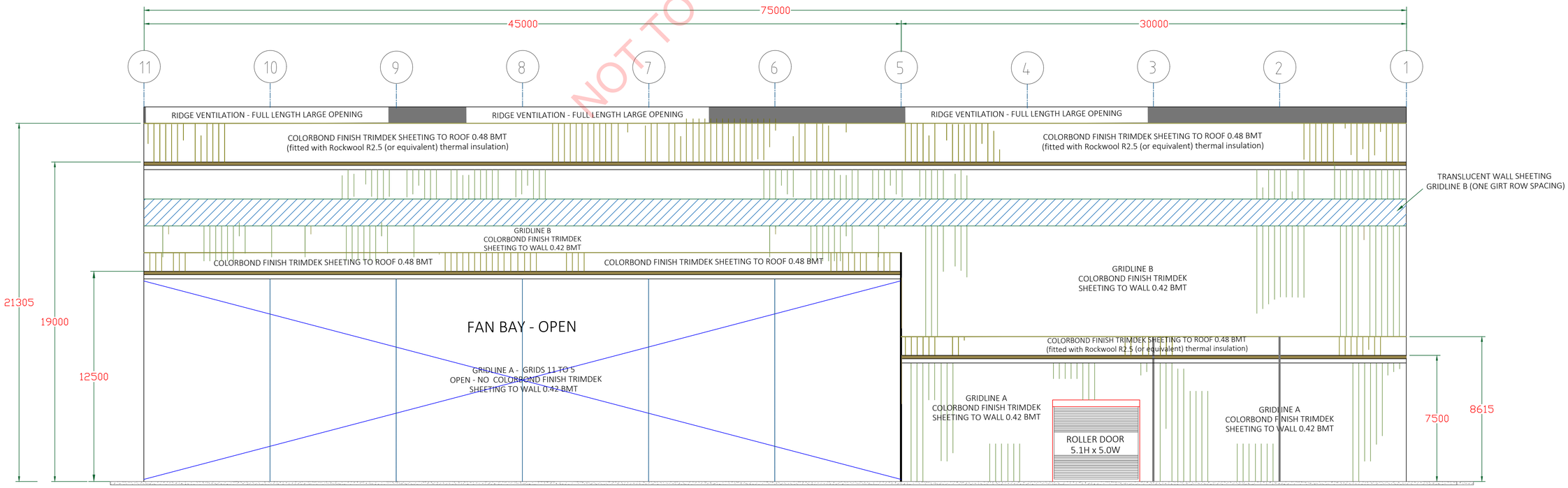
KUNUNURRA COTTON GIN PROJECT

GIN BUILDING FAN BAY TO CYCLONE RACK GA ELEVATIONS



GIN BUILDING EASTERN ELEVATION GRID LINE 11

END (EASTERN ELEVATION)



GIN BUILDING NORTHERN ELEVATION GRID LINE A

KIMBERLEY COTTON COMPANY

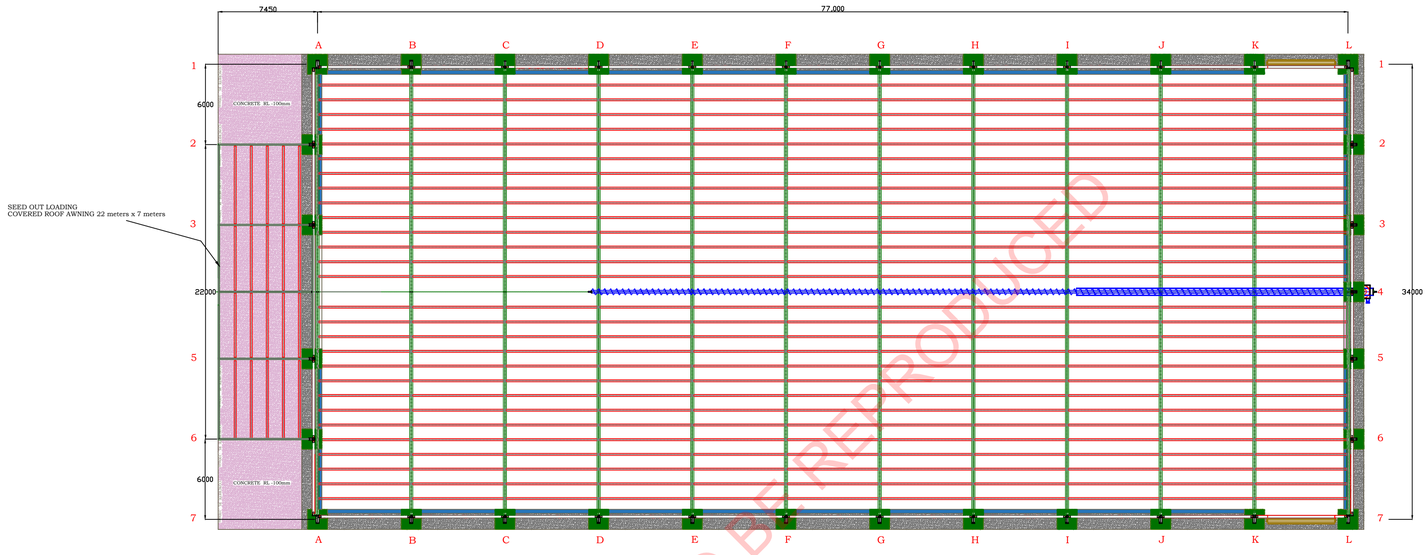
KUNUNURRA COTTON GIN

CONCEPT SEED SHED GA LAYOUTS REV10 11-07-2022

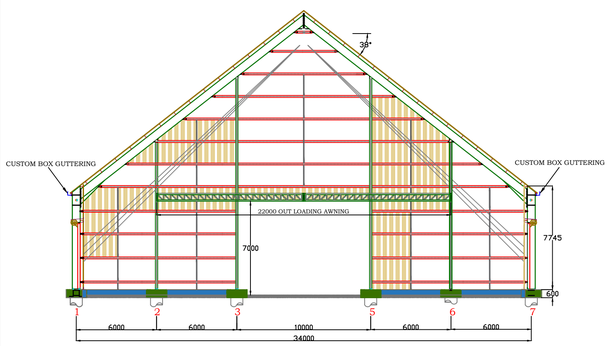
8,000-10,000 TONNE CAPACITY

PRELIMINARY CONCEPT IN DRAFT REV-10

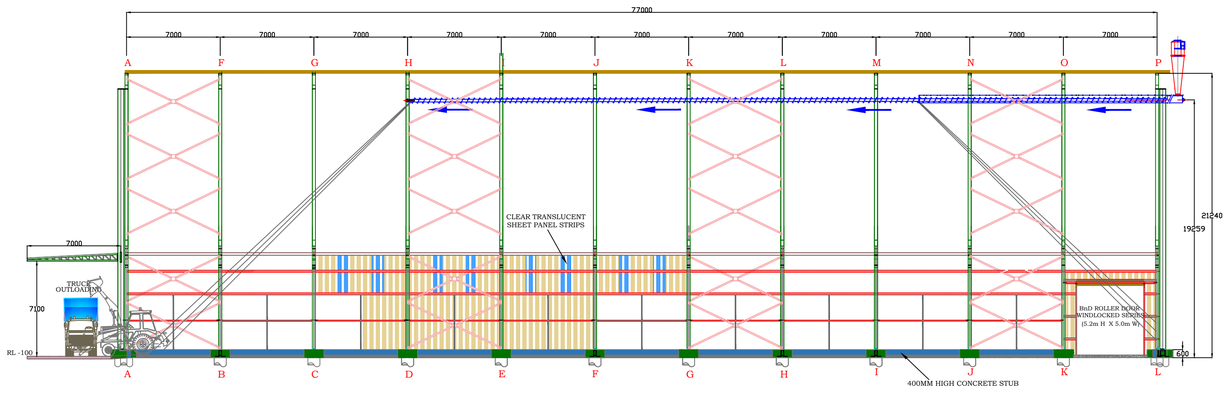
N



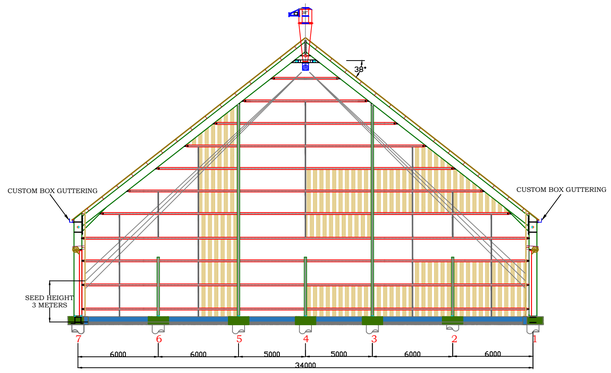
PLAN



WESTERN END ELEVATION



SOUTHERN SIDE ELEVATION



EASTERN END ELEVATION

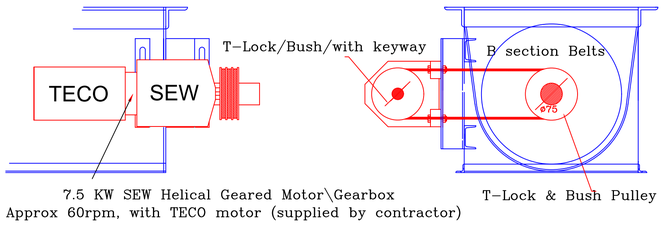
KIMBERLEY COTTON COMPANY

KUNUNURRA COTTON GIN

CONCEPT SEED SHED GA LAYOUTS REV10 11-07-2022

PRELIMINARY CONCEPT IN DRAFT
REV-10

NOT TO SCALE



Auger Elevation (Eastern Drive End)
Support Frame showing Motor / SEW Gearbox Placement

AUGER DETAILS
3 mm casing. 2 mm flight. Ball brgs. at ends. 10 mm end plates. Centre tube 127mm Diameter (5"), 6mm Wall no hanging brgs along center tube. Shaft size 75mm. 406mm Diameter 406mm pitch screw

GENERAL

G1 THIS DRAWING SHALL BE READ AND USED FOR TENDER ESTIMATION AND DETAILED DESIGN PURPOSES. DIMENSIONS & SPECIFICATIONS TO BE CONFIRMED BY PRINCIPAL USING WRITTEN INSTRUCTIONS BEFORE APPROVING FOR CONSTRUCTION PRIOR COMMENCING WITH THE WORK

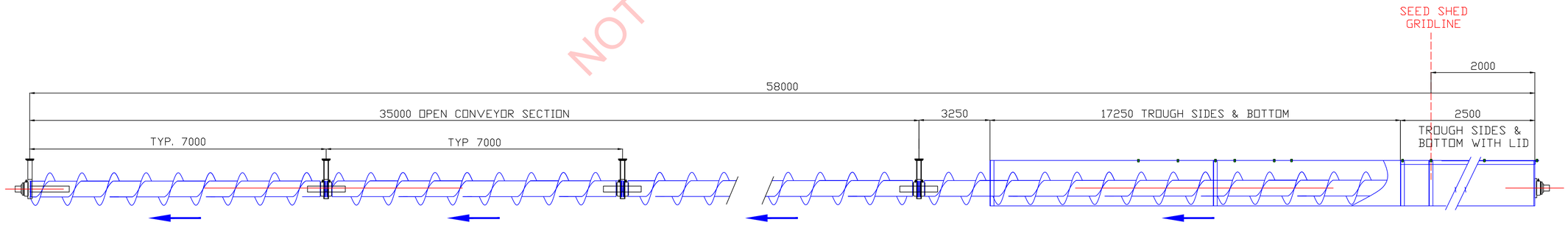
G2 ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT SAA CODES AND THE BYLAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION

G3 ALL DIMENSIONS SHOWN TO BE VERIFIED

G4 CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION OF THEIR WORKS, AND CO-OPERATION WITH OTHER SITE OCCUPIERS, AND SHALL CO-OPERATE IN ALL RESPECTS WITH THE PRINCIPAL

SCREW CONVEYOR GENERAL NOTES & SPECIFICATIONS (Draft in concept for budgetary ONLY)

1. The installation of the screw conveyor is to comply with AS 1755.
2. The screw conveyor is to be bolted to the Shed Rafters.
3. The successful contractor is to supply and install the belts, taperlocks, pulleys, guards, motor drive, and gearbox
4. Fixed drive guarding must be securely attached to the end of the screw conveyor inline to meet all requirements of AS 4024.
5. Conveyor drive (motor brand 'TECO' - size 7.5 kW, series Max-E3-H66). Gearbox Manufacturer SEW - 'base mount style'
6. Conveyor driveline style, 'B' Section Belt, conveyor running approximate speed 60 rpm, driveline fully guarded to AS 4024
7. All bolted connections, minimum grade 8.8 bolts
8. Conveyor External - external troughing section outside of Seed Shed end wall - weather proof.
9. External metal (sheet & structural) shall painted with prime coated 2 Coat 2 Pack System or equivalent



KIMBERLEY COTTON COMPANY

KUNUNURRA COTTON GIN

CONCEPT SEED SHED GA LAYOUTS REV10 11-07-2022

PRELIMINARY CONCEPT IN DRAFT REV-10

SIZE	A	B	C	D	E	F	H	J	K	AF	AR	OA
38 "	966mm	1016mm	75mm	2848mm	356mm	483mm	75mm	241mm	483mm	50mm	50mm	4114mm

Item Description	Number of. Required
38" Ø Seed Shed Cyclone	x 1 (anti-clockwise)
38" Ø Cyclone Inlet Transition	x 1

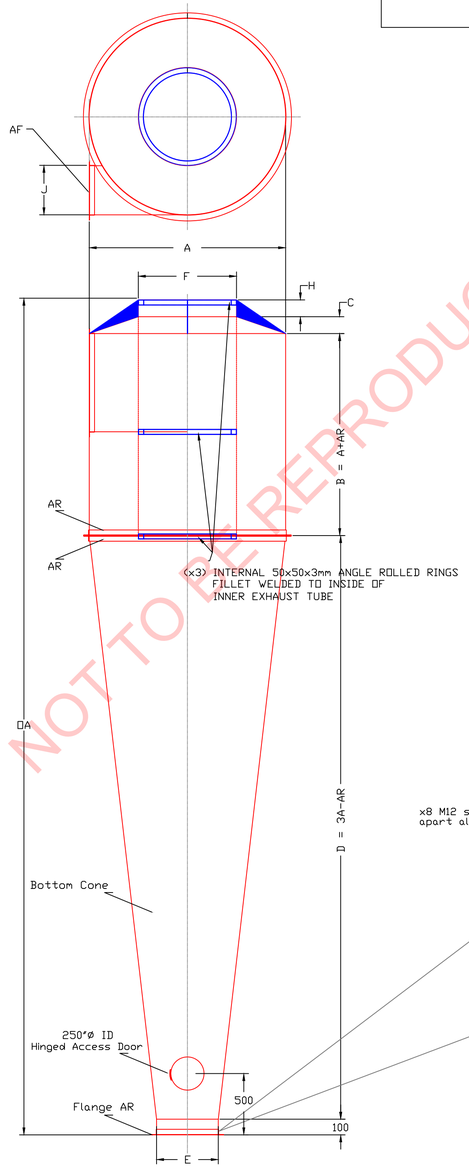
STRUCTURAL STEEL SPECIFICATION - 38"Ø Cyclone Construction

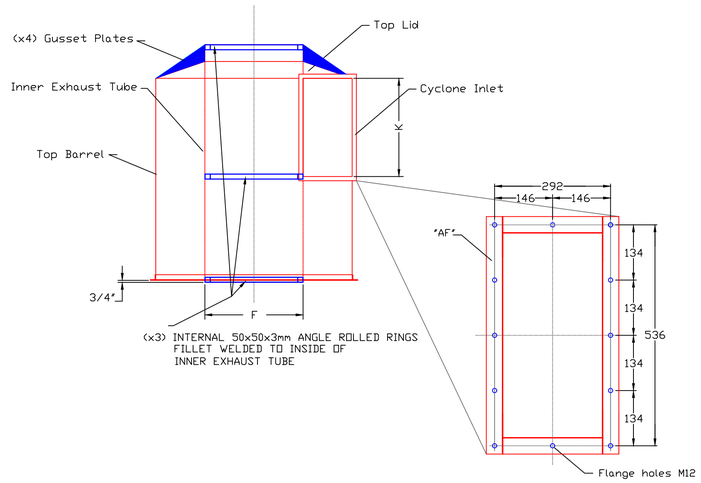
General Description	Minimum Thickness
Top Lid	3 mm mild steel
Top Barrel	3 mm mild steel
Cyclone Inlet	3 mm mild steel
Top Lid - Exhaust Tube Gussets	5 mm mild steel
Inner Exhaust Tube	3 mm mild steel
Bottom Cone	3 mm mild steel
Angle Flanges	3 mm mild steel

NOTE:

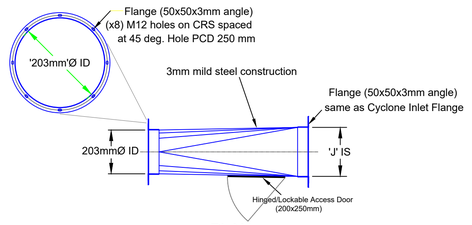
1. All structural steel shall be mild steel, wall thickness as specified.
2. Unless stated all welded connections shall be continuous and a minimum thickness of 3mm. Welding rods shall be a minimum grade of E41XX.
3. All welds shall be done in accordance with the Welding Structural Code AS 1554.1
4. All construction dimensions and fabrication notes shall be addhered to unless prior permission is obtained from the relevant people at Auscott Ltd.
5. All structural steel for fabrication shall be in accordance with AS 4100 where the minimum grade used is a 250MPa yield strength.
6. Top and Bottom Cone Sections shall be of Rolled Construction.
7. 'AF' and 'AR' Angle flanges constructed from 50x50x5mm equal angle.
8. Finished Cyclones and Transitions shall painted with prime coated 2 Coat 2 Pack Paint System applied as per manufacturer's instruction.
9. All flanges shall be of Angle section construction - 50x50x3mm MS.
10. Inlet transition and Cyclone, including access doors, shall be of leak-tight construction.

(Anti Clockwise Shown)

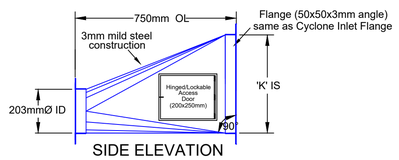




Inlet Flange (50x50x3mm angle)



PLAN



SIDE ELEVATION

38"Ø CYCLONE INLET TRANSITION

WASTE MANAGEMENT PLAN

ROWE GROUP

Kimberley Cotton Company
PO Box 636
KUNUNURRA WA 6743

Waste Management Plan

July 2022

Shire of Wyndham East Kimberley
Recieved: Monday 17 October 2022

TABLE OF CONTENTS

Contents

Introduction

The purpose of the Waste Management Plan is to describe the principles, procedures and management of the waste generated by Kimberley Cotton Company during construction and operation of the Kununurra Cotton Gin. This Plan has been prepared to ensure wastes are reduced, reused and recycled wherever possible.

The Waste Management Plan outlines measures to manage and mitigate waste generation and resource consumption during the operation of the development. The Plan includes details on the following:

- The types and quantities of waste generated during construction;
- Procedures to collect and dispose of waste;
- Measures that will be implemented to minimise waste generation associated with the development; and
- A program for monitoring the effectiveness of these measures.

The Waste Management Plan is designed to support a sustainably based management approach underpinned by adaptive management principles to encourage increased diversion of waste from landfill and fire risk mitigation.

Surplus or waste materials arise from either the materials imported to the site or from those generated on the site. Imported materials are those which are brought to the site for inclusion in the operations. Generated materials are those that occur during the daily operations of the site i.e., cotton waste and wastewater.

This Plan also considers other aspects to waste management such as waste reduction, segregation of waste, disposal of waste, financial impacts of waste disposal and recording, monitoring, education and reviewing. This Plan outlines the waste management procedures that have been put in place and demonstrate the benefits to the environment, and how these procedures and practices are sustainable.

Waste Types

A variety of waste will be generated during construction and operation of the cotton gin. The following provides a general list of potential waste from the site and the path for recycling or disposal:

Construction Phase

The construction phase will include delivery pre-fabricated building material. This will include:

- Packaging from equipment delivered to site, including timber, steel and plastic:
  - Timber packaging to be disposed of at local landfill as general waste.
  - Steel to be retained onsite for reuse;
  - Plastic to be compressed and recycled if recyclable packaging is used or landfilled as a general waste if non-recyclable.
- General waste from contractors and staff during construction:
  - Waste to be separated into recycle and non-recyclable waste.
  - Waste to then be removed to local landfill for further treatment or disposal as either recyclable or non-recyclable materials

The construction site will operate with skip bins for general waste. Staff rooms will include general waste and recycle bins for staff. The Kununurra Landfill provides a recycling service. The option of returning larger construction packaging items will be available via shipping containers being returned

to Darwin or other Port facilities.

The options for recycling of materials in Kununurra is limited due to transport costs to recycling sites.

During Gin Operations

The cotton ginning process will produce four waste streams during operations. These will consist of operational and maintenance waste from the cotton gin, general waste from staff rooms, plastic wrapping from round cotton modules and organic waste material referred to as cotton trash.

- Plastic wrapping from cotton modules – brought to the site on each round cotton bale and removed in the bale feeder bay:
    - To be stored onsite, compressed and hauled away from the site at the end of the season for recycling purposes;
- Oil and other hydrocarbon waste from servicing of equipment and machinery. This will include hydraulic oil from internal systems, and engine oil from machinery;
    - Collected in drums and removed from site for recycling by a registered contractor;
- Cotton trash consisting of organic matter and soil material removed from the raw seed cotton during the ginning process:
    - To be stored onsite and returned to local cotton growers – Not considered as waste
- Tyres from vehicles onsite;
    - To be recycled through local tyre companies
- Waste from trucking contractors
    - To be removed by trucking contractors for appropriate disposal or recycling if available.
- Steel waste generated during life of cotton gin from replacement of machinery;
    - Stored onsite for potential recycling or removed by steel recycling contractor.
- Putrescible and recyclable waste from staff
    - Removed from site through general waste stream to Kununurra landfill.

Recycling

If surplus materials cannot be reused in their present form but could be used in a different form, they will be sent to recycling or labelled as future recycling wherever possible. This would include used oils, steel, and plastic wrapping.

Waste Collection and Disposal

Chemicals

Storage of waste chemicals such as oils will be held to an absolute minimum on the land-based sites.

Drums and tanks containing waste oil or other chemicals will be stored within impervious bunds. Adequate absorption materials shall be readily available to collect and recover any liquid spillages.

Chemical wastes will be disposed of through an approved waste contractor.

Sanitary, Grey and Black Water Wastes

Office and staff facilities will generate wastewater and other general waste from ablution facilities and amenities. Portable toilet facilities will be utilised during the construction phase until permanent facilities are constructed.

The proposed development will include an onsite wastewater management system for disposal of wastewater. This will involve a septic tank system with disposal via either an absorption system or similar structure for onsite evapotranspiration of the wastewater.

The total daily wastewater volumes to be generated by staff will be in the order of 30-litres per person. Maximum staff numbers will be in the order of 30-during peak ginning operations. The proposed system will therefore need to be designed for disposal of a daily wastewater volume in the order of 900-litres.

Contaminated / Hazardous Wastes

All materials generated on the Kununurra Cotton Gin will be fully evaluated for potential contamination.

Notice to staff will be given immediately if hazardous materials or conditions are found onsite that are in unprotected environments including the following:

- Toxic or contaminated materials;
- Tanks or other contaminated substances.

Depending on the type of material and the danger level of the material, storage and handling procedures may be required.

Potential materials of concern that will be used on site include:

- Diesel fuel – To be stored in above ground tanks with bunding in accordance with AS1940:2017. This may include self-bunded containerized fuel storages.
- Hydraulic Oil – To be stored in 200 litre drums kept on a concreted surface with appropriate bunding.
- Minor quantities of herbicide in drums of up to 20-litres for onsite weed control. Drums to be ordered on an as-required basis.

If contaminated wastes are evident, the Manager will be advised so that arrangements can be made for the engagement of appropriately qualified specialists in hazardous materials handling. Any contaminated waste will be managed in accordance with relevant WH&S policies.

Waste Minimisation

Wastes from the ginning operation have the potential to impact on the environment. The environment includes emissions from dust and odour, as well as surface runoff. The cotton gin site adjoins a section of the Ord River Irrigation Area (ORIA). The ORIA includes a drainage network which captures and circulates runoff from the farms within the ORIA. Existing water quality parameters for the ORIA drainage network will be adhered to as required under Licences issued to the drainage managers (Ord Irrigation Cooperative - OIC). KCCL does not anticipate any change to water quality parameters already monitored by OIC on behalf of Ord growers, including nutrients, salinity and turbidity. Water quality parameters are agreed between OIC and the WA Department of Water and Environmental Regulation under OIC's water licence.

The Waste Management Plan has been developed to manage the risk associated with the potential impacts including minimising waste generation.

Kimberley Cotton Company will implement all waste minimisation procedures and therefore reduce the amount of waste to be removed from the site. Management, staff, contractors and suppliers will all be encouraged to look at ways to minimise the amount of waste generated at the work site.

Industry Best Practice

Kimberley Cotton Company will follow industry best practice guidelines such as:

- Waste materials will be reduced, reused and recycled where possible;
- General wastes will be disposed of through available disposal schemes within Kununurra
- All septic wastes will be disposed on onsite through an onsite wastewater disposal system designed to sustainably dispose of waste from the peak daily wastewater production during cotton ginning.
- Residual materials that cannot be reused or recycled will be disposed of at an approved waste management facility.

The onsite induction relating to waste management will include advice on appropriate separation, handling, recycling, reuse methods to be used by all parties conducting operations onsite were applicable.

Regular toolbox meetings will include discussion of waste management issues and updates on how to minimise wastes.

The monitoring of wastes generated will provide an opportunity to review the wastes being generated and ways in which they can be reduced (See Section 5).

Training

Kimberley Cotton Company recognizes the need for staff and contractors to be appropriately trained in the tasks that they are to undertake to reduce the chance of wastes being produced.

Monitoring

Kimberley Cotton Company are committed to minimising the risks associated with the generation of wastes in the operation of the Kununurra Cotton Gin.

The monitoring of the quantity and types of wastes being generated by gin construction and operations will be recorded in the wastes logbook and always kept on site so that regular reviews can be undertaken.

All products that are considered of concern in relation to the waste being generated will be replaced were possible for products that are less wasteful and/or considered to be environmentally friendly.

All waste storage containers will be inspected weekly to ensure that they are maintained in a condition appropriate for their use and containment of the specific waste.

Skips and/or bins will need to be monitored regularly to ensure that cross contamination does not occur. All waste removed from site including products for reuse will also be monitored to ensure no cross contamination.

Kimberley Cotton Company will continue to review the type of surplus materials produced and where possible, change the site design and operation to minimise products that go to landfill. Recycling or reuse of wastes are a priority.

Mitigation Measures

Proposed operations utilise the following waste management measures (as outlined in the Environmental Management Plan):

- The waste hierarchy is to be implemented on site:

- Avoid
- Reuse
- Recycle/Re-process
- Dispose
- Reuse materials wherever possible;

Purchasing procedures are to be developed to ensure:

- Items have minimal packaging
- Less hazardous products selected wherever possible
- Provide appropriate receptacles for each waste stream. Ensure these are labelled.
- Conduct regular inspections/audits to ensure waste is separated as required

Follow manufacturer's instructions for disposal of chemicals (Material Safety Data Sheet) along with local waste disposal facility direct

- Site toilets will be serviced regularly
- No Littering policy will be implemented. All litter will be picked up immediately and disposed of in appropriate receptacle
- Materials contaminated by leaks (such as fuel or oils) will be stored in a sealed container and transported to a suitable waste facility
- Incompatible wastes are kept separate
- Wastewater collection and treatment system will be implanted as required. Contaminated water will be disposed of following State Authority requirements
- Waste collection will be arranged at regular intervals to ensure no adverse impacts on the environment and community (such as overfilling of receptacles and subsequent littering, odour, pests or other disturbances)

Surface Runoff

The cotton gin site will generate surface runoff during rain events. This runoff may carry suspended silt and minor amount of organic matter such as cotton fibre, leaf matter from the storage of cotton on open cotton module pads.

Runoff will flow to the northern corner of the site because of the natural fall in the landscape.

The development proposal will incorporate a stormwater detention pond to capture and settle this runoff. The process will involve stormwater entering a pond and being detained in the pond. The proposed pond is to be designed to have a capacity to capture a 1 in 20-year average exceedance probability (AEP) design storm event. For events larger than this, some detention time will occur to allow solids to settle in the pond.

Runoff captured in the pond will be utilised for road watering and general dust suppression along internal roads. The process will involve watering of roads that are being used during daily ginning operations. For example, if cotton modules are being delivered to a specific module bay, this road will be watered to suppress dust from incoming trucks and associated activity. Other internal roads may be watered during windy conditions to reduce dust emissions from the site and to avoid dust contamination of the cotton modules.

When the detention pond fills and overflows during a storm event, the proposed development aims to direct this overflow to the existing ORIA drainage network for reuse on other properties.

Water Quality of Stormwater Runoff

Stormwater runoff from the Gin site will be captured in a detention pond system within the Gin site. This water will be used for road watering (dust mitigation) and any landscaping requirements.

Stormwater runoff from cotton gins in Australia has been monitored for more than 20-years to determine water quality risks. To date, no data suggests that the runoff contains unacceptable levels of chemicals washed from gin sites such as herbicide or pesticide. Water quality results identify a varied level of suspended solids and pesticide/herbicide levels below normal limits of reporting for NATA accredited laboratories.

The design of the cotton gin will ensure that runoff will firstly be settled in one or two detention ponds prior to release off the site to the ORIA drainage network. Water quality in the network is monitored by the OIC and therefore the gin will be subject to monitoring by OIC as a third party.

Stormwater runoff is not considered a waste product.

Assessment of Impact

Potential Pollution

Waste generated at the Gin that cannot be recycled is limited to putrescible wastes generated within lunchrooms and staff facilities. This waste stream would need to be disposed of locally through the municipal waste stream.

The majority of other wastes such as plastic module wrap, and steel can be recycled. Oils and other hydrocarbon waste products from lubrication/hydraulic systems can be recycled under contracts.

The potential for waste pollution to be an issue on this site is limited as management intend to provide appropriate mechanisms for disposal and recycling.

Biosecurity

The assessment outlines the plant, animal and community risks associated with the proposed development and assesses the risk in accordance with AS/NZS 4360:2004 taking into consideration the likelihood and potential consequence(s) of the environmental impacts.

Defining Risk

Risk is the chance of something happening that will have an impact upon the objectives of a task, which in this case is the development and operation of the Gin without increasing the biosecurity risk posed to plants, animals and the community. Risk is measured in terms of consequence and likelihood, which are then evaluated in a risk matrix.

Sources of Risk

The primary source of biosecurity risk associated relates to the stockpiling or transportation of materials on vehicles, people, equipment or materials onto and off the site. The specific risks, as relevant to plants, animals and the community relate to the following:

- Introduction and spread of disease onto or from the site which could affect plant, animal or human health.
- Introduction, propagation and spread of weed species by vectors including vehicles and personnel moving on and off the site.

The primary activity on this site involves the transport of raw cotton to the module yards and the separation of this raw cotton into processed cotton, cotton seed and cotton trash. The cotton is grown

locally but on many farms. Most farms have a biosecurity plan in place to avoid the movement of disease and weed seed on and off the property, however the risk remains that cotton modules delivered to the site may contain a biosecurity risk that needs to be managed.

Summary of Biosecurity Risk

On consideration of the sources of risk and proposed management and mitigation measures to be imposed by management, the proposal presents some risk of the delivery of weed seeds to the Gin. These would include cotton seeds of various varieties that would potentially germinate within the Gin area. Such rogue plants would potentially harbour a range of diseases and pests throughout the year that may impact surrounding farms. The control and management using appropriate herbicide programs will be an essential part of site operations to eradicate this risk.

Cotton trash will have a level of weed seed collected from properties during harvest. Trash is initially stored at a cotton gin prior to being returned to farms for recycling as an organic additive to be used on farms where the cotton came from. This would mean that the trash is returned to farms which grew the cotton and therefore already have biosecurity management programs for control of any foreign weeds.

STORMWATER ASSESSMENT

ROWE GROUP

SMK

CONSULTANTS

surveying – irrigation – environmental – planning - engineering

Kununurra Cotton Gin

Stormwater Assessment

Kimberley Cotton Company
PO Box 636
KUNUNURRA WA 6743

July 2022

SMK
CONSULTANTS

DOCUMENT CONTROL

Project Name	**Stormwater Assessment**
Proponent	Kimberley Cotton Company P.O. Box 636 KUNUNURRA WA 6743
Project Reference	21-235
Report Number	21-235-SWA
Prepared for	Kimberley Cotton Company P.O. Box 636 KUNUNURRA WA 6743
Prepared by	SMK Consultants 39 Frome Street Moree, NSW 2400
Contact	Peter Taylor E: ptaylor@smk.com.au Ph: 02 6752 1021

Author	
Name	*Peter Taylor* Peter Taylor BSc. MEIANZ LAA
Position	Environmental and Resource Consultant
Company	SMK Consultants

Revision History			
Version Number	**Date**	**Authority**	**Details**
0	November 2021	Peter Taylor	Issued to Client
1	December 2021	Peter Taylor	Revised Gin Layout
2	July 2022	Peter Taylor	Revised Gin layout

CONTENTS

1 Introduction

SMK Consultants has been engaged by Kimberley Cotton Company to provide a Stormwater Assessment for the construction and operation of a cotton gin on Lot 510, located on Mulligans Lagoon Road, Kununurra. The development is situated approximately 10.7 kilometres north of Kununurra.

The assessment has been prepared in reference to the West Australian Government (WAG) Stormwater Management Manual (2004).

1.1 Aims and Objectives

This assessment aims to identify management requirements for stormwater generated from the cotton gin site during construction and operation of the cotton gin upon the local region. Impacts considered include volume of stormwater, potential contaminants in the stormwater, proposals for onsite capture of stormwater for reuse purposes and potential discharge points.

The objective of the assessment is to assess management of stormwater on the developed cotton gin site.

The objectives of Kimberley Cotton Company are to:

- Minimise adverse impacts upon the surrounding community;
- Ensure that employees and contractors associated with the operation can work in a safe environment;
- Minimise onsite erosion risk;
- Control the release of stormwater discharge from the site;
- Utilise stormwater as a potential source of water for dust management on internal roads.

1.2 Scope of Works

The scope of works includes preparation of Stormwater Assessment (SWA). The SWA will include the following:

- Storm water analysis to assess potential for runoff;
- Discharge related issues relating to water quality risks;
- Assess requirements for containment of stormwater.

1.3 Cotton Ginning Process

The cotton ginning process separates the cotton seed, cotton staples and gin motes. The three products can then be processed into a range of products. Cotton seed is a high-quality stock feed but also can be used for cotton seed oil which is a high value vegetable oil material used for cooking and cosmetics. The cotton fibre is processed into yarn for cotton clothing. The mote is further processed to extract the fibres and separate other organic material.

The processes occurring at the cotton gin can be summarised as follows:

- **Unloading:** The incoming cotton arrives at the gin in round bales weighing approximately 4.3 tonnes each. The round bales will initially be stored in the module yard and then carried into the module feeder bay for processing. The module feeding system removes the wrapping on the bales then utilises high speed spiked cylinders to separate the locks. The automatic air suction control pulls the cotton bolls into the conveyance system.

- **Drying and Pre-cleaning**: After unloading, the seed cotton is subjected to a multi stage drying and pre-cleaning treatment process. The first drier is sized to provide a specified ratio of heated air which enables the maximum drying capacity of the seed cotton. The heated air stream moves onto the inclined cleaner where the heat further opens the cotton and cylinder spikes remove the smaller trash. The secondary cleaner then removes the larger trash such as sticks and leaves.
- **Distribution and Overflow**: A specially designed trough conveyor delivers the cleaned and dried cotton to the hoppers which are mounted above the feeding system. An overflow system captures any excess seed cotton and returns this back into the system.
- **Feeding and Ginning:** The main component in the ginning process, the gin stand is where the lint and seed are separated. The feeder enables the gin stand consistent input so maximum throughput can be achieved. The gin stand comprises of a bank of saws which rub against a bank of ribs to pull the lint away from the seed. The bank of ribs allows the lint to fall through yet blocks the seed.
- **Lint Cleaning:** Following the separation of the lint and the seed, the lint requires additional cleaning to ensure all contaminants are removed. First stage lint cleaning is through a centrifugal cleaner which uses centrifugal force to spin away the contaminants. The cleaning technology does not cause any damage to the fibre as there are no moving parts which the lint could get caught on. The final stage of cleaning is a gentle saw cleaner which combs out the lint.
- **Condensing and Moisture Restoration:** The condenser takes the single fibres of lint and presses it into a blanket like layer or batt. At this point moisture is reintroduced to the fibre, up to 7.5%, which enhances the compressibility of the cotton fibre
- **Pressing and Bale Handling:** The final step in the ginning process requires the clean lint to be compressed into bales of 227 kg. The bales are weighed and strapped to contain the product before being moved into bale warehousing.

2 The Development Site

2.1 Development Site

The selected site is located on the eastern side of Weaber Plain Road and on the northwest side of Mulligans Lagoon Road. The property was originally developed for the Kununurra Sugar Mill which has since been decommissioned.

Since the Sugar Mill was decommissioned, the southwest section of the property has been developed as a grain receival facility, mainly for storage of corn grown in the Ord River Irrigation Area (ORIA).

The proposed cotton gin site is to be located northeast of the grain bunkers on land that had historically been cleared but now supports mainly regrowth vegetation. The cotton gin and infrastructure will occupy an area of approximately 34 hectares. This will include the following components:

- Cotton Gin building to enclose the cotton gin and processing equipment;
- Office for staff and administration;

- Bale Shed to store lint cotton bales and protect the processed bales from dirt, rain and other material which may reduce the quality of the processed cotton;
- Cotton seed hopper for out-loading of cotton seed;
- Round module storage area consisting of formed rows for storage of round bales brought to the Gin from surrounding farms;
- Cotton trash storage yard;
- Weighbridge for weighing all trucks in and out of the site;
- Sediment and stormwater management system for capture and settling of stormwater runoff from within the site.
- Internal road system for management of trucks delivering and removing cotton from the site.
- Staff parking area to be located adjacent to gin office and away from internal roads used by trucks.

2.2 Site Layout and Operations

A locality plan and the preliminary layout of the proposed development site is presented in Appendix 1.

The site will be cleared of vegetation to allow construction works. Once cleared, building pads will be constructed for the cotton gin and lint bale storage shed. The preliminary layout plan shows the general layout of the site that will be developed. A series of one-way internal roads will be constructed to allow traffic to circulate within the facility. All internal roads will be gravelled.

The module storage area will be constructed to the northeast of the gin. Most module pads will be gravelled. Drains will be cleared of vegetation during construction and then allowed to naturally grass-up under managed conditions to stabilise the drains in the wet season.

Cleared areas between buildings including drains will be re-established as mown grass buffer zones to reduce the total area of bare ground exposed during rainfall runoff. These areas are to be managed by mowing to limit the potential for fires that could be triggered by cotton, lightning strikes or other sources. Other areas around the buildings will be maintained as bare ground as a requirement for fire safety issues between buildings.

Cotton trash will be stored on a prepared storage pad and returned to farms for spreading on paddocks as an organic material additive. The cotton trash is generally stored in windrows to enable the separation of fresh trash.

2.3 Staging

Kimberley Cotton Company anticipate that the cotton gin will operate at approximately half of the design capacity in the first year at a ginning rate of approximately 612 bales per day. This is anticipated to process the forecasted production of cotton in the ORIA in this first year. It is anticipated that this will increase to a design capacity of 1,244-bales per day for the potential 15,000-hectares of cotton to be grown in the ORIA once suitable irrigation fields are developed and farmers start producing more cotton.

The first stage will include all buildings as per attached plans. The additional ginning capacity relates to processing machinery to be located within the cotton gin building. The module pad area will be fully developed but only part may be gravelled. All internal roads will be required for stage 1. Stage 1 will include the construction of internal borrow pits for fill material to construct shed building pads. This internal borrow pit will form the detention pond for the management of stormwater.

The location of this detention pond is not yet marked on plans. The general slope of the site is to the north and therefore all surface runoff will flow to the north. The main detention pond will therefore be located to the north of the gin. A secondary runoff detention pond may be required for the cotton trash yard to capture runoff from this area.

3 Receiving Waters

The cotton gin site slopes to the north/northwest. All drainage from the site at present flows to the northwest boundary and then drains in a northeast direction. A channel associated with the ORIA drainage network adjoins the northern boundary of the gin property. The drainage network provides the outlet for runoff from the cotton gin property at present. This water is then channelled through the ORIA network of drains and channels. The water can be used by irrigators or alternatively, releases with other stormwater.

Excess drainage from the gin will be directed to this same system. The runoff will be circulated in the ORIA drainage network. An existing pipe structure into the ORIA drainage network will continue to be used as the discharge point for the cotton gin development.

The flow of water within the ORIA drainage network is controlled through a system of gates and large channels. Under significant storm or inflow events from local runoff, water levels in the scheme channels can be controlled by stormwater release gates and channels. These gates can be opened to lower water levels within the channel network. The excess water is released onto the Ord River floodplain area which supports natural swamps. Once these fill, the excess water has the potential to flow into the Ord River.

The ORIA drainage network is used by irrigation farms connected to the scheme to circulate excess water and transfer water to and from their irrigation properties. Overflow from this system carries runoff from farms. Water quality in the drainage network is managed under a system of Licences managed by the Ord Irrigation Cooperative (OIC).

Existing water quality parameters for the ORIA drainage network will be adhered to as required under Licences issued to the drainage managers (OIC). KCC does not anticipate any change to water quality parameters already monitored by OIC on behalf of Ord growers, including nutrients, salinity, and turbidity. Water quality parameters are agreed between OIC and the WA Department of Water and Environmental Regulation under OIC's water licence.

The closest potential discharge point into a natural water body is approximately 6 km from the cotton gin via the scheme channels. This discharge point traverses through multiple irrigation farms. During a rainfall event that would generate sufficient runoff to fill the ORIA drainage network, most farms would be discharging water from their properties into the channel system in addition to retaining some water pondage on fields. The water would be draining from a wide variety of crops and therefore carry variable water quality parameters, dependent on time of the year and paddock preparation.

The channel scheme is not considered as a sensitive water body. The Ord River and associated floodplain is considered a sensitive water body. The channel scheme provides an extensive capacity for settlement of stormwater before it is released into the natural water bodies available to drain the ORIA network.

In order to manage the discharge of water into the ORIA drainage network, KCC intends to construction a stormwater settlement pond. The pond will provide a source of water for dust management on this site for the ginning season. This will be a secondary source of water as the cotton gin will have access to ORIA water. The purpose of the detention pond is to capture silt and other organic debris that may be contained in stormwater. The silt and debris would be settled in the pond and excess runoff would be

released under controlled conditions. Such conditions may include installation of a debris capture weir which would skim off floating organic material and hold this in the pond.

Using this captured water onsite would remove the captured water from the pond and therefore maintain some capacity in the pond.

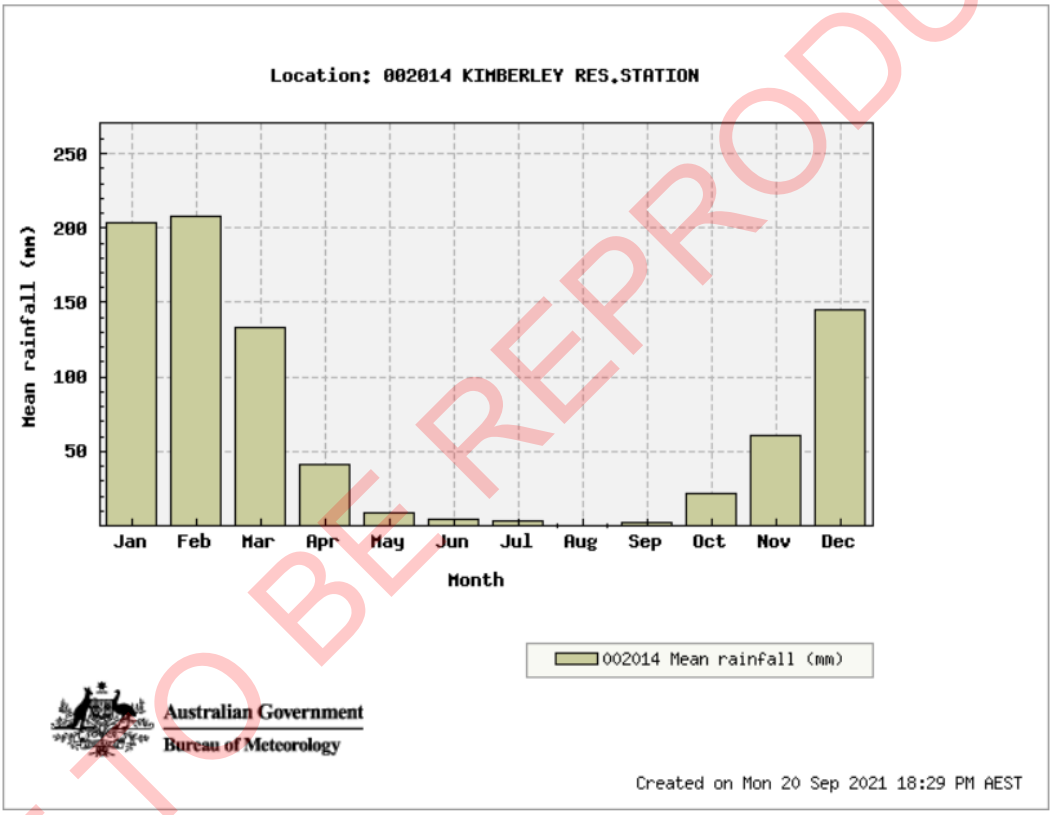
4 Weather Conditions

4.1 General Weather

Average annual rainfall over the past 40-years for Kununurra is 824mm. The majority of rain falls between December and March. The remainder of the year is relatively dry. This is especially the case in August.

The following graph presents the BOM summary of rainfall distribution for Kununurra. The graph shows monthly average rainfall.

Figure 1: Rainfall distribution for Kununurra



The Ginning season would start in June and run through to October in a normal year. Based on averages, the site would have minimal risk of rainfall during the majority of the ginning season but be exposed to potential storm conditions in October and November. Activity on the site would be limited to general maintenance of the gin equipment during the remainder of the year. Activity would be very limited in the wet season.

Temperatures have a relatively minor range with average temperatures during the ginning season between 26 degrees C in the early part of the season through to 32 degrees C late in the season.

Humidity records show increased humidity between the months of November through to March. (Wet season) The months of June through to September have relatively low humidity. The wet season can

commence in October with a storm and then be more significant in November through to March. Minimal activity will be occurring at the gin site through the wet season.

Table 1: Average Humidity for Kununurra (BOM Airport data)

Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean 9am relative humidity (%)	68	71	60	42	34	32	28	28	36	40	48	60
Mean 3pm relative humidity (%)	51	56	44	31	26	24	20	18	21	24	32	45

Rainfall intensity is significantly variable. Rainfall intensity is impacted on occasion by cyclones and severe tropical storms. Appendix 2 presents an Intensity-Frequency-Duration table for Kununurra rainfall as generated by BOM. This provides a range of rainfall depths for various durations. The data includes annual exceedance probabilities (AEP) which are calculated from historical rainfall peaks and intensities.

5 Gin Runoff Water Quality

5.1 Potential Contaminants

The cotton gin site includes extensive open ground for the storage of raw cotton picked from irrigation farms and open areas of road and drains. The raw cotton is compressed in round bales, but cotton bolls will fall out of the bales onto the ground. The roads and drains will receive some cotton bolls. The cotton bolls will contain cotton seed and leaves.

The gin will require a range of hydrocarbon liquids including diesel fuel for frontend loaders and forklifts. Some forklifts will be gas powered. Diesel will be stored in a bunded above ground tank with a bunded fuelling area for capture of any spills. The potential for diesel to wash from this area will be minimal. The facility will have spill equipment to allow the cleanup of any spilt fuel.

Gas will be stored in a gas tank which has no risk of contamination.

The gin will require a range of hydraulic fluids for internal equipment. The gin building has a workshop to be built within the gin building. The hydraulic fluid will be stored in 200-litres drums within this room. The room will be bunded and enclosed so that no spill can impact the cotton. Empty drums will be used to store waste oil prior to being removed offsite.

The cotton gin site will require some weed control and therefore the use of a range of herbicides. These will be limited to rapid knockdown herbicides with limited residual parameters. Such chemicals would be delivered in 20-litre drums and stored within the gin building workshop area. The chemicals stored onsite for this purpose would be minimal as it would be delivered on an as-required basis. The risk of chemical being washed from the site is limited.

Larger areas of grass within the gin site will be mown and not sprayed. The grassed areas will stabilise the open ground. This also reduces the area of exposed soil to wind erosion which could generate dust.

Cotton trash material will be stored onsite on a compacted pad prior to transport offsite. The cotton trash consists of cotton plant material with some soil particles. Cotton trash is a product removed from the raw seed cotton during the ginning process. A minor risk is present that the cotton trash includes some residual chemical used during the production of cotton on the farms. The trash will be stored for a short period before being returned back to farms. The stored trash material will be exposed to weather and therefore some runoff

will occur from the trash pad area. The design of the cotton gin drainage system will allow runoff from this trash pad to drain directly into a detention pond to settle the organic matter which may wash off this pad. Runoff from the cotton trash area would therefore settle in the detention pond before being discharged into internal drains and then potentially leave the site to enter the ORIA drainage network.

5.2 Water Quality

The quality of stormwater discharge from cotton gins has been monitored for more than 30-years from cotton gins based in NSW. This has been undertaken in accordance with the NSW Protection of the Environment Operations Act 1997. Cotton gins monitor for a range of general parameters in accordance with NSW EPA requirements. The following provides an example of 2021 results for the testing parameters for a NSW Cotton Gin:

Table 2: Typical Stormwater discharge water quality results for a NSW Cotton Gin from a significant storm event at the end of a cotton ginning season*

Analyte grouping/Analyte	Unit	Value
pH Value	pH Unit	**6.35**
Electrical Conductivity @ 25°C	µS/cm	**51**
Total Dissolved Solids (Calc.)	mg/L	**33**
Suspended Solids (SS)	mg/L	**226**
Nitrite + Nitrate as N	mg/L	**0.09**
Total Kjeldahl Nitrogen as N	mg/L	**2.1**
Total Nitrogen as N	mg/L	**2.2**
Total Phosphorus as P	mg/L	**0.65**
Oil & Grease	mg/L	<5

*Source: SMK Consultants water testing data base for cotton gins.

The data shows some sediment in the water and some slight presence of N and P as a result of organic matter. The Oil and Grease test is undertaken to determine whether non-volatile hydrocarbons (i.e. petroleum derivatives), vegetable oils, animal fats, waxes, soaps, greases and related material in a sample. For cotton gins, the test would identify whether any hydrocarbons are present in the stormwater discharge. No other oils or greases are present on the gin site. Cotton seed is a potential source of vegetable oils, but it is not crushed and released on the site and therefore the oil is retained within the whole cotton seed.

The variables for stormwater from a cotton gin site include whether the runoff occurs during or between cotton ginning seasons. During the ginning season, raw cotton will be present and therefore some cotton plant material may be captured in runoff. During the offseason, the extent of cotton material is reduced and therefore the material captured in runoff would be limited to eroded soil particles.

Water quality will vary as a result of rainfall intensity. More intensive storms will generate more silt. Lower intensity rainfall will generate less silt. The cotton gin will be active during periods of minimal rain and therefore a lower risk of erosion of cotton-based products will be present. During monsoonal conditions through summer, little or no activity will be occurring outside of the gin building.

6 Stormwater Detention Proposal

6.1 Method of Detention

The aim of stormwater management on the cotton gin site is to capture the first flush of rainfall runoff. This is to be achieved via a detention pond system. The pond or ponds will allow the velocity of runoff to decrease to a speed or stop. This allows sediments and other material to drop from the stormwater and be captured in the pond.

Preliminary designs allow for two detention ponds. These ponds will be formed as borrow pits within the gin site to obtain fill material for building pads and reshape the site due to the slight slope to the north. The ponds will be created with a controlled inlet area, which may consist of a drop box and pipe structure. The ponds will have a bywash capable of carrying a design rainfall event from the catchment once the pond/s is full.

Clean water runoff from upslope areas outside of the cotton gin will be diverted through the gin area. This upslope runoff will be uncontaminated from any activity on the cotton gin. The land upslope of the cotton gin consists of native vegetation and no potential contaminating activity. The design of the diversion channel will be subject to final survey and assessment of drainage across Mulligans Lagoon Road.

6.2 Design Storm Event

A review of Guidelines from DWER suggest that discharge off the site should not exceed pre-site development peak flows. This needs to be considered in the design capacity of the ponds in that a large part of the catchment will be altered from the present grassland catchment to a gravelled and roofed surface. The runoff characteristics will be altered.

The gin site and surrounding catchment will be drained into the ORIA drainage network and therefore does not directly enter a natural watercourse. This is an artificial water body. On this basis, the hydrological or potential ecological impacts on downstream waterways are limited. The site already drains into the network. The changes of runoff onsite compared to the capacity of the whole ORIA drainage network is considered minor as the gin catchment is significantly less than 1-percent of the current catchment which the drainage network services.

The stormwater management proposal for the cotton gin site is to use a detention/retention pond for capture of runoff. The controlled release point will be the pipe outlet into the ORIA drainage network. There is no process effluent on this site and therefore the mixing of clean roof runoff is not identified to be an issue. Oils and other contaminants identified on this site will be secured and runoff from these areas will be contained to eliminate any risk of hydrocarbon contaminants being captured in runoff.

The major parameter for runoff control relates to sediment collection. This will be based on catchment discharge and management of water velocities, stabilisation of bare ground areas and a collection system to allow sediment to settle before the runoff is discharged from the property.

Catchment discharge can be calculated using rainfall totals, rainfall intensity, the time for the runoff to discharge at a specific point in the catchment, and catchment characteristics. An acceptable process for evaluating rainfall-runoff and discharge at a specific point in a catchment is to adopt a method recommended in Australian Rainfall and Runoff (Engineers Australia). In this case, the Rational Method has been selected using the formula:

Q = CIA/360

Where Q = Peak Discharge cubic metres per second
C = Runoff coefficient
I = Rainfall intensity mm/h
A = Area of catchment in Ha

The critical rainfall intensity relates to travel time from the most remote point in the catchment to the outlet point subject to investigation, or the time taken from the start of a rainfall event until all the catchment is simultaneously contributing flow to the outlet. In this case, the critical point relates to the detention pond bywash facility.

The formula adopted to determine this critical rainfall event referred to as Time of Concentration is presented below:

$$Tc = 58L / (A^{0.1} \times S_e^{0.2})$$

Where Tc = time of concentration (minutes)
L = mainstream length of stream (km)
A = Area of catchment (km^2)
S = Equal area slope of the mainstream (m/km)

Based on preliminary plans, the catchment length is approximately 0.55 km. The total area within the catchment is approximately 34 Ha. The equal area slope of the main channel system from the upslope capture point to the bywash of the main detention pond is in the order of 7m over 550m or 3.85 m per kilometre.

Time of concentration for this site is then calculated to be 27 minutes. The time of concentration of 30-minutes is adopted from the BOM IFD chart for convenience as the length of catchment is to be further defined once final civil works plans are completed.

The following table provides potential peak discharge from the cotton gin catchment for various AEP's. Total volume of discharge for these specific storm events can be estimated by multiplying depth of rainfall by area of catchment. This is included in the following table.

Table 3: Peak Discharge and total runoff volume calculation table

	Annual Exceedance Probability				
Parameter	**63.2%**	**50 %**	**20%**	**10%**	**5%**
Rainfall Depth (mm)	29.6	32.9	42.4	48.3	53.8
Runoff Coefficient	0.45	0.45	0.45	0.45	0.45
Area (Ha)	34	34	34	34	34
Peak Discharge (m^3/s)	1.26	1.4	1.8	2.05	2.29
Total volume of discharge (m^3)	10,064	11,186	14,416	16,422	18,920

6.3 Sediment Pond

The proposed development of the cotton gin civil works will involve a cut and fill process to elevate the Gin building, roads, and module pads. A large proportion of the cut material is to be obtained from an

internal borrow pits. These borrow pits are to be located on the downslope section of the development site and therefore can be used to capture drainage.

The preliminary configuration of the main pond involves a length of approximately 400m long and a width of 50m to suit the slope and surrounding infrastructure. This is optimal for settlement of total suspended solid management for the stormwater system to avoid issues of exceeding the threshold of 50 mg of soil per litre of water discharged from the site.

Civil design work is yet to be undertaken for this site and therefore no preliminary calculations are available to determine the volume of fill needed from the retention/detention ponds to be constructed on this site. Preliminary pond capacity will therefore be adopted for a 10% annual exceedance probability storm event. The bywash will need to carry a peak discharge of 2.05 cubic metres per second and the pond capacity will need to be a minimum of 16.42 megalitres.

Water collected in the pond will be used during the ginning season for road watering. This will be subject to water availability, as the pond is more likely to fill in the wet season and then remain subject to minimal inflow and extensive evaporation during the months of April through to September. On this basis, the pond will be designed to hold peak inflows, but the shape of the pond will be subject to two main parameters.

Parameter 1 involves the shape of the pond to allow sediment to settle. This will determine the length of flow in the pond from the inlet to the outlet. The longer the length, the slower the water flow becomes and the more opportunity occurs to settle silt.

Parameter 2 will involve pond depth to limit evaporation losses. Parameter 2 may therefore dictate that a deeper holding pond is created within the detention pond. The depth of this will be subject to geotechnical investigation to determine the suitability of deeper soils on this site and the potential requirement to line a deep pond to avoid seepage losses and percolation of this stored water into the subsoil material and potential groundwater table which is at a depth of 5m or less.

7 Mitigation Measures

A range of mitigation measures are available to the facility during both construction and operation of the cotton gin. The general scope of mitigation measures for stormwater management is presented below:

Operational Environmental Management Plan for Stormwater		
Issue	**Safeguards**	**Frequency**
Runoff Management	Inspect the site prior to any areas being disturbed to ensure that catch drains and sediment ponds have been installed and that necessary sediment and erosion controls are in place.	Prior to work commencing.
	Confirm that erosion and sediment controls are maintained in accordance with design specifications to ensure that they are operating correctly. Corrective action would be instituted if necessary and follow up inspections would be undertaken to verify the outcome of the corrective action.	Weekly and within 24 hours of a significant rainfall event.
Control erosion and sediment	Progressively revegetate and maintain disturbed areas outside of the operation area.	Continual
	Maintain sediment ponds and remove accumulated sediments to ensure adequate storage volumes are maintained.	
Storage Capacity	Ensure that batters are not less than 3 horizontal to 1 vertical (3:1 H: V) in the sedimentation pond to ensure bank stability.	As required
	Use water captured in sediment and storm detention ponds for road watering to maintain storage capacity in the detention system.	
	Overflow from the sediment ponds is to be released through existing drain lines to reach the discharge pipe into the ORIA drainage scheme.	
Drainage system	Install sediment control structures as end of drainage system during construction works if this occurs during a period where rainfall/storms are expected	As required
	Manage the growth of vegetation within drains including suitable shaping of drains to enable access by a slasher for management of grass	
	Where design velocity in the drain may exceed 0.5m per second, consider a gravel or rock layer in the drain to minimise erosion potential	
	Regrade drains on an annual basis to reform batters and beds to maximise laminar (smooth) flow in the drains to avoid scouring or turbulent flow.	
Module yard and open spaces	For all areas between roads and formed module pads, maintain a grass cover to stabilise the soil and minimise potential rainfall-runoff erosion.	Continual

8 Discussion and Recommendations

Kimberley Cotton Company commissioned SMK Consultants to undertake a preliminary Stormwater assessment for the Kununurra Cotton Gin. This investigation provides a preliminary assessment based on available information. At this stage, the information does not include a final civil design of the facility that includes the drainage system, road design, and internal fill requirements which will be obtained from a borrow pit or two borrow pits within the site. Once constructed, the ponds will then be used as a retention/detention pond system once the cotton gin is built and operational.

Preliminary calculations have identified a total catchment area of approximately 34 Ha which will be disturbed by construction and operation of the cotton gin. The area currently drains to the north of the site toward an existing ORIA drainage network channel. This is the only point where the gin site and surrounding upslope catchment can drain to and therefore this will be the discharge point for runoff from the property.

The management of stormwater will involve two parts. Where possible, clean water runoff from upslope or non-gin areas will be diverted through the property directly to the ORIA drainage network. This diversion system will require further investigation once the volumes of runoff can be quantified through a process of survey and hydrological design. The diversion system may or may not require a detention pond system to manage the rate of discharge.

Rainfall runoff from within the cotton gin site will be directed into a series of internal drains. The drains will direct the runoff to a detention pond system for the purpose of settling sediments and solids captured in the runoff. The preliminary design of the ponds aims for an overall pond capacity of 16.42 megalitres to capture a design storm event with an annual exceedance probability of 10-percent. The shape of the pond will be subject to final civil works design of the site. The pond design will incorporate factors of reducing flow velocity to less than 0.01 metres per second to settle solids and a depth to enable capture and use of this water in the ginning season for watering of roads.

Mitigation measures proposed for this development are standard. They include establishment of sediment control structures when the area is to be disturbed during the wet season and grassing of as much bare ground as possible to stabilise the soil during the wet season. No earthworks will be undertaken in the wet season which has the highest potential for heavy rainfall and erosion of disturbed surfaces. Earthworks during a wet season are not practical and therefore not considered as an issue.

Final drain design will determine the drain slope and therefore water velocity, which will be utilised to determine the requirements for drain bed stabilisation. This may or may not include gravelling or rock lining of sections of drain to avoid erosion if water velocity exceeds a standard level of 0.5 metres per second for bare soil conditions.

This report provides a preliminary assessment of stormwater for the proposed cotton gin development. Final design of the system will occur during the civil works design process which will include drain, pipe and detention pond modelling to optimize the system for a design rainfall event and control of water velocities for drainage through the site.

Limitations

This Stormwater Assessment

- Has been prepared by SMK Consultants for the sole use of Kimberley Cotton Company;
- The report should be read in full, and no summary, conclusion or other section of the report may be used or relied upon in isolation or taken as representative of the report as a whole;
- May be provided to other third parties but such third parties' use of or reliance on the report is at their sole risk; and
- May only be used for the purpose as stated in Section 1.1 of the report (and must not be used for any other purpose).

References

- Australian Government Bureau of Meteorology IFD Design Rainfall Depth website - http://www.bom.gov.au/water/designRainfalls/revised-ifd/
- Institute of Engineers Australia 1998, *Australian Rainfall and Runoff – A guide to flood estimation*.
- Government of Western Australia Department of Water 2007, *Stormwater Management Manual for Western Australia – Stormwater Management Plans*.
- Government of Western Australia Department of Water 2010, *Water Quality Protection Note – Stormwater Management at Industrial Site.*

Appendix 1: Locality Plan and Preliminary Site Plans

Figure 2: Locality Plan of Kununurra Cotton Gin

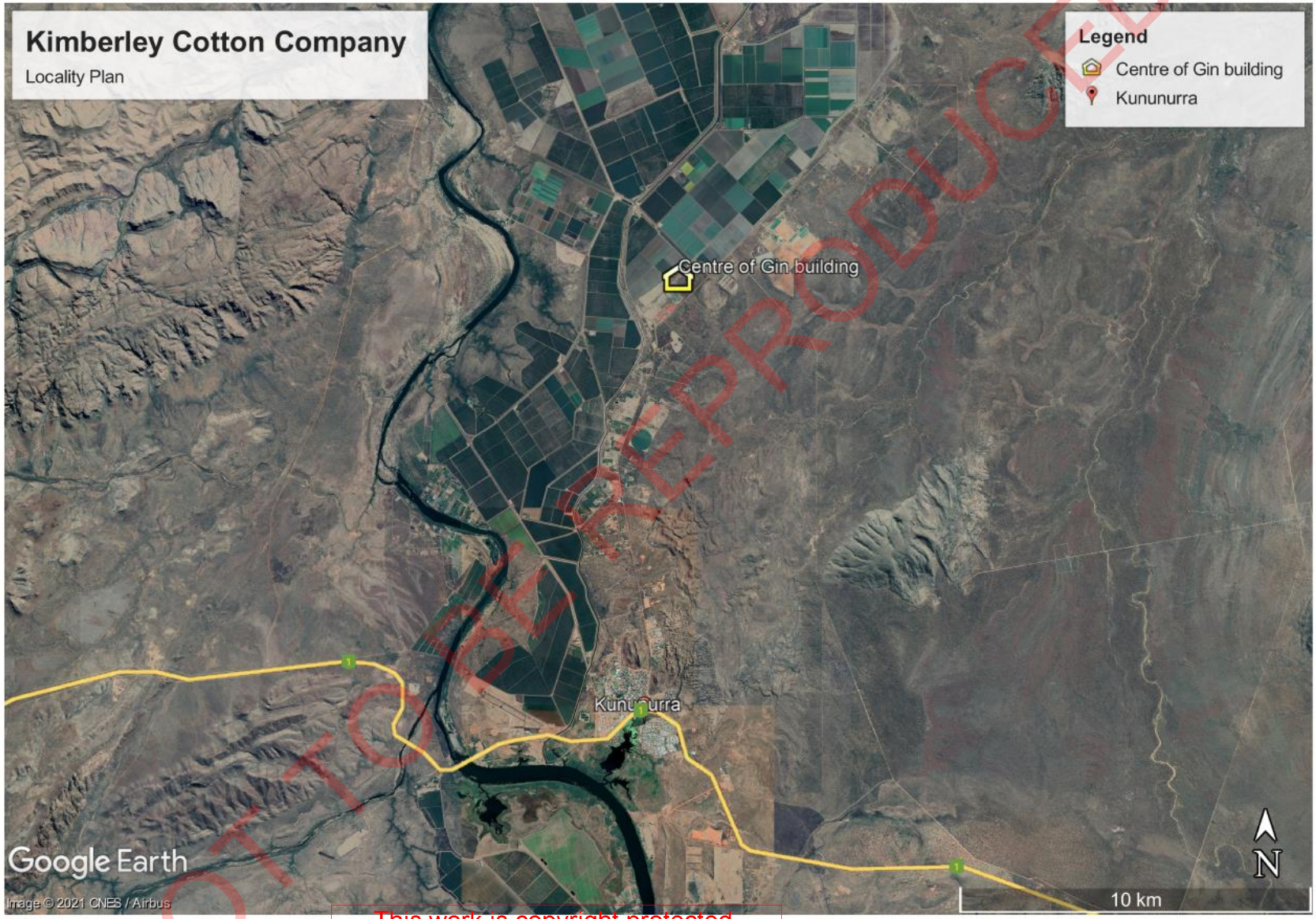


Figure 3: Schematic layout of proposed cotton gin

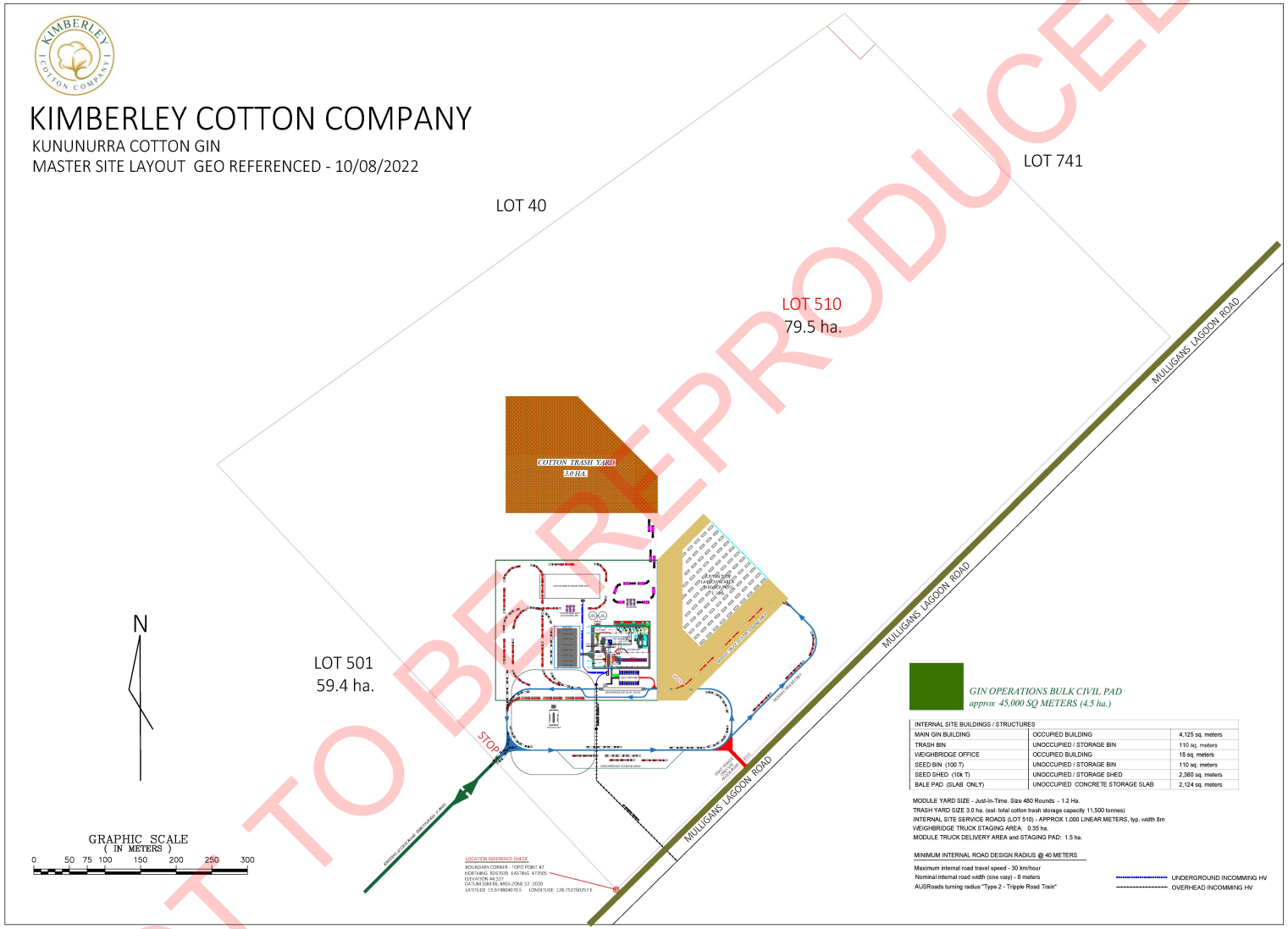


Figure 4: Preliminary Layout of Kununurra Cotton Gin

Appendix 2: IFD Table for Kununurra

Copyright Commonwealth of Australia 2016 Bureau of Meteorology (ABN 92 637 533 532)								
IFD Design Rainfall Depth (mm)								
Issued:	30-Dec-21							
Location Label:								
Requested coordinate:	Latitude	-15.7414	Longitude	128.7527				
		Annual Exceedance Probability (AEP)						
Duration	Duration in min	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	2.44	2.71	3.49	3.98	4.43	4.97	5.36
2 min	2	4.23	4.71	6.1	6.93	7.67	8.55	9.12
3 min	3	6	6.68	8.63	9.82	10.9	12.2	13
4 min	4	7.68	8.54	11	12.6	13.9	15.6	16.8
5 min	5	9.26	10.3	13.3	15.1	16.8	18.8	20.3
10 min	10	15.7	17.4	22.5	25.6	28.5	32	34.6
15 min	15	20.5	22.7	29.3	33.4	37.1	41.7	45.1
20 min	20	24.2	26.8	34.6	39.4	43.8	49.3	53.2
25 min	25	27.2	30.1	38.8	44.3	49.3	55.4	59.7
30 min	30	29.6	32.8	42.4	48.3	53.8	60.4	65.2
45 min	45	34.8	38.7	50.1	57.3	63.8	71.9	77.6
1 hour	60	38.3	42.7	55.5	63.5	70.9	80	86.5
1.5 hour	90	42.8	47.8	62.6	72	80.7	91.6	99.5
2 hours	120	45.7	51.1	67.3	77.8	87.6	100	109
3 hours	180	49.4	55.3	73.7	85.9	97.5	113	124
4.5 hour	270	52.9	59.5	80.3	94.5	108	127	142
6 hours	360	55.5	62.5	85.3	101	117	139	156
9 hours	540	59.6	67.4	93.4	112	132	159	180
12 hours	720	63.1	71.6	100	122	145	176	201
18 hours	1080	69.3	78.9	112	138	167	205	236
24 hours	1440	74.8	85.4	123	153	186	229	265
30 hours	1800	79.9	91.4	133	166	202	251	291
36 hours	2160	84.6	97	142	177	217	269	313
48 hours	2880	93.1	107	157	198	243	301	349
72 hours	4320	108	124	182	230	282	348	401

DUST AND AIR QUALITY ASSESSMENT

ROWE GROUP

SMK

CONSULTANTS

surveying – irrigation – environmental – planning - engineering





Kununurra Cotton Gin

AIR QUALITY ASSESSMENT

Kimberley Cotton Company
PO Box 636
KUNUNURRA WA 6743

June 2022

SMK

CONSULTANTS

surveying – irrigation – environmental – planning - engineering

ABN 63 061 919 003

SMK

CONSULTANTS

surveying – irrigation – environmental - planning

ABN 63 061 919 003

39 Frome Street
PO Box 774
Moree NSW 2400
Ph 02 6752 1021
Fax 02 6752 5070
ptaylor@smk.com.au

www.smk.com.au

Kununurra Cotton Gin

AIR QUALITY ASSESSMENT

Kimberley Cotton Company
PO Box 636
KUNUNURRA WA 6743

June 2022

DOCUMENT CONTROL

Project Name	**Air Quality Assessment**
Proponent	Kimberley Cotton Company PO Box 636 KUNUNURRA WA 6743
Project Reference	21-235
Report Number	21-235-AQA
Prepared for	Kimberley Cotton Company PO Box 636 KUNUNURRA WA 6743
Prepared by	SMK Consultants 39 Frome Street Moree, NSW 2400
Contact	Peter Taylor E: ptaylor@smk.com.au Ph: 02 6752 1021

Author	
Name	*Peter Taylor* Peter Taylor BSc. MEIANZ LAA
Position	Environmental and Resource Consultant
Company	SMK Consultants

Revision History			
Version Number	**Date**	**Authority**	**Details**
0	September 2021	Peter Taylor	Issued to Client
1	December 2021	Peter Taylor	Revised site layout
2	June 2022	Peter Taylor	Final site plan

1 Introduction

SMK Consultants has been engaged by Kimberley Cotton Company to provide an Air Quality Assessment for the proposed construction and operation of a cotton gin on Lot 510 in DP421305, located on Mulligans Lagoon Road, Kununurra. The development is situated approximately 10.7 kilometres north of Kununurra.

The assessment has been prepared in reference to the West Australian Government (WAG) Environmental Factor Guideline – Air Quality (2020).

1.1 Aims and Objectives

This assessment aims to identify the likely impact of air emissions during construction and operation of the cotton gin upon the local region. Impacts considered include dust emissions from bare surfaces within the cotton gin site, dust emissions from the cotton ginning process and dust generated by internal traffic during construction and operations. The objective of the assessment is to determine the potential impact of dust emissions on the amenity of sensitive receivers in the local area.

The objectives of Kimberley Cotton Company are to:

- Minimise adverse impacts upon the surrounding community; and
- Ensure that employees and contractors associated with the operation can work in a safe environment.

1.2 Scope of Works

The scope of works includes preparation of Air Quality Assessment (AQA). The AQA will include the following:

- Determine potential sources of dust emissions;
- Determination of wind and weather conditions;
- Assessment of the surrounding environment and existing conditions;
- Assessment of likely impacts associated with operation of the cotton gin;
- Identify mitigation measures required to minimise dust impacts;
- Recommendations for construction and operation of the cotton gin.

1.3 Definitions

The following report uses several terms associated with cotton. The following provides a brief summary of these terms.

- Seed cotton – Cotton material picked from the field which is raw cotton buds which contain cotton seed, cotton fibre, and cotton plant matter;
- Cotton Module or Round bale – This is the round bales of cotton produced by cotton pickers and wrapped in plastic for storage and transport to the cotton gin. This contains the seed cotton. A standard semi-trailer can carry 6-bales in one layer. Specialist trucks can stack the bales in two layers and carry 9-round bales per trailer. The average weight of a round bale is 2.4 tonnes.

- Cotton seed – This is the seed contained within each cotton boll picked from the plant and makes up approximately 50-percent by weight of a cotton boll;
- Cotton lint – This in the cotton fibre which is pulled off the cotton seed during the ginning process. This is exported for processing into cotton cloth as there are no processing factories in Australia. The cotton lint is pressed into 227 kg highly compacted rectangular bales and wrapped in hessian for transport from the Gin;
- Cotton mote bales – Small, broken, or immature seeds with fibres still attached. The gin removes the motes at a different stage from the mature, whole seeds. Motes can be sold as a poorer quality cotton material for use in products such as denim;
- Cotton trash – The ginning process includes several stages of cleaning the seed cotton to remove sticks, leaves, dust and other foreign material collected in the seed cotton during picking of the cotton from the paddock. Cotton trash is vegetative material which can be mulched and used as a soil conditioner to improve organic matter. The cotton trash can be stored on the gin site for processing or transported directly back to farms for on-farm processing and incorporation in cultivation paddocks.

1.4 Cotton Ginning Process

The cotton ginning process separates the cotton seed, cotton lint and gin motes. The three products can then be processed into a range of products. Cotton seed is a high-quality stock feed but also can be used for cotton seed oil which is a high value vegetable oil material used for cooking and cosmetics. The cotton fibre is processed into yarn for cotton clothing. The motes are further processed to extract the fibres and separate other organic material.

The processes occurring at the cotton gin can be summarised as follows:

- **Unloading:** The incoming cotton arrives at the gin in round bales weighing approximately 2.4 tonnes each. The round bales will initially be stored in the module yard and then carried into the module feeder bay for processing. The module feeding system removes the wrapping on the bales then utilises high speed spiked cylinders to separate the cotton bolls for processing. The automatic air suction control pulls the cotton bolls into the conveyance system for ginning.

- **Drying and Pre-cleaning**: After removal from the round bales, the seed cotton is subjected to a multi stage drying and pre-cleaning treatment process. The first drier is sized to provide a specified ratio of heated air which enables the maximum drying capacity of the seed cotton. The cotton moves onto the inclined cleaner which further separates the cotton and cylinder spikes are used to remove the smaller trash. The secondary cleaner then removes the larger trash such as sticks and leaves.

- **Distribution and Overflow**: A specially designed trough conveyor delivers the cleaned and dried cotton to the hoppers which are mounted above the feeding system into the gin saws. An overflow system captures any excess seed cotton and returns this back into the system.

- **Feeding and Ginning:** The main component in the ginning process, the gin stand is where the lint and seed are separated. The feeder enables the gin stand consistent input so maximum throughput can be achieved. The gin stand comprises of a bank of saws which rub against a bank of ribs to pull the lint away from the seed. The bank of ribs allows the lint to fall through, and separates the seed.
- **Lint Cleaning:** Following the separation of the lint and the seed, the lint requires additional cleaning to ensure all contaminants are removed. First stage lint cleaning is through a centrifugal cleaner which uses centrifugal force to spin away the contaminants. The cleaning technology does not cause any damage to the fibre as there are no moving parts which the lint could get caught on. The final stage of cleaning is a gentle saw cleaner which combs out the lint.
- **Condensing and Moisture Restoration:** The condenser takes the single fibres of lint and presses it into a blanket like layer or batt. At this point moisture is reintroduced to the fibre (up to 7.5%), which enhances the compressibility of the cotton fibre.
- **Pressing and Bale Handling:** The final step in the ginning process requires the cleaned lint to be compressed into 227 kg rectangular cotton bales. The bales are weighed and strapped before being moved into bale storage area for export.

2 The Development Site

2.1 Development Site

The selected site is located northeast of Weaber Plain Road and is accessible via Mulligan's Lagoon Road to the southeast. The property was originally developed for the Kununurra Sugar Mill which has since been decommissioned.

Since the Sugar Mill was decommissioned, the south west section of the property has been subdivided and developed as a grain receival facility, mainly for storage of corn grown in the Ord River Irrigation Area (ORIA).

The proposed cotton gin site is to be located northeast of the grain bunkers on land that had historically been cleared but now supports mainly regrowth vegetation. The cotton gin and infrastructure will occupy an area of approximately 34 hectares. This will include the following components:

- Cotton Gin building to enclose the cotton gin and processing equipment;
- Office for staff and administration;
- Open sided bale Shed to store lint cotton bales and protect the processed bales from dirt, rain and other material which may reduce the quality of the processed cotton;
- Cotton seed storage hopper for short-term storage of cotton seed;
- Round bale or Module storage area consisting of formed rows for storage of round bales brought to the Gin from surrounding farms;
- Cotton trash hopper and bulk storage area;
- Weighbridge for weighing all trucks in and out of the site;

- Sediment and stormwater management system for capture and settling of stormwater runoff from within the site;
- Internal road system for circulation of trucks delivering and removing cotton from the site;
- Staff parking area to be located adjacent to gin office and away from internal roads used by trucks.

2.1.1 Site Layout and Operations

The preliminary layout of the proposed development site is presented in the following figures 1, 2 and 3. The gin building is centre to the development. This building is be orientated east-west to minimise the shed wall exposure to the sun. The remainder of the site is orientated around this building. The final location of the detention and runoff capture ponds will be subject to civil design details and the orientation of the drainage system.

The site will be cleared of vegetation to allow construction works. Once cleared, building pads will be constructed for the cotton gin and lint bale storage shed. The cotton seed hopper will be built to the north of the gin. The module storage area will be constructed to the northeast of the gin. All internal roads will be gravelled. The module pads will be gravelled. An extensive area of land between buildings and module pads will initially be cleared but once the site is operational, these areas will be managed as grassed buffer zones to reduce the total area of bare ground exposed.

The gin may produce up to 312 tonne of cotton seed per day when the Gin is processing the design capacity of 1,224 bales of lint cotton. The cotton seed will be stored in a cotton seed hopper, then trucked from the site on a continual basis. For this facility, the majority of the cotton seed will be trucked offsite for cattle feed in the Kimberley region. The potential exists to utilise road train triples for removal of the cotton seed and therefore up to 75-tonnes of cotton seed will be removed each load. The cotton seed removal process will therefore require a minimum of four (4) triple road trains movements per day.

Cotton trash is conveyed from the various cotton cleaners with the gin to the cyclone wrack. The preliminary design involves 21-cyclones which the cotton trash will pass through. The cotton trash is collected at the base of the cyclones and conveyed to a cotton trash hopper adjacent to the cotton gin for temporary storage. This hopper will sit over an enclosed shed. The cotton trash will be loaded into a body truck and transported across to an open gravel pad area which is referred to as the cotton trash yard on the attached plans. The loading of the truck is done once the doors to the cotton trash shed are closed. The pad will consist of a compacted area to allow 24-hour access. This area will be drained to a detention pond to capture any runoff and settle organic matter that may be eroded off the pad area.

Cotton trash will then be returned to cotton farms for spreading on paddocks as organic matter to increase soil quality and soil carbon.

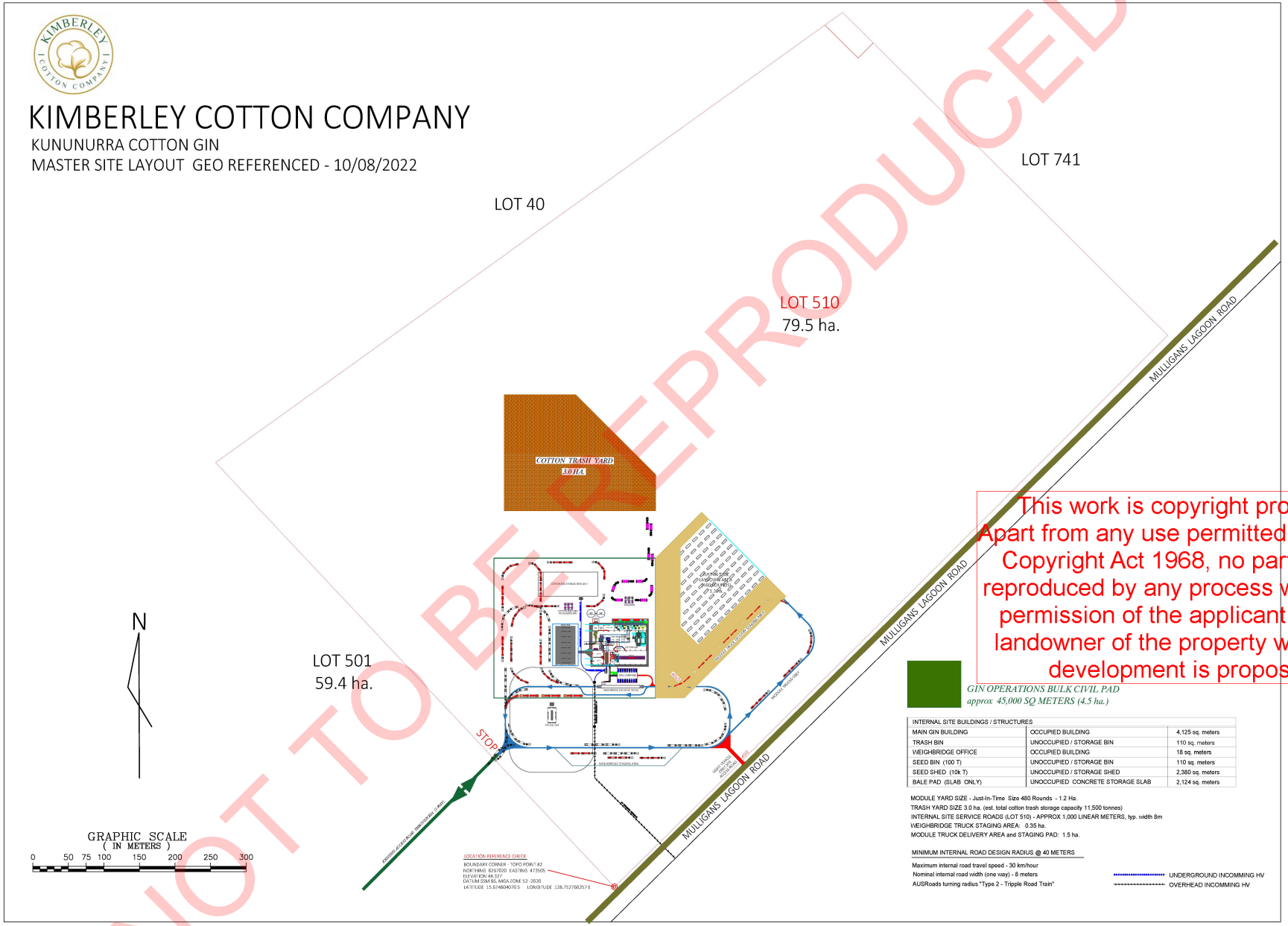
2.1.2 Staging

Kimberley Cotton Company anticipate that the cotton gin will be constructed in two primary stages. Stage 1 will involve installation of a three-stand cotton gin with a processing capacity of approximately 60-bales per hour. Stage 1 is to include all buildings identified on the plans and the module yard area.

Stage 2 will involve installation of two additional ginning stands and associated equipment within the gin building. This will allow the gin to process a design capacity of 120-bales per hour of lint cotton.

Ginning requirements are anticipated to increase in year 2. Kimberley Cotton Company anticipate a demand to gin up to 102,000 bales in year 2 and this may extend to 150,000 bales by year 5 if the cotton farming industry expands in the ORIA.

Figure 1: Overall preliminary layout of KCC Cotton Gin site

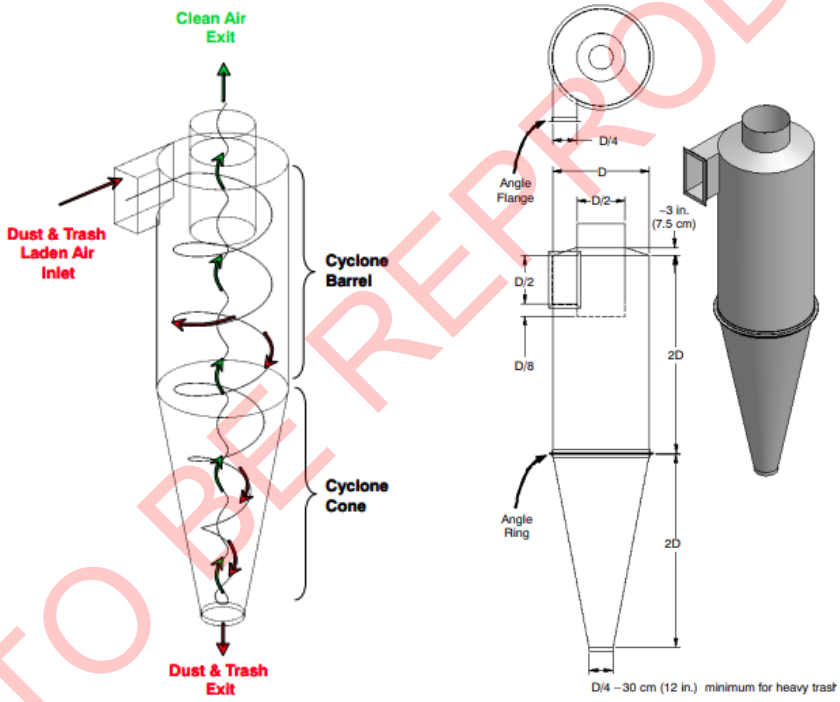


2.1.3 Dust Emission Management from Cotton Gin

The ginning process involves blowing the cotton through the gin from each processing point. This process generates a significant internal air flow. The air flow is released through a system of Cyclones which are designed to separate dust and cotton particles from this flow of air through the cotton gin. The cyclone dimensions are based on the volume of air flow and the potential dust particle concentration in the air stream entering the cyclone. A cotton gin operates with multiple cyclones to collect dust emissions. The Kununurra cotton gin preliminary design includes 21-cyclones of varying sizes.

The following diagram shows a typical cyclone used at a cotton gin. Air flows into the top of the cyclone which pushes the raw dust and trash material in a downward spiral. The heavier particles fall to the bottom of the cycle and the cleaned air is emitted from the top. The trash and dust material collected at the base of the cyclone are then transferred to an enclosed trash shed with an overhead storage hopper bin for transfer via an enclosed truck to the trash storage yard.

Figure 2: Sketch of a cyclone used to remove dust particles from the air emissions from the Cotton Gin



Some cyclones are capped to alter the internal flow of air and prevent rain entering the cyclone. The capping can be used to direct the air exhaust back to ground level or in a preferred direction for optimum dispersion of this exhausted air. Alternatively, the cyclone emission points can be extended to increase the height where the air is emitted to change the dispersion process.

The Kununurra Cotton gin preliminary design includes 21-cyclones of varying sizes. These are to be located on the north side of the cotton gin. The cyclones will range in total height from 8m to approximately 12m with all emission points above the adjacent roof line of the cotton gin building. The cyclone size varies according to air flow through that specific cyclone. The larger cyclones are required to exhaust air that potentially contains a higher dust particle content. Smaller cyclones are required for the cleaned cotton air flow emissions. The following image provides photographs of typical cotton gin cyclones, both new and old.

Figure 3: Examples of cotton gin cyclones installations

Cyclones are an essential part of the cotton ginning operations as the internal air flow velocity to move the cotton through the ginning process is designed to provide appropriate emission rates through the cyclone system to enable the cyclones to operate efficiently at the design flow rate. The diameter and height of the cyclone is based on air flow and predicted dust content.

For the Kununurra Cotton Gin, the preliminary site design has located these cyclones on the north side of the Gin. This location is based on the internal layout of machinery within the gin building. The major internal piping systems and the fan bay is located on this side of the cotton gin and therefore the design locates the cyclones adjacent to this area to minimise internal piping requirements.

The cyclones will require annual maintenance in addition to immediate repairs when damage is identified. Maintenance will include painting, repair of any fractures or cracking, replacement of inlet piping when cracking or fracturing is identified, in addition to ensuring the cyclone rack remains aligned and fully operational.

The following table presents the preliminary airflow system components and discharge rates. The table identifies the location and specific purpose of the 21-cyclones to be installed for dust management of the air flow through the cotton gin.

Table 1: Preliminary Airflow system duties and discharges

System general description	Discharge point location	Airflow volume	Dust control type	Cyclone size	Airflow discharge	
		(CFM)		Inches	m^3/s	Discharge speed (m/S)
1A Pull	main cyclone rack	26,000	1D-3D Cyclone	96	12.3	10.9
1B Pull	main cyclone rack	26,000	1D-3D Cyclone	96	12.3	10.9
2A Pull	main cyclone rack	22,000	1D-3D Cyclone	90	10.4	10.5
2B Pull	main cyclone rack	22,000	1D-3D Cyclone	90	10.4	10.5
Overflow	main cyclone rack	8,000	1D-3D Cyclone	56	3.8	9.8
Gin Trash	main cyclone rack	12,000	1D-3D Cyclone	68	5.7	10.0
No1 Primary Lint Cleaner	main cyclone rack	11,000	1D-3D Cyclone	64	5.2	10.3
No1 Secondary Lint Cleaner	main cyclone rack	11,000	1D-3D Cyclone	64	5.2	10.3
No2 Primary Lint Cleaner	main cyclone rack	11,000	1D-3D Cyclone	64	5.2	10.3
No2 Secondary Lint Cleaner	main cyclone rack	11,000	1D-3D Cyclone	64	5.2	10.3
No3 Primary Lint Cleaner	main cyclone rack	11,000	1D-3D Cyclone	64	5.2	10.3
No3 Secondary Lint Cleaner	main cyclone rack	11,000	1D-3D Cyclone	64	5.2	10.3
No4 Primary Lint Cleaner	main cyclone rack	11,000	1D-3D Cyclone	64	5.2	10.3
No4 Secondary Lint Cleaner	main cyclone rack	11,000	1D-3D Cyclone	64	5.2	10.3
Primary Mote Pull	main cyclone rack	16,000	1D-3D Cyclone	76	7.6	10.7
Secondary Mote Pull	main cyclone rack	16,000	1D-3D Cyclone	76	7.6	10.7
Mote Transfer	main cyclone rack	6,000	1D-3D Cyclone	48	2.8	10.0
Battery Condenser	main cyclone rack	40,000	1D-3D Cyclone	90	18.9	9.5
Seed Bin	seed bin	2,700	1D-3D Cyclone	38	1.3	7.2
Trash Bin	trash bin	4,000	1D-3D Cyclone	42	1.9	8.7

2.1.4 Gin Operating Hours

The intention of cotton ginning is to start the ginning season and keep the cotton gin running until all cotton has been processed. This may involve processing of the first two or three days of cotton received at the site and then a shut down period to fine tune the processing. The actual cotton gin operation is often hampered by internal break-downs and blockages within the processing equipment. This results in potentially one or two complete shutdowns through the day. Additionally, Sunday is the traditional day for more major repairs and complete servicing of internal equipment.

External operations include the receival and despatch of cotton products including raw cotton, processed cotton lint bales, cotton seed, and cotton trash, in addition to delivery and service operations.

The control point for all external activities for a cotton gin operation, is the weighbridge. All materials entering or leaving the cotton gin site must be weighed and documented. The opening hours for the weighbridge therefore control external activity on the cotton gin site.

The following provides anticipated operating hours for the cotton gin.

Table 2: Hours of Operation

Activity	Monday to Friday	Saturday	Sunday and Public Holidays
Ginning operations	24-hours	24-hours	24-hours subject to weekly maintenance requirements
Weighbridge hours for receival and despatch of trucks	➢ 5am to 7pm during ginning season ➢ 7am to 4pm outside of ginning season (Mon to Fri) ➢ Extended weighbridge hours – 24/7 for initial receival of cotton modules until module yard is filled (3–4-week period) in June		
Maintenance of plant and equipment during non-ginning season	7am to 5pm	7am to 1pm	Nil

A cotton gin aims to operate on a 24-hour basis so that the cotton delivered to the site is processed in the shortest time possible. Unprocessed cotton which is stored in the module yard area or remains on-farm in round bales, is exposed to weather. Rainfall and dust could contaminate the cotton and therefore result in downgrades of cotton quality, resulting in reduced prices for the cotton products. Raw wet cotton can result in mouldy cotton which is more difficult to process and will result in downgrades in colour of the cotton from the pure white cotton which the gin aims to produce.

The option of operating on a 24-hour basis from commencement through to completion is the aim of all cotton ginning companies. Breakdowns will occur through the day and therefore at some stage, part of the cotton ginning machinery will shut down. The issue of restarting the electrical motors within the cotton gin needs to be considered in relation to the draw of electricity from the system to restart the motors. The cotton gin will use soft-start electrical motors where affordable,

but will also include a computer aided restart procedure to limit the draw of electricity from the local electrical grid.

KCC is requesting that site operations, mainly the opening of the weighbridge commences at 5am. This reflects the standard rural day in the Kimberley Region. Due to extreme temperatures, work commences once daylight is available and follows a custom of working long days when required. Opening of the weighbridge at 5am will trigger the receival of trucks either delivering cotton or despatching cotton products. Cotton lint bales will be trucked to Darwin for export and therefore these trucks will have an 830km each way trip. The receival and despatch of these trucks will have a varied schedule. The potential dust emissions from these trucks will be low as they will be travelling on sealed roads and the process of loading these trucks will not generate dust.

3 Receptor Location

Aerial imagery searches were undertaken to identify the location of buildings around the proposed cotton gin site, with the purpose of identifying potential receptors. The imagery search was ground-truthed by KCC.

The aerial image showing seventeen (17) residences in the local area is presented in appendix 1. The image includes circles measured from the centre of the gin building. The circles have a radius of 500m, 1000m, and 1500m. The receptors are concentrated to the south of the site along Weaber Plain Road. Receptors 1, 5, and 6 are located south of the site. Receptors 2, 3 and 4 are located east, northeast and north of the site, respectively. Receptors 2, 3 and 4 are the closest receptors to the gin site.

All other receptors identified on the plan are located between 1.3 km to 3.5 km away from the gin building.

The following table presents a listing to show the receptor identification, location and receptor type.

Table 3: Listing of receptors within 3.5 km of the proposed cotton gin site

Receptor ID	Location	Receiver Type	Distance and Direction from Gin Building
1	Mulligans Lagoon Road	Rural residential	1.34 km South
2	Mulligans Lagoon Road	Farm residence	1.2 km east
3	Mulligans Lagoon Road	Farm residence	980 m northeast
4	Weaber Plain Road	Farm residence	655 m north
5	Weaber Plain Road	Residence on industrial site	1.42 km southwest
6	Weaber Plain Road	Rural residence	1.5 km southwest
7	Mulligans Lagoon Road	Rural residence	1.71 km south
8	Mulligans Lagoon Road	Rural residence	1.76 km south
9	Mulligans Lagoon Road	Rural residence	1.8 km south

Receptor ID	Location	Receiver Type	Distance and Direction from Gin Building
10	Mulligans Lagoon Road	Rural residence	1.88 km south
11	Weaber Plain Road	Rural residence	1.91 km southwest
12	Weaber Plain Road	Rural residence	2.1 km south-southwest
13	Weaber Plain Road	Rural residence	2.2 km south-southwest
14	Weaber Plain Road	Rural residence	2.38 km south-southwest
15	Weaber Plain Road	Farm residence	2.42 km northwest
16	Weaber Plain Road	Farm residence	3.1 km northwest
17	Weaber Plain Road	Hoochery distillery tourist facility	3.47 km north

The description of receiver types has been included to provide some recognition of the different landuse around the receptor. For a rural residential property, there is limited other activity associated with the dwelling other than vehicle movements. For Farm residences, the receptor would be located near land that is either cultivated or activities occur that may on occasion cause raised dust from either crop harvesting, truck activity, machinery movements or during the handling of produce.

The Hoochery facility is a tourist attraction and therefore on occasions, occupied by a larger group of people. The site would potentially be more sensitive to changes in ambient dust conditions. This is located 3.38 km to the north of the cotton gin building. The Hoochery continues to be part of an active farming operation which would be generating its own dust.

The potential for additional receptors to establish in areas subject to prevailing wind directions from the gin facility is limited by land zoning and access. The land to the north, west and east of the site is either developed for farming or consists of open grazing land that is not suitable for farming. The potential for additional receptors to establish near the gin site is limited to Weaber Plain Road corridor. This is extensively developed for industrial purposes, mainly associated with trucking and industrial related facilities. The rural residential land available to additional receptors is located some 2.5 km or more to the south-southwest of the gin site. The majority of this rural residential area is already built on.

4 Weather Conditions

4.1 Wind Data

Appendix 2 presents wind roses generated for Kununurra from two sources. Ginning operations are anticipated to commence in late June. In June, July, August the prevailing wind direction is from the southeast quarter with some southerly and easterly winds. A minor frequency of northerly wind directions starts in August.

The wind rose data indicates that wind direction increases from the north for September, October and November. Southerly and easterly winds decrease in frequency during this period of the year.

By October, approximately one quarter of the wind flow comes from the north. Minor wind flows continue from the south to east. A similar pattern occurs in November.

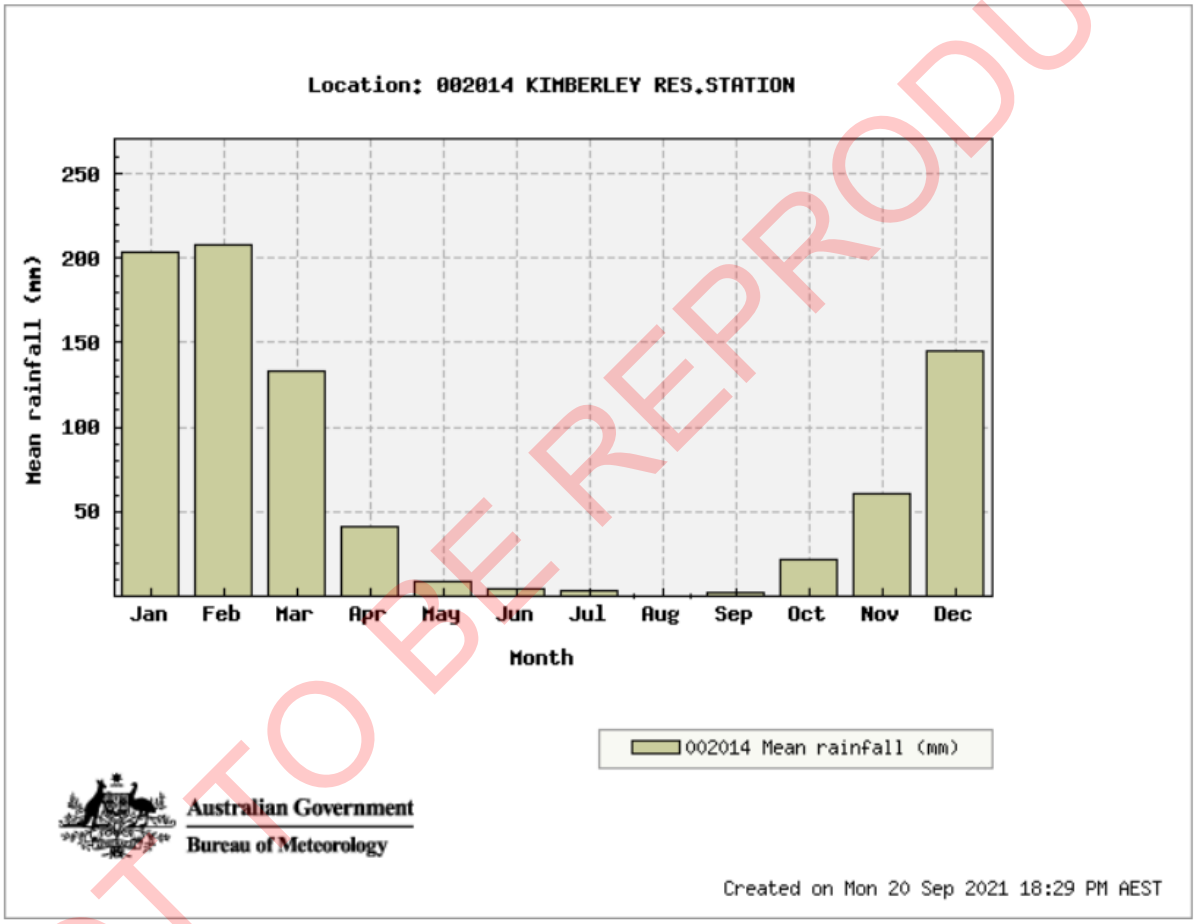
The change in wind pattern can be associated with the dry weather from June through to August. The humidity starts to increase in September and increases through to December in association with the wet season. More humid conditions results in the northerly wind pattern dominating the prevailing wind conditions.

Ginning would generally be completed by the end of September/October (3 to 4-months) but may continue through to November in seasons with late harvest or delays in planting of cotton at the start of a year.

4.2 General Weather

Average annual rainfall over the past 40-years is 824mm. The majority of rain falls between December and March. The following graph presents the BOM summary of rainfall distribution.

Figure 4: Rainfall distribution for Kununurra



The ginning and processing season would start in June and run through to October in a normal year. Based on averages, the site would have minimal risk of rainfall during the majority of the ginning season. The site would be exposed to potential storm conditions in October and November.

Temperatures have a relatively minor range with average temperatures during the ginning season between 26 degrees C in the early part of the season through to 32 degrees C late in the season.

Humidity records show increased humidity between the months of November through to March. (Wet season) The months of June through to September have relatively low humidity. The wet

season can commence in October with a storm and then be more significant in November through to March. Minimal activity will be occurring at the gin site through the wet season.

Table 4: Average Humidity for Kununurra (BOM Airport data)

Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean 9am relative humidity (%)	68	71	60	42	34	32	28	28	36	40	48	60
Mean 3pm relative humidity (%)	51	56	44	31	26	24	20	18	21	24	32	45

5 Dust Emission Criteria

Cotton gin emissions consist of dust from the ginning process and dust from internal traffic and bare earth areas. No other contaminants can be associated with air emissions, such as significant levels of carbon monoxide, metals such as lead, ozone, or nitrogen dioxide. The dust emissions from the cotton gin will include fine particles of soil, cotton fibres not captured in the ginning process, and other fine organic matter not captured in the dust processing plant.

The following table presents the standards for air pollutants for Western Australia.

Table 5: Threshold Levels for dust emissions in WA

Pollutant	Averaging period	Maximum concentration	Maximum allowable exceedances (goal)
PM_{10}	1 day 1 year	50 µg/m^3 25 µg/m^3	No exceedances (see note)
$PM_{2.5}$	1 day 1 year	25 µg/m^3 8 µg/m^3	20 µg/m^3 (2025 goal) 7 µg/m^3 (2025 goal) No exceedances (see note)
TSP	Annual	90 µg/m^3	

$PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 microns and 10 microns, respectively; ppm = parts per million; µg/m^3 = micrograms per cubic metre.

Note: Before 2016, there was an allowance of 5 exceedances per year for the PM standards. This was replaced in 2016 by an exceptional event rule. An exceptional event is a fire or dust occurrence that adversely affects air quality at a particular location, causes an exceedance of 1-day average standards in excess of normal historical fluctuations and background levels; and is directly related to bushfire, jurisdiction-authorised hazard reduction burning or continental-scale windblown dust. The handling of exceptional events in the reporting of averages is specified in the Air NEPM.

The cotton gin emissions are considered within WA ambient air quality guideline values (AGVs) pollutant categories as “Criteria pollutants”. The emissions do not include Principal or Individual toxic substances as the emissions are limited to organic matter and soil particles.

The use of mostly biodegradable chemicals has been adopted across the cotton industry to avoid the potential for toxic contaminants to be present in the cotton products. Such toxic chemical has been replaced by modifying the cotton plants to include a resistant to bugs and the introduction of integrated pest management where beneficial insects (e.g. native wasps) are introduced to the crop to provide natural control of pest insects and therefore avoid the use of chemicals where possible. The risk of chemical emissions from a cotton gin have therefore been removed.

The Department of Water and Environmental Regulation publish an annual Western Australian Air Monitoring Report from 15-air monitoring sites. None are in the Kimberley Region and therefore no local ambient background dust levels are available for Kununurra.

The Guidelines for air emissions, (excluding odour and fugitive dust) involves the predicted ground level concentration of air pollutants (GLCs). This relates to ambient air quality values or AGVs and not specific emission levels from a point source.

6 Dust Emissions from the Cotton Gin Site

6.1 Traffic and Module Areas

Potential sources of dust within the facility would consist of vehicle movements generating road dust and wind erosion from area of bare earth or gravel. The following provides a general description of activities from these sources during construction and operation of the cotton gin.

- Construction traffic accessing the site for civil construction works and delivery of ginning equipment and buildings;
- Inbound and outbound road train movements occurring daily with the transfer of cotton modules from trucks to cotton storage pads during the ginning season.
- Front-end loaders or moon buggies operating on site to unload trucks and move cotton modules from the storage area to the module loading bay;
- Trucks hauling ginned cotton and cotton seed from the site;
- Staff vehicle movements including light vehicles carrying staff around the site during the ginning season for management and maintenance.

Internal haul roads will not be sealed but consist of gravel pavements. Areas where trucks are loaded including the cotton bale shed and the cotton seed shed maybe concreted, or bitumen sealed to ensure stability when loading. Activity on these areas would include the use of forklifts for the loading process.

Standard operations will involve daily use of a watering truck to wet the regularly used access roads. The purpose of this would firstly relate to road safety to avoid dust and potential traffic conflict. The second purpose relates to minimising road dust emissions. Road watering is commonly used for traffic direction with the simple advice to inbound and outbound trucks to follow the wet roads.

Road dust emissions are highly variable. Previous published studies for cotton gins suggest an emission rate in the order of a minimum of 0.2 g/s TSP to a maximum of 0.6 g/s TSP. This is highly dependent on the road surface, wind conditions, and speed of the vehicle. Vehicle speed will be limited on this site for safety purposes. Trucks will generally move at a speed of 20 km/h or less.

For trucks collecting cotton from farms, wheel dust can become an issue where trucks stop, and the dust falls onto the pavement from the wheel hubs. The wheel dust would consist of extremely fine soil particles collected in truck wheels which can be deposited once a truck stops. The potential is available to reduce the ingress of this dust by having the trucks stop at another location

(before entering a bitumen road from the farm) to drop this dust. This is a common practice which avoids an accumulation of wheel dust at stopping points within the gin site, such as before the weighbridge. This would avoid the need to collect this dust onsite and avoid the risk of this dust become airborne every time a truck disturbs the deposited dust.

6.2 Cotton Ginning Emissions

Cotton ginning emissions will consist of air being exhausted from the cotton gin cyclone system. Only limited dust emissions are present within the gin building itself as the cotton is only exposed once it is cleaned. The inside of the cotton gin will be kept clean to avoid any contamination of the cotton being processed. The ginning operation is generally undertaken in an enclosed environment to avoid dust contamination within the processing area.

A major component of the ginning process is the separation of leaves, stalk and other organic matter in the raw lint cotton delivered to the facility from the irrigation farms. Raw cotton will contain some dirt particles from the harvesting and transport process. The initial cleaners will be designed to extract the majority of course dust and organic matter. The exhaust from these cleaners will pass through the larger cyclones. The exhaust emissions from the final cleaning processes when the cotton lint has been separated from cotton seed, to be packed into lint bales, will be minimal. The smaller cyclones will mainly be extracting cotton fibre particles. As much of this as possible is recycled through the motes system to maximise the extraction of cotton fibre from the raw cotton.

The preliminary design of the cyclone dust suppression system will consist of 21-cyclones, constructed in a rack along the outside of the gin building. The top of the cyclones will be above the height of the building eave to allow dispersion of the air emissions. The cyclone system is designed in accordance with air flow volumes. Basic cyclone design will result in a separation of heavier dust particles. Emissions will generally be limited to lighter dust and some cotton fibres occur.

The dust and cotton materials removed by the cyclones are referred to as cotton trash. The cotton trash from the cyclones is augered to the adjoining trash house. The trash is stored in an overhead storage hopper bin and then trucked to the trash storage site. The trash shed is sealed when a truck is loaded to prevent the escape of dust and cotton material.

For design purposes, publications have suggested that emission rates from the cyclones vary from approximately 0.014 g/s to 0.7365 g/s for TSP, 0.0054 g/s to 0.35 g/s for PM_{10}, and 0.0007 g/s to 0.0278 g/s for $PM_{2.5}$. (Pacific Environment Ltd 2014) for each cyclone. These are presented as 24-hour averages on the assumption that the cotton gin will be processing cotton on a continual basis over a 24-hour period. This generally does not occur as on average; ginning will stop for a period of 2 to 3 hours per day for repair or maintenance work.

The final design of the cyclone rack has not been prepared as this will be subject to final air flow requirements through the gin system. A minimum of 21-cyclones has been incorporated in the preliminary design. The rate of air emissions will vary from cyclone to cyclone. The preliminary design of the cyclone system for the KCC gin identifies a range of air discharge rates for the 21-cyclones, between 1.3 and 18.9 cubic metres per second. The 50-percentile discharge rate is predicted to be 5.2 cubic metres per second.

The predicted emission rates of TSP were considered to range between 0.7 to 49 mg/m^3 of TSP, with a 50-percentile emission rate of 12.5 mg/m^3. The rate of emissions will vary as a result of cotton quality. Parameters impacting this quality include seasonal conditions, soil particles collected in the cotton during harvesting and the impact of dust on the raw cotton during transit and storage.

The cyclone rack is to be located on the north side of the cotton gin building to limit the effect of the adjoining building on prevailing winds and dispersion of the emissions. The specific emission height of the cyclones is yet to be determined. However, the height is normally set above the adjoining eave of the cotton gin building. The ridge of the gin building is estimated to be in the order of 17m in height with the eave at approximately 14m above ground level. The emission point of the cyclones will therefore be in the order of 15m or 16m above ground level. The cyclone rack will be approximately 16m from the edge of the building.

Two of the cyclones identified will be away from the gin building, mainly a cyclone over the seed hopper and a cyclone associated with the end of the pipe delivering trash to the trash hopper. Both of these cyclone will be set on the roof of these buildings to maximise dispersion.

7 Emission Assessment

7.1 Traffic and Module Yard

The overall layout of the cotton gin is based on three primary internal circuits. The main circuit will carry trucks across the weighbridge to be located adjacent to the office building.

A second circuit to the east will be for seed cotton bale trucks delivery cotton from the farms to the module storage area. Once weighed and unloaded, these trucks would cross the weighbridge a second time and then leave the site. This circuit is contained and would be used regularly during the receival part of the season. This circuit would therefore be constantly watered.

The third internal circuit will carry lint bale and cotton seed trucks. On average, this may include six trucks per day during the ginning season and continue for potentially several weeks after ginning to remove the bales and seed from the site prior to the wet season commencing.

The potential exists for uncontrolled emissions from roads and bare areas of gravelled surfaces and areas of bare ground. It is noted that once construction works are completed, areas of bare ground, including fire breaks, will be allowed to re-grass. The grass will be managed by slashing to keep it short as a fire risk management strategy. The presence of the grass cover will minimise the area of bare ground and therefore minimise dust emissions from these areas.

Wind borne road dust is a matter that relates to quality of gravel and the generation of fines on top of the gravel during road use. KCC intend to utilise selected gravel material on road surfaces to minimise the development of fine soil particles. This will be achieved through the selection of gravel material with minimal fines, such as a course road base gravel.

Previous assessments of cotton gin sites have identified TSP road dust emission values in the order of 3.5 g/s as a maximum over a 12-hour period with 10 to 15 truck movements per day. These emissions can be managed by road watering. Regular road watering and selection of course gravel materials for road surfaces, will minimise the potential for road dust emissions.

7.2 Cotton Gin Emissions

The primary source of dust emissions from this facility will be from the cyclones which treat the exhausted air from the cotton ginning process. The rate of discharge from each cyclone will vary according to its purpose and the source of air from the ginning process.

No final design is available for specific considerations or modelling. Cotton gins are all very similar in operation and emission levels and therefore data available from other cotton gins has

been obtained for calculation purposes. The information available is limited but has been used as a preliminary assessment of whether emissions will meet WA Criteria.

The specific Guideline adopted for this assessment is the *Draft Guideline – Air Emissions* prepared by the DWER in 2019 (The Guideline). It is unclear whether the Guideline has been finalised and adopted.

Section 9.2 of the guideline adopts a process of Screening Calculations for the purpose of determine whether potential dust emissions are insignificant or may exceed AGV screening values. This process has been followed using data available for cotton gin air quality assessment undertaken for Australian cotton gins between 2014 and 2018. The following steps utilise the screening concentration calculation process presented in figure 2 of the above draft guidelines for TSP. Insufficient accurate data is available for PM_{10} and $PM_{2.5}$ for assessment of these parameters without a complete cotton ginning and cyclone system design. TSP levels provide a broader estimate of potential dust emissions.

The Guideline assessment process aims to screen out "insignificant" emissions. If an emission is not insignificant, the assessment process needs to include Detailed Analysis which is beyond the scope of this report.

The screening analysis adopted in the Guideline involves:

- *A conservative analysis;*
- *Simple calculations to predict screening concentrations (SC) assuming worst case conditions and not considering all factors affecting air dispersion;*
- *Compares the SC value with the ambient air quality guideline screening tolerances, which represent likely insignificant impacts.*

The screening analysis uses point source or stack emissions which is acknowledged to over-estimate the potential ambient conditions. Importantly, the screening method does not allow for dispersion or settlement of the emissions between the point source and a sensitive receptor. It aims to provide an estimate of potential air emission exceedances.

For the Kununurra Cotton gin site, the land is relatively flat with a gentle slope to the north from the cotton gin. The terrain will have minimal impact on the dispersion of emissions. The primary impact will relate to the content of the emissions and wind direction.

The following provides a screening assessment of TSP stack emissions from the cyclones based on available data and the calculation method adopted in the Guideline.

Step 1 – Calculate emission rate (E)

$E = (C/1000) \times Q$

Where E = Emission rate in grams per second
C = Emission concentration in mg/m^3
Q = Volumetric flow rate of emission in m^3/s

For the 50-percentile emissions, C was identified to be 12.5 mg/m^3 and worst case is in the order of 49 mg/m^3. The 50-percentile design flow rate from the cyclones is in the order of 5.2 m^3/s with the larger cyclone flow rate of 18.9 m^3/s. For 50-percetile emission rates, E is calculated as 0.065 g/s. This can be compared to the range from previous cotton gin site assessments of 0.014 g/s to an extreme level of 0.7365 g/s for TSP.

Step 2 – Calculate effective emission height (H_{eff})

The cyclone design is not completed. The gin building will be approximately 6m away from the cyclones. The building will be approximately 56m wide by 96m long, and 17m high in the ridge line. The location of the cyclones exposes them to minimal wind shielding from the building, based on wind rose information during the ginning season. This has been done on purpose to allow a clean air flow for dispersion of emissions from the cyclones.

Based on the scenarios presented in the Guideline, the cyclones are within 5 times the building dimension. On this basis, the guideline recommends using the following formula to calculate the effective emission height of the cyclones.

H_{eff} = Min(Hs, 0.5 x Hb)

Where H_{eff} = effective emission height (m)
Hs = stack height (m above ground level at emission point) = 14m
Hb = building height (m) = 17m

H_{eff} = 8.5m based on 0.5 x Hb
H_{eff} = 14m based on stack height

The draft equation for H_{eff} is difficult to interpret due to the "," in the formula. It may or may not allow the use of 8.5m and 14m for H_{eff} or it may restrict the height to only 8.5m.

Step 3 – Calculate Screening Concentration

The following equation is presented in the Guideline for calculation of screening concentration (SC). An emission dispersion factor of 91 has been chosen from table 4 in the draft guideline, representing a H_{eff} value of 10m and a 24-hour C_{ue}. This value has been selected on the basis of lack of specific data to identify the actual height of the cyclone emission points and the final design of the adjoining gin building.

SC = C_{ue} x E
Where SC = screening concentration in µg/m^3
E = emission rate of substance in g/s
C_{ue} = emission dispersion factor

SC = 91 x 0.065
= 5.92 µg/m^3

For average emissions, 24-hour SC is calculated to be 5.92 µg/m^3. Dependent on the H_{eff} chosen, this could range between 4.22 µg/m^3 to 10.4 µg/m^3 for a 24-hour SC.

Current draft guidelines refer to 24-hour TSP emissions and therefore no analysis is provided for annual or 1-hour periods.

Step 4 – Compare SC with ambient guideline values (AGVs)

The calculations above are an assessment of TSP. Threshold criteria for TSP as published in table A1 of the Guideline is 90 µg/m^3 for a 24-hour period.

Under section 9.1 of the Guideline, the AGV screening tolerances for an averaging time of 24-hours should be less than 3-percent of the published AGV. In this case, the SC calculated using C_{UE} factor of 91 is approximately 6.58-percent of the AGV. Using a lower C_{UE} factor of 65 which allows for a stack height of 14m which is not impacted by the adjoining building, results in an SC being 4.7-percent of the AGV.

Based on the Guideline, the AGV screening criteria is “not met” as a result of the dimensions of the main building and the anticipated height of the emission points from the cyclones. Using this methodology, the emissions are not considered as insignificant. The Guideline therefore suggests either a review by DWER/EPA or detailed analysis in the form of air quality modelling. Modelling has not been presented with this assessment on the basis of lack of specific detail for the air flow and cyclone design for this cotton gin.

The screening tolerance of 6.58-percent is considered a minor exceedance, but exceeds the guideline threshold. Matters that need to be considered for emissions would include the location of sensitive receptors and landuse in the area of potential dispersion. In this case, prevailing wind would dissipate the emissions across unused grazing land with the closest receptor being 1.3 km to the south of the emission point. The majority of prevailing winds during ginning season will dissipate dust emissions from this site across cropping land.

Options are available to modify the location and height of the emission points. These options include moving the cyclones further away from the building to reduce the impact of the building on air flow. Alternatively, the cyclone height could be increased to be similar to the building height. However, raising the cyclones to a higher level would require consideration of the cyclone structure itself in regard to wind loading in extreme winds, such as cyclonic type conditions.

8 Mitigation Measures

A range of mitigation measures are available to the facility during both construction and operation of the cotton gin. The general scope of mitigation measures to reduce or minimise dust emissions is presented below:

It is recommended to implement the management and mitigation measures listed below to minimise air quality impacts from the Kununurra Cotton Gin on sensitive receptors in the vicinity.

Table 6: Recommended Mitigation Measures for Operation of KCC Cotton Gin

<table>
<tr><th>Dust</th><td></td><td></td></tr>
<tr><td>Objectives</td><td colspan="2">Dust emission levels to be adopted on the site are:
<table>
<tr><th>Pollutant</th><th>Averaging period</th><th>Maximum concentration</th><th>Units</th></tr>
<tr><td rowspan="2">Particles as PM10</td><td>24 hours</td><td>50</td><td>µg/m^3</td></tr>
<tr><td>Annual</td><td>25</td><td>µg/m^3</td></tr>
<tr><td rowspan="2">Particles as PM2.5</td><td>1 day</td><td>50</td><td>µg/m^3</td></tr>
<tr><td>Annual</td><td>25</td><td>µg/m^3</td></tr>
<tr><td>Total Deposited dust</td><td>Annual</td><td>Max 4</td><td>g/m^2</td></tr>
<tr><td>Total Deposited dust</td><td>Annual</td><td>Max increase of 2</td><td>g/m^2</td></tr>
<tr><td>Total Suspended Particles</td><td>Annual</td><td>90</td><td>µg/m^3</td></tr>
</table></td></tr>
<tr><td>Road and Traffic generated dust emissions.</td><td>Minimise wind borne dust potential by selection of coarse pavement surfacing materials.
Provide a specific location for trucks to stop and drop wheel dust along the entrance road, prior to the weighbridge.
Use a water truck to wet main haul roads on a daily basis to control road dust emissions during ginning periods.
Ensure trucks remain on main haul roads.</td><td>Monitoring on a continual basis with work as required.</td></tr>
<tr><td rowspan="3">Cotton Gin generated dust emissions</td><td>Maintain all cyclones, dust filters and dust extraction equipment in accordance with design and operational parameters.</td><td rowspan="6">Continuous during ginning operations.</td></tr>
<tr><td>Operate the ginning rate in accordance with visually observed dust content of cotton being ginned.</td></tr>
<tr><td>Ensure cotton trash shed is closed and sealed during ginning operations and loading of the cotton trash truck/s</td></tr>
<tr><td rowspan="3">Monitoring</td><td>Identify the quality and dust content of cotton as it is being ginned.</td></tr>
<tr><td>Visually observe dust emission levels.</td></tr>
<tr><td>Maintain a record of ginning and dust emission periods, including wind direction monitoring</td></tr>
<tr><td rowspan="2">Complaint procedure</td><td>Provide a complaints procedure for all sensitive receptors.</td></tr>
<tr><td>Maintain records of any complaints received and actions taken to resolve the complaint.</td></tr>
</table>

9 Discussion

A cotton gin produces two primary forms of dust emissions which can be summarized as point source emissions from the dust management system at the gin (Cyclones) and diffuse dust emissions from roads, traffic and other bare surfaces.

This assessment of the dust emissions from the ginning process suggests that dust emission levels for the cyclone system is greater than the screening concentration of < 3-percent of AGVs as adopted in the draft DWER Guideline – Air Emissions. The screening level calculations indicate that average total suspended particle emission (TSP) rates are approximately 6.58 percent of the maximum (ambient) 24-hour concentration of 90 µg/m^3. Adjustments to the cyclone structures are possible but the calculations suggest that the emissions will potentially be slightly higher than the 3-percent tolerance.

This assessment is based on preliminary calculations as the final design of the cotton gin emission system is not available at present.

The cyclone system used to extract dust from exhausted air from the cotton gin will be located on the north side of the cotton gin building. The final height, design and number of cyclones is yet to be determined. A lack of final height of the emission point limits the screening calculations to an estimation of the potential impact of the adjoining cotton gin building on air flow creating dispersion of the emissions from the cyclones.

The data used to determine emission rates is based on other cotton gins in eastern Australia. This data provides an estimate of emissions only. The data incorporates published information from USA based cotton gin emission research in relation to TSP, PM_{10} and $PM_{2.5}$ emission levels. This rate will vary according to the cotton gin design, the condition of cotton being processed, and management of the cotton ginning process. The gin design alters in relation to the number of cleaning units within the gin. This is generally determined from predicted moisture levels, field contamination of the cotton from the paddock and picking processes. Once ginning commences, management of the process in relation to rate of ginning for clean and dirty cotton will vary, with the aim of the ginning process to produce the highest quality and cleanest cotton possible. This would then reflect in the price of the cotton when sold as well as dust emission levels.

It should be noted that no other processing facility is present in the local region which generates dust from processing of a material. The only other sources of dust in the region would include road dust from trucking activity associated with farm operations and dust generated from farm activities such as cultivation. Windborne dust can be an issue in dry periods where bare earth is exposed.

Road dust on the cotton gin site will be managed through appropriate selection of road base materials and the use of a water truck. The site has sufficient water supply to continually water roads during receival of cotton from farms and dispatch of cotton lint bales, cottonseed, and cotton trash. The road watering process will minimise the potential for diffuse dust emissions generated from truck activity on the site.

Prevailing wind across the site can be summarized as being from the southeast for the first three months of the ginning season and then dominated by northerly wind for the remainder of the ginning season. Receptor 4 is located to the north of the site and therefore has limited exposure from prevailing winds across the gin site. The remaining 16 receptors are not in a direct line with prevailing winds.
The closest receptor in a northwest direction from the gin is approximately 5.3 km from the site and surrounded by farming land. This is considered as a sufficient buffer distance to enable

extensive dust dispersion and settling which would avoid any unacceptable impacts to existing ambient air conditions.

Receptor 1 is in the path of prevailing winds in the latter part of the ginning season. Receptor 1 is located 1.3 km south of the gin site. The terrain between the gin and this receptor includes a ridge area and open woodland. The ridge is approximately 20m higher that the gin site. The ridge would impact the movement of air and therefore the risk of impacting this receptor with dust generated from the cotton gin is considered low.

The remaining receptors are not in a direct line with prevailing winds during the ginning season.

Air quality impact studies for cotton gins have been reviewed as part of this investigation. The modelling has used the program CALPUFF to assess the likely distribution of dust materials from an active cotton gin site. The modelling suggests annual PM_{10} increases of 5 $\mu g/m^3$ within a radius of 500m from the cotton gin. The modelling indicated that $PM_{2.5}$ levels are affected within a radius of less than 500m. There are no receptors other than the adjoining grain storage facility within this radius. The receptors closest to the cotton gin include receptors 3 and 4, located at a distance of approximately 1,050m and 699m, respectively.

The parameter dust deposition mainly relates to soil particles being carried from the site and settling on the ground or other surfaces. Previous modelling of cotton gin sites that adopt similar mitigation measures as presented above, show that dust deposition levels do not exceed an increase of 2 g/m^2/month at under 2 km from the gin building for receptors within the path of prevailing wind. WA does not specifically include any threshold levels for dust deposition in standards and guidelines that have been reviewed as part of this report. A 2 g/m^2/month increase is adopted as an acceptable threshold in eastern states with a maximum annual average of 4 g/m^2/month to preserve the amenity of a receptor.

The primary mitigation measure adopted to manage road dust is road watering. This is an activity that can easily be managed on a gin site as it is beneficial to avoid dust settling on the cotton either stored in the module bays or processed cotton stored in the bale shed. The soil particles would downgrade the cotton and therefore reduce the value of cotton.

Based on previous air modeling for cotton gins, an aerial image has been prepared to show potential impact zones. This plan is presented in appendix 3. The potential impact zone is within a 500m radius of the gin building. No neighbouring residences are present within this radius.

Only receptors 3 and 4 are located within 1000m of the gin site. Receptor 4 is discussed above. Wind roses indicate that southerly wind directions during the ginning season occur but at low frequency and low wind speeds. The risk of impacting the ambient air conditions at this residence is therefore considered low. Receptor 3 is located east-northeast of the cotton gin operation and therefore not subject to prevailing winds from the site that may carry dust particles.

All other receptors are 1200m or more from the cotton gin site. Modelling available from other gin sites indicates that the potential impact of dust emissions outside of a 1000m buffer is infrequent other than during worst case wind condition where wind flows directly to receptors at relatively high velocity. Regular winds flowing toward all receptors outside of a 1000m buffer distance are not present, according to available wind roses.

In relation to potential road dust from either trucks or equipment moving round cotton bales, Receptor 4 is the closest at approximately 524m from the closest module pad. Vehicle activity at this closest point will be limited to 3 or 4 times per ginning season. Mitigation measures to avoid

dust generation from this vehicle activity would include avoidance of vehicle movements under conditions of a southeast wind direction. The same mitigation measure would be adopted for receptor 3 which is located at 800m east-northeast of the closest module bay. Travel to this sector of the module bay can be avoided in the event of a rare southwest wind direction.

The potential for air quality impacts on all other receptors is considered unlikely as a result of the lack of prevailing wind from the northeast. The majority of receptors are located to the south and southwest of the site. The frequency of prevailing wind toward these receptors according to available wind roses is less than 2-percent. The receptors have a minimum buffer distance of 1.3 km which is considered sufficient to avoid any non-compliances of air quality standards.

10 Conclusion and Recommendations

Kimberley Cotton Company commissioned SMK Consultants to undertake a preliminary air quality assessment for their Kununurra Cotton Gin.

This assessment is based on preliminary site designs and available dust emission data from other cotton gins in eastern Australia. All cotton gins are relatively standard in relation to processing of cotton. The variable for cotton in relation to air emissions from the ginning process is the presence of soil particles, leaf and stalk material captured in the cotton as it is picked and transported to the site. The ginning process removes this material which is then collected in a dust management system and recycled from the gin as organic matter referred to as cotton trash.

Screening analysis adopted from the draft DWER Guideline – Air Emissions, indicates that the cyclone system to be constructed as part of the cotton gin will potentially emit TSP to a level of 8.85-percent of the maximum (ambient) concentration. The Guideline identifies a limit of 3-percent of this value to classify the emissions as insignificant. However, other factors can be considered by DWER in their assessment of the emissions. These would include terrain, wind conditions, the presence or lack of other dust sources, and potential changes in receptor proximity.

The dust emissions from this proposed development were not assessed through a detailed modelling process on the basis that the specific details of air flow volumes and design of the cyclone system is not available at present.

The cotton gin emission data available suggests that ambient guideline values for air emissions will be met within 500m from the cotton gin building for point source emissions. The closest receptor to the emission point from the main cyclone area is over 650m away.

For diffuse emissions including road dust, a watering program will be adopted to control this source of dust as a priority to eliminate dust contamination of stored and processed cotton.

In relation to the available buffer distances and options for mitigation measures to minimise dust emissions from the site, buffer distances are considered acceptable when considering prevailing wind directions. For the closest receptor, management would have options to reduce emissions from the cotton gin and module yard under circumstances where prevailing wind is moving directly toward the receptor, or a concern is raised by the receptor.

Preliminary mitigation measures available to the operation of this site are presented within this report and it is recommended that these mitigation measures are adopted as part of both construction operations and ginning operations.

Limitations

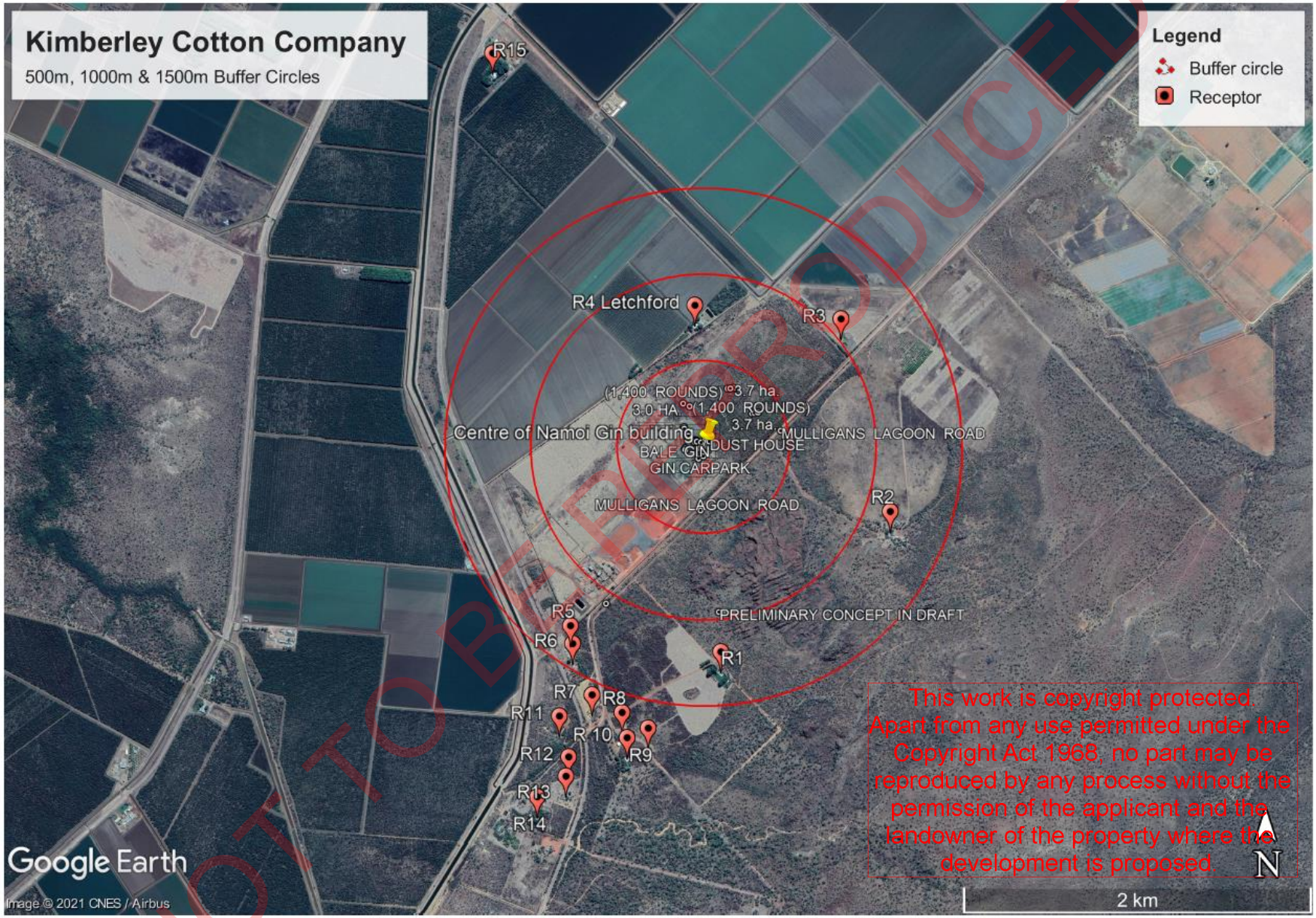
This Air Quality Assessment

- Has been prepared by SMK Consultants for the sole use of Kimberley Cotton Company;
- The report should be read in full, and no summary, conclusion or other section of the report may be used or relied upon in isolation or taken as representative of the report as a whole;
- May be provided to other third parties but such third parties' use of or reliance on the report is at their sole risk; and
- May only be used for the purpose as stated in Section 1.1 of the report (and must not be used for any other purpose).
- The report includes dust emission data obtained by SMK Consultants in the preparation of environmental impact assessments for other cotton gins in eastern Australia. The specific cotton gins have not been identified in this report for the purpose of commercial confidentiality.

References

- Air Assessments (2014), "*Northern Minerals Limited – Browns Range Rare Earths Project Air Quality Assessment'*,
- Department of Water and Environmental Regulation (2019), "*Draft Guideline – Air Emissions'*.
- Department of Environment and Conservation (2011), "*A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites, remediation and other related activities'*,
- NEPC (2021) *National air quality standards Ambient air quality (2016)* accessed via https://soe.environment.gov.au/theme/ambient-air-quality/topic/2016/national-air-quality-standards on 18-9-21
- Pacific Environment Limited (2014, "*Air Quality Assessment – ……. Cotton Gin*"
- Western Australian Environmental Protection Authority – Environmental Factor Guideline – Air Quality (2020)
- Whitelock, DP, Armijo, C. B., Buser M. D., Hugh S. E., Applied Engineering in Agriculture Vol. 25(4): 563-576 2009 American Society of Agricultural and Biological Engineers ISSN 0883-8542 563: Using Cyclones effectively at Cotton Gins.

Appendix 1: Receptor Locality Plan



Appendix 2: Wind Roses for Kununurra

The following wind roses have been obtained from Willy Weather to provide details of wind direction and speed throughout the ginning season.

Figure 5: 5-Year Windrose for Kununurra – *All months*

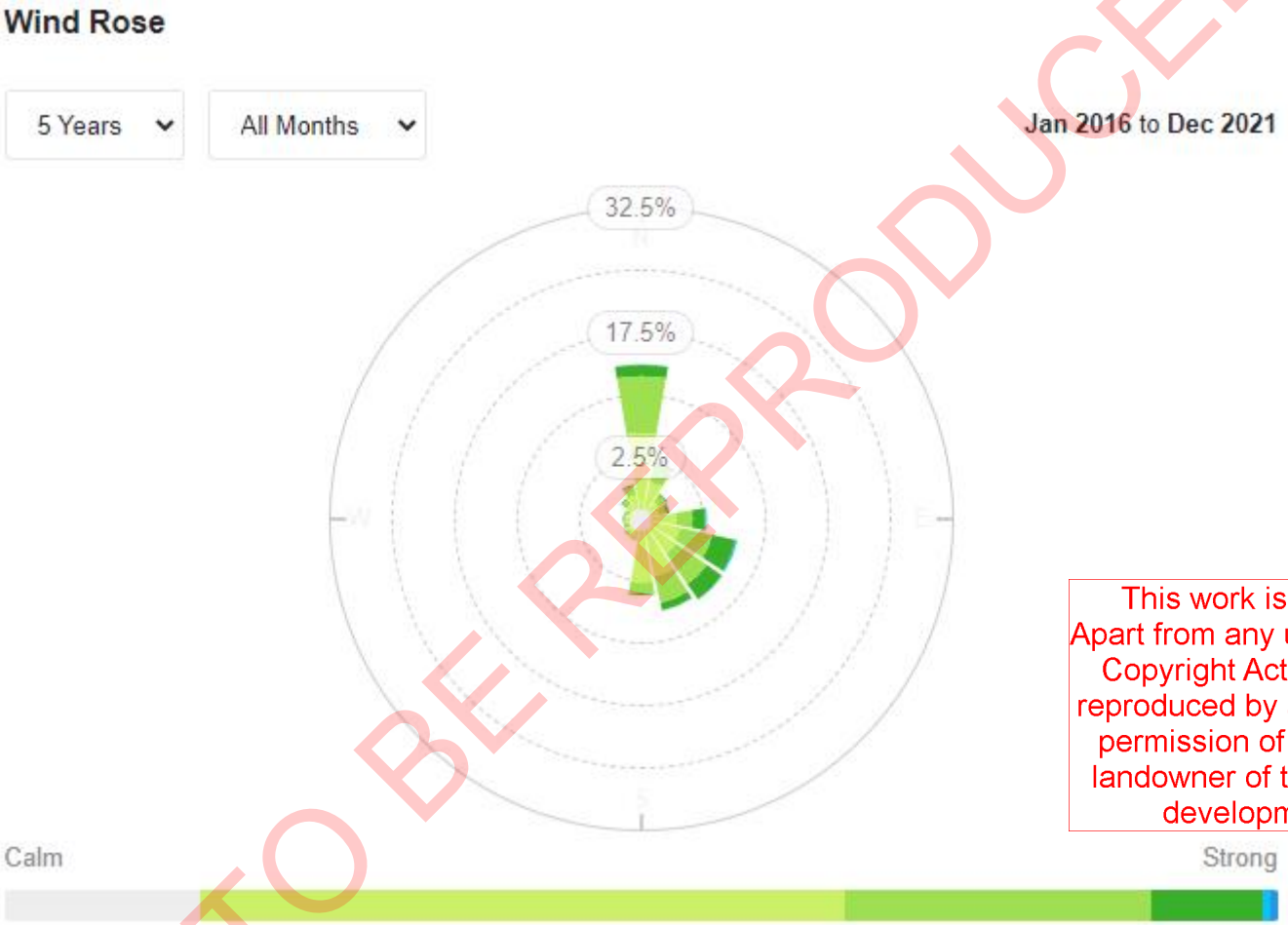


Figure 6: 5-year Wind Rose for June

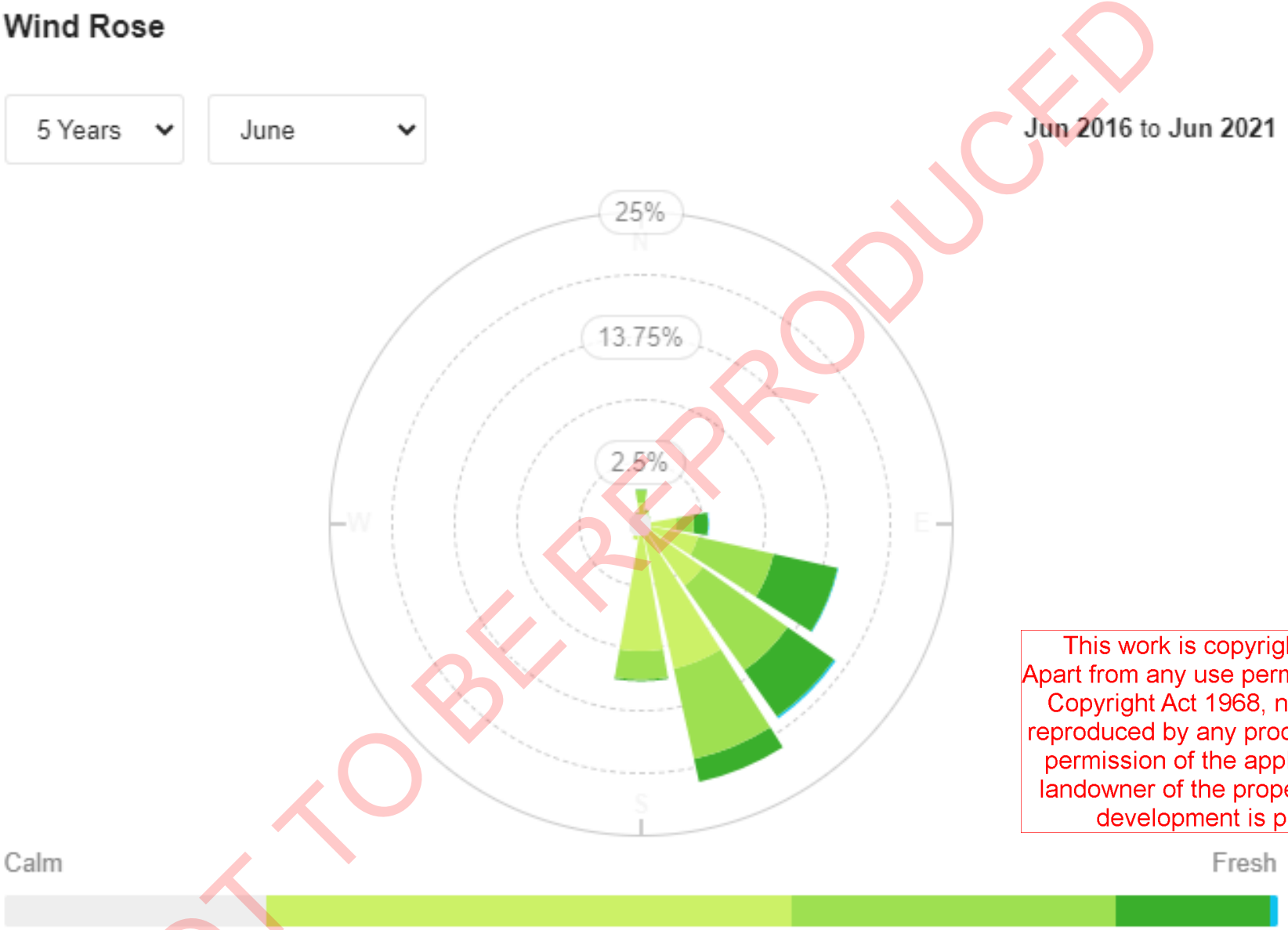


Figure 7: 5-Year Wind Rose for July

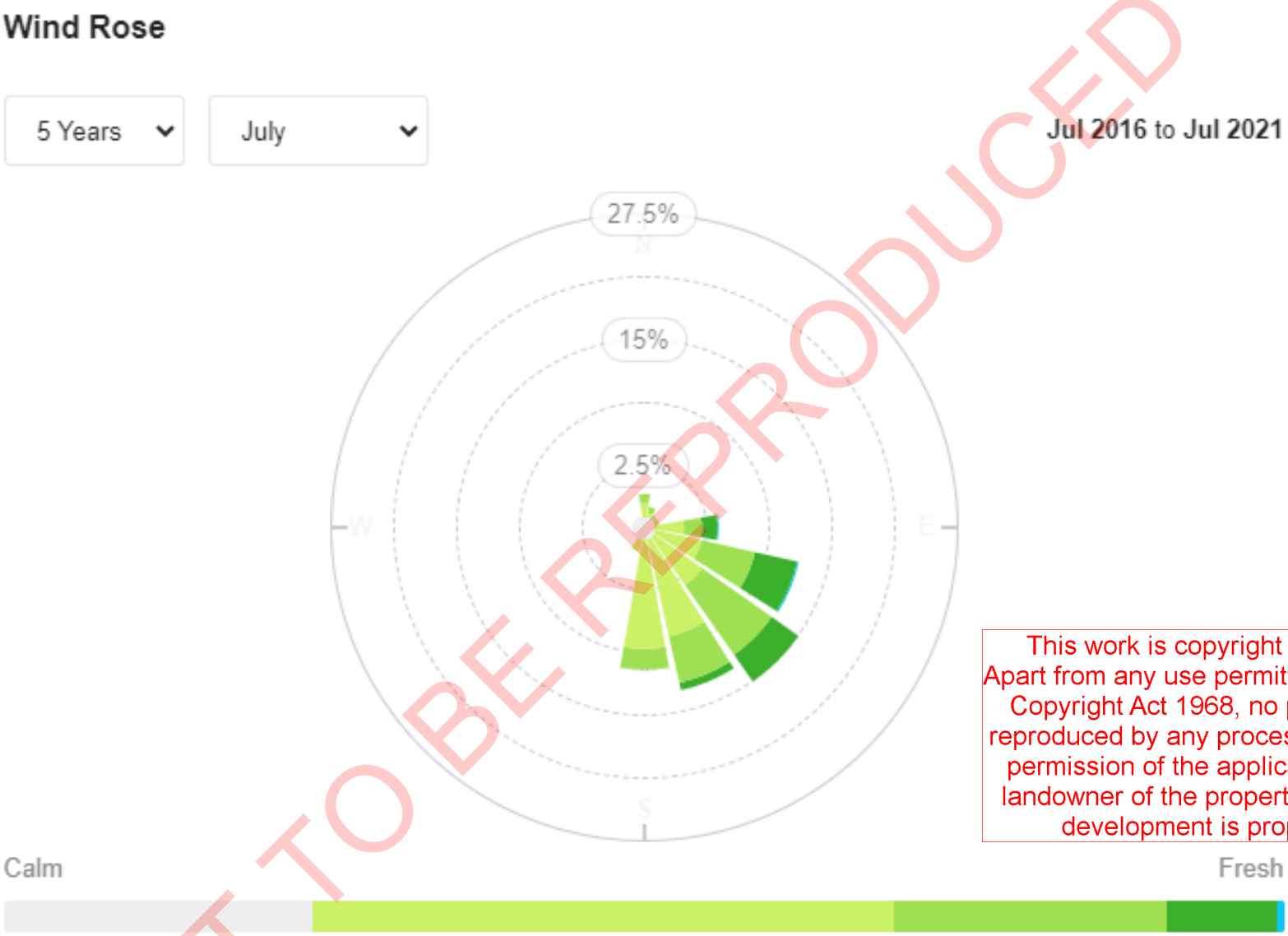


Figure 8: 5-Year Wind Rose for August

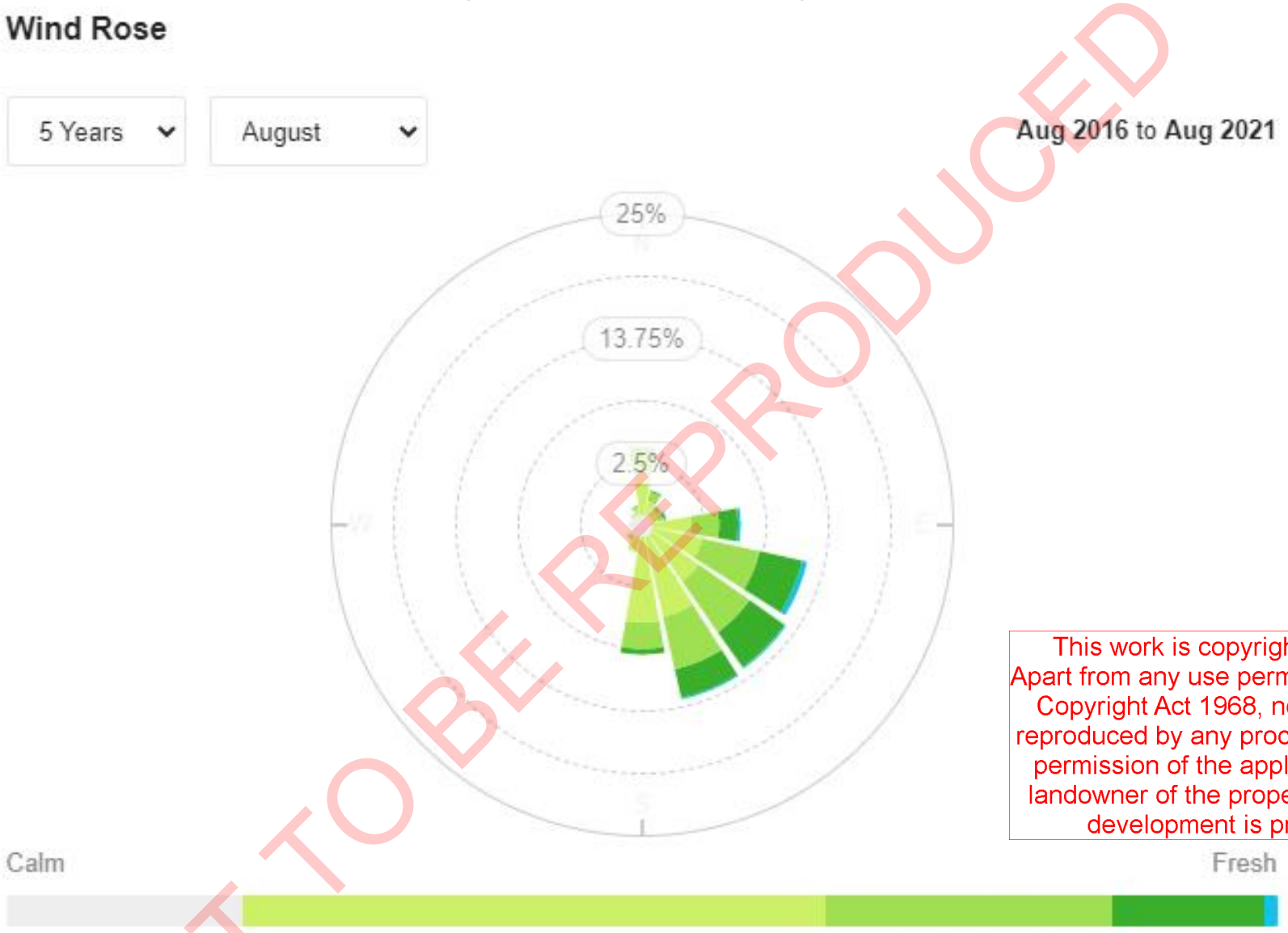
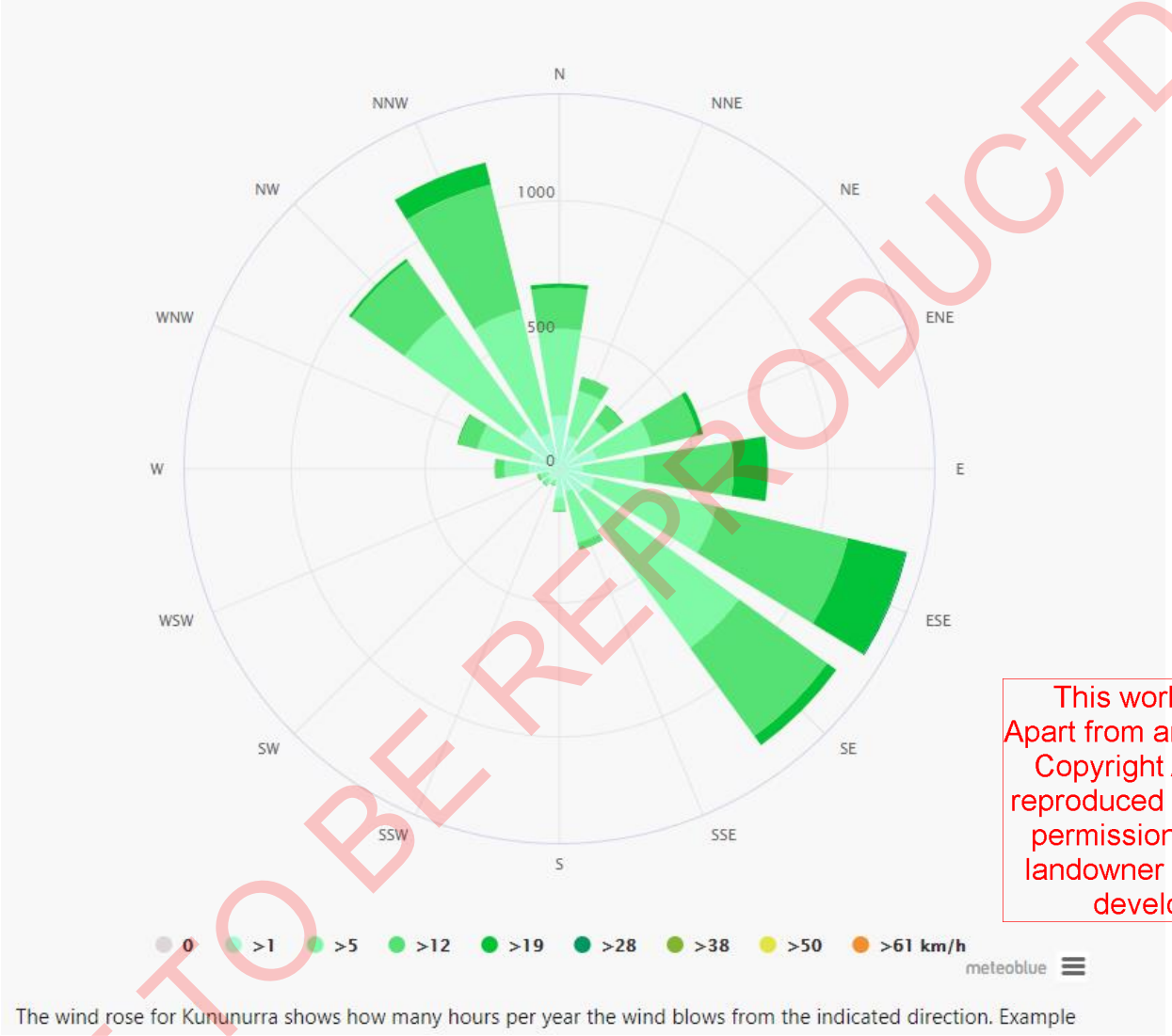


Figure 9: 5-Year wind rose for September

Figure 10: 5-Year wind rose for October

Figure 11: 5-Year wind rose for November

Figure 12: Kununurra Wind Rose for 12-month period



Source: Meteoblue weather data https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/kununurra_australia_2068110

11 Appendix 3: Prevailing Wind – Potential Dust Deposition Zones

NOISE ASSESSMENT

ROWE GROUP

SMK

CONSULTANTS

surveying – irrigation – environmental – planning - engineering

dB Level	Examples	Permitted Exposure (Hours per Day)
10	Breathing	
20	Whisper	
30	Library	
50	Quiet Office	
60	Conversational Speech, Electric shaver	
65	Piano Practice	
70	Noisy Restaurant	
75	Alarm Clock	
80	Vacuum Cleaner	
85	Garbage Disposal / Busy Hotel Lobby	
90	Tractor / Subway	8
100	Blender, Factory Noise	2
105	Motorcycle, Orchestra	1
110	Power Saw, Heavy Truck, Power Mower	0.5
115	Uncomfortable Feeling Starts	0.25
120	Disco / Loud Bar Music / Shotgun	0
130	Cymbal Crash, Air Raid Siren	0
140	Rock Concert Front Row / Jet	0
150	Chest begins to vibrate	0
160	Eardrum bursts	0
190	Loudest Possible Sound	0

Kununurra Cotton Gin

NOISE IMPACT ASSESSMENT

Kimberley Cotton Company
PO Box 636, KUNUNURRA WA 6743

June 2022

SMK

CONSULTANTS

surveying – irrigation – environmental – planning - engineering

ABN 63 061 919 003

SMK

CONSULTANTS

surveying – irrigation – environmental - planning
ABN 63 061 919 003

39 Frome Street
PO Box 774
Moree NSW 2400
Ph 02 6752 1021
Fax 02 6752 5070
ptaylor@smk.com.au

www.smk.com.au

Kununurra Cotton Gin

NOISE IMPACT ASSESSMENT

Kimberley Cotton Company
PO Box 636, KUNUNURRA WA 6743

June 2022

DOCUMENT CONTROL

Project Name	**Noise Impact Assessment**
Proponent	Kimberley Cotton Company PO Box 636 KUNUNURRA WA 6743
Project Reference	21-235
Report Number	21-235-NIA
Prepared for	Kimberley Cotton Company PO Box 636 KUNUNURRA WA 6743
Prepared by	SMK Consultants 39 Frome Street Moree, NSW 2400
Contact	Peter Taylor E: ptaylor@smk.com.au Ph: 02 6752 1021

Author	
Name	*Peter Taylor* Peter Taylor BSc. MEIANZ LAA
Position	Environmental and Resource Consultant
Company	SMK Consultants

Revision History			
Version Number	**Date**	**Authority**	**Details**
0	September 2021	Peter Taylor	Issued to Client
1	December 2021	Peter Taylor	Revised gin layout
2	June 2022	Peter Taylor	Final gin layout

CONTENTS

1 Introduction

SMK Consultants has been engaged by Kimberley Cotton Company to provide a Noise Impact Assessment for the proposed construction and operation of a cotton gin on Lot 510 in DP421305, located on Mulligan's Lagoon Road, Kununurra. The development is situated approximately 10.7 kilometres north of Kununurra.

The assessment has been prepared in reference to the West Australian Government *Environmental Protection (Noise) Regulations 1997*.

1.1 Aims and Objectives

This assessment aims to identify the likely impact of noise emissions during construction and operation of the cotton gin upon the amenity of the local region. Impacts considered include noise generated during construction, traffic noise on internal roads, and noise emissions from the cotton ginning process. The objective of the assessment is to determine the potential impact of noise emissions on the amenity of sensitive receivers in the local area.

The objectives of Kimberley Cotton Company are to:

- Minimise adverse impacts upon the surrounding community; and
- Ensure that employees and contractors associated with the operation can work in a safe environment.

1.2 Scope of Works

The scope of works for Noise Impact Assessment (NIA) include the:

- Determination of potential sources of noise emissions;
- Determination of wind and weather conditions;
- Determination of compliance thresholds applicable to the site;
- Assessment of the surrounding environment and existing conditions;
- Assessment of likely impacts associated with the operation of the cotton gin;
- Identification of mitigation measures required to minimise noise impacts;
- Recommendations for the construction and operation of the cotton gin.

1.3 Definitions

The following report uses several terms associated with the cotton industry. The following provides a brief summary of these terms:

- Seed cotton – Cotton material picked from the field which is raw cotton buds which contain cotton seed, cotton fibre, and cotton plant matter;
- Cotton module or round bale – These are the round bales of cotton produced by cotton pickers in the cotton fields, which are wrapped in plastic for storage and transported to the cotton gin for processing. They contain the seed cotton. A standard semi-trailer can carry 6-bales in one layer. Specialist trucks can stack the bales in two layers and can carry 9-round bales per trailer. The average weight of a round bale is 2.4 tonnes.
- Cotton seed – This is the seed contained within each cotton boll picked from the plant and makes up approximately 50-percent by weight of a cotton boll;
- Cotton lint – This in the cotton fibre which is pulled off the cotton seed during the ginning process. This is exported for processing into cotton cloth as there are no

processing factories in Australia. The cotton lint is pressed into 227kg highly compacted rectangular bales and wrapped in hessian for transport from the Gin;

- Cotton mote bales – Small, broken, or immature seeds with fibres still attached. The gin removes the motes at a different stage from the mature, whole seeds. Motes can be sold as a poorer quality cotton material for use in products such as denim;
- Cotton trash – The ginning process includes several stages of cleaning the seed cotton to remove sticks, leaves and other foreign material collected in the seed cotton during picking of the cotton. Cotton trash is vegetative material which can be mulched and used as a soil conditioner to improve organic matter. The cotton trash can be stored on the gin site for processing or transported directly back to farms for on-farm processing.

2 Cotton Ginning Process

The cotton ginning process separates the cotton seed, cotton lint and gin motes. The three products can then be processed into a range of products. Cotton seed is a high-quality stock feed but also can be used for cotton seed oil which is a high value vegetable oil material used for cooking and cosmetics. The cotton fibre is processed into yarn for cotton clothing. The mote cotton is further processed to extract the fibres and separate other organic material.

The processes occurring at the cotton gin can be summarised as follows:

- **Unloading:** The incoming cotton arrives at the gin in round bales weighing approximately 2.4 tonnes each. The round bales will initially be stored in the module yard and then carried into the module feeder bay for processing. The module feeding system removes the wrapping on the bales then utilises high speed spiked cylinders to separate the cotton bolls for processing. The automatic air suction control pulls the cotton bolls into the conveyance system for ginning.

- **Drying and Pre-cleaning**: After removal from the round bales, the seed cotton is subjected to a multi stage drying and pre-cleaning treatment process. The first drier is sized to provide a specified ratio of heated air which enables the maximum drying capacity of the seed cotton. The cotton moves onto the inclined cleaner where the heat further separates the cotton and cylinder spikes remove the smaller trash. The secondary cleaner then removes the larger trash such as sticks and leaves.

- **Distribution and Overflow**: A specially designed trough conveyor delivers the cleaned and dried cotton to the hoppers which are mounted above the feeding system into the gin saws. An overflow system captures any excess seed cotton and returns this back into the system.

- **Feeding and Ginning:** The main component in the ginning process, the gin stand is where the lint and seed are separated. The feeder enables the gin stand consistent input so maximum throughput can be achieved. The gin stand comprises of a bank of saws which rub against a bank of ribs to pull the lint away from the seed. The bank of ribs allows the lint to fall through, and separates the seed.

- **Lint Cleaning:** Following the separation of the lint and the seed, the lint requires additional cleaning to ensure all contaminants are removed. First stage lint cleaning is through a centrifugal cleaner which uses centrifugal force to spin away the contaminants. The cleaning technology does not cause any damage to the fibre as there are no moving parts which the lint could get caught on. The final stage of cleaning is a gentle saw cleaner which combs out the lint.

- **Condensing and Moisture Restoration:** The condenser takes the single fibres of lint and presses it into a blanket like layer or batt. At this point moisture is reintroduced to the fibre (up to 7.5%), which enhances the compressibility of the cotton fibre.

- **Pressing and Bale Handling:** The final step in the ginning process requires the cleaned lint to be compressed into 227 kg rectangular cotton bales. The bales are weighed and strapped before being moved into bale storage area for export.

3 The Proposed Development

3.1 Development Site

The proposed gin site is located off Weaber Plain Road and is accessible via Mulligan's Lagoon Road to the south-east. The property was originally developed for the Kununurra Sugar Mill which has since been decommissioned.

Since the Sugar Mill was decommissioned, the southwest section of the property has been subdivided and developed as a grain receival facility, mainly for storage of corn grown in the Ord River Irrigation Area (ORIA). This grain bunker facility continues to be extended.

The proposed cotton gin site is located north-east of the grain bunkers on Lot 510. The site was historically cleared but now supports mainly regrowth vegetation. The cotton gin and associated infrastructure will occupy an area of approximately 34 hectares. This will include the following components:

- Cotton Gin building to enclose the cotton gin and processing equipment;
- Office for staff and administration;
- Bale Shed to store lint cotton bales prior to transport;
- Cotton seed hopper for temporary storage of cotton seed;
- Round bale/module storage area consisting of formed rows for storage of round bales delivered from the paddock;
- Cotton trash storage yard for short-term storage of cotton trash;
- Weighbridge for weighing all trucks in and out of the site;
- Sediment and stormwater management system
- Internal road system for management of trucks delivering and removing cotton from the site.
- Staff parking area to be located adjacent to gin office and away from internal roads used by trucks.

3.2 Site Layout and Operations

The preliminary layout of the proposed development site is presented in the following figure 1. This layout will be subject to minor changes. It provides a representative layout for the facility. Internal roads will consist of single or dual lane roads. The areas between the roads will be retained as managed grass areas or drainage lines.

Figure 2 shows a more detailed layout of the cotton gin with truck movement directions, noting that figure 1 shows the correct location of the trash storage area.

The construction area will initially be cleared of vegetation to allow for construction works. Once cleared, building foundation pads will be constructed for the cotton gin and lint bale storage shed. Seed storage facilities will be built to the north of the gin. The module storage area will be constructed to the north-east of the gin. All internal roads and module pads will be gravelled using a selection of locally available gravel materials. Drains will be clear of vegetation.

Once the site is operational, cleared drains and open space areas between roads and buildings will be managed as mown grass buffer zones to reduce the total area of bare ground exposed.

The gin may produce up to 312 tonne of cotton seed per day when the Gin is processing the design capacity of 1,224 bales of lint cotton. The cotton seed will be stored in a cotton seed hopper, then trucked from the site on an as required basis. For this facility, the majority of the cotton seed will be trucked offsite for cattle feed in the Kimberley region. The potential exists to utilise road train triples for removal of the cotton seed. The normal schedule for cotton seed removal involves a minimum of four (4) trucks to operate from this site on a daily basis.

Figure 1: Overall site layout for Kununurra Cotton Gin

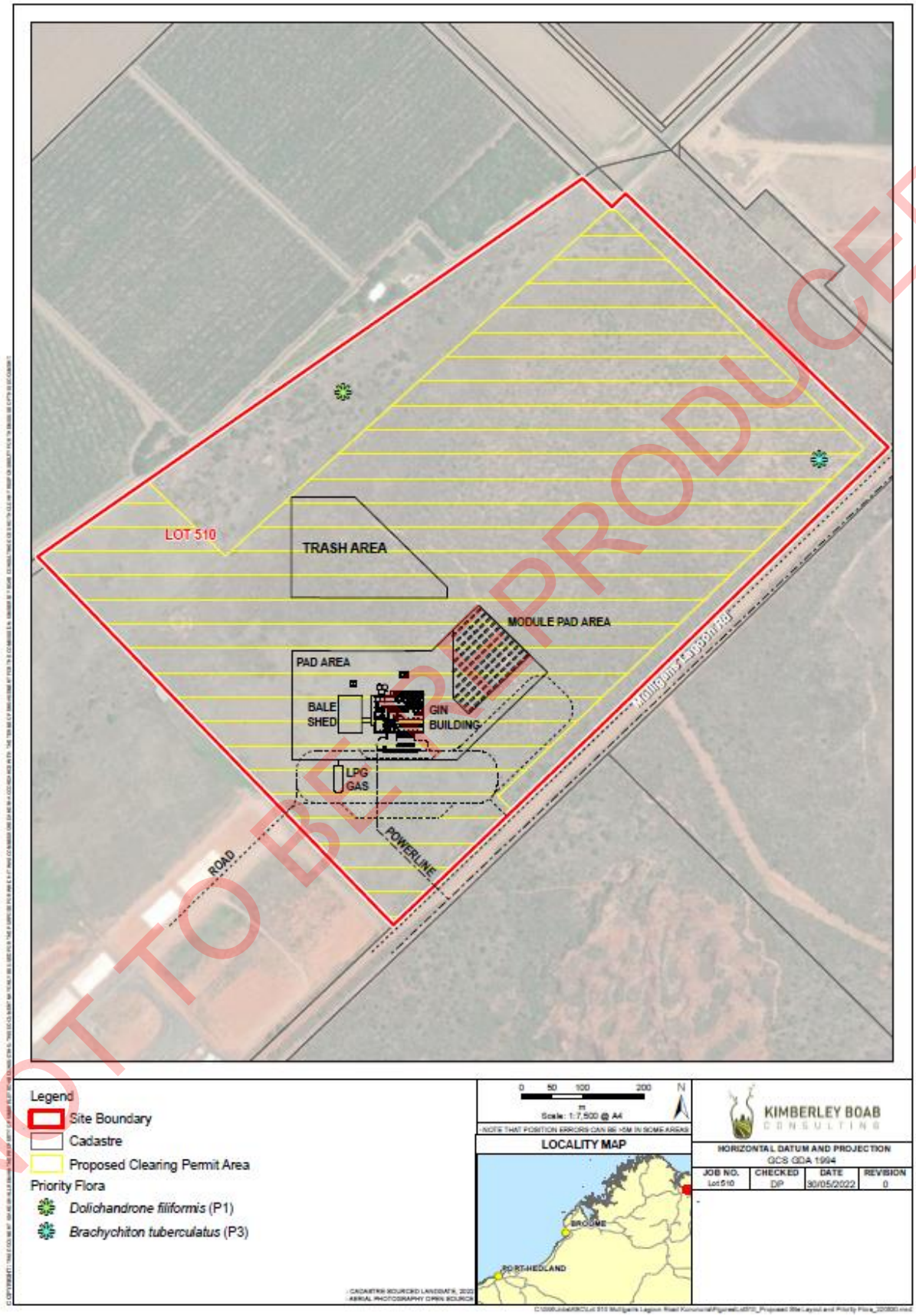
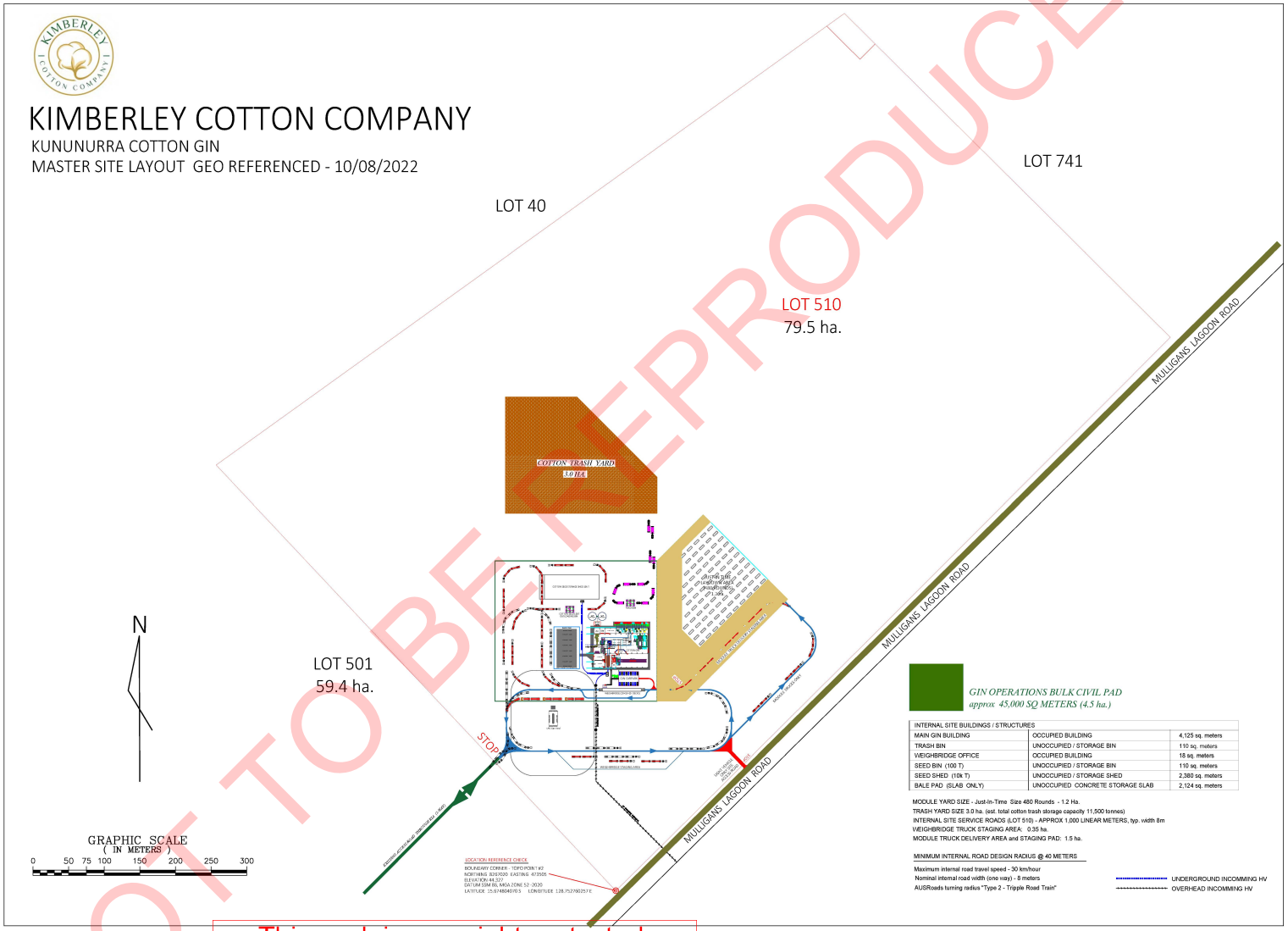


Figure 2: Overall preliminary layout of KCC Cotton Gin site



Cotton trash is stored on a constructed cotton trash pad. The pad will consist of a compacted area to allow 24-hour access. This area will be drained to a detention pond to capture any runoff and settle organic matter that may be eroded off the pad area. The cotton trash will then be returned to cotton farms for spreading on paddocks as organic matter to increase soil quality and soil carbon.

3.3 Staging

Kimberley Cotton Company anticipate that the cotton gin will be constructed in two primary stages. Stage 1 will involve installation of a three-stand cotton gin with a processing capacity of approximately 60-bales per hour. Stage 1 is to include all buildings identified on the plans and the module yard area.

Stage 2 will involve installation of two additional ginning stands and associated equipment within the gin building. This will allow the gin a design capacity of 120-bales per hour of lint cotton.

Ginning requirements are anticipated to increase in year 2. Kimberley Cotton Company anticipate a demand to gin up to 102,000 bales in year 2 and this may extend to 150,000 bales by year 5 if the cotton farming industry expands in the ORIA. .

3.4 Operating Hours

The proposed operating hours are presented in Table 1. The intent is to operate the cotton gin on a 24-hour basis from the first or second week of cotton picking until all cotton is processed. KCC aim to allow truck access to the site between 5.00am and 7.00pm, for standard operating times during the ginning season. This would align weighbridge hours with local working hours for farming operations.

Table 1: Hours of Operation

Activity	Monday to Friday	Saturday	Sunday and Public Holidays
Ginning operations	24-hours	24-hours	24-hours subject to weekly maintenance requirements
Weighbridge hours for receival and despatch of trucks	➢ 5am to 7pm during ginning season ➢ 7am to 4pm outside of ginning season (Mon to Fri) ➢ Extended weighbridge hours – 24/7 for initial receival of cotton modules until module yard is filled (3–4-week period) in June		
Maintenance of plant and equipment during non-ginning season	7am to 5pm	7am to 1pm	Nil

A cotton gin aims to operate on a 24-hour basis so that the cotton delivered to the site is processed in the shortest time possible. Unprocessed cotton which is stored in the module yard area or remains on-farm in round bales, is exposed to weather. Rainfall and dust could contaminate the cotton and therefore result in downgrades of cotton quality, resulting in reduced prices for the cotton products. Raw wet cotton can result in mouldy cotton which is more difficult to process and will result in downgrades in colour of the cotton from the pure white cotton which the gin aims to produce.

The option of operating on a 24-hour basis from commencement through to completion is the aim of all cotton ginning companies. Breakdowns will occur throughout the day and therefore at some stage, part of the cotton ginning machinery will shut down. The issue of restarting the electrical motors within the cotton gin needs to be considered in relation to the draw of electricity from the system to restart the motors. The cotton gin will use soft-start electrical motors where possible but will also include a computer aided restart procedure to limit the draw of electricity from the local electrical grid. Cotton gins tend to utilise Sundays for major repairs and more extensive maintenance activities. During such periods, the gin would shut down. This also allows changes for staff from day-shift to night-shift.

KCC is requesting that site operation for areas external to the cotton gin, mainly the opening of the weighbridge commences at 5am. This reflects the standard rural day in the Kimberley Region. Due to extreme temperatures, work commences once daylight is available and follows a custom of working long days when required. Opening of the weighbridge at 5am will trigger the receival of trucks either delivering cotton or despatching cotton products. These operating hours would be same in many surrounding businesses which includes farms and transport facilities.

3.5 Sensitive Receptors

SMK Consultants undertook aerial imagery searches to identify the location of buildings and potential receptors around the proposed cotton gin site. The imagery search was then ground-truthed by KCC.

The aerial image showing seventeen (17) residences in the local area is presented in appendix 1. The image includes buffer circles measured from the centre of the gin building. The circles have a radius of 500m, 1000m, and 1500m. The search has indicated that receptors are concentrated to the south of the site along Weaber Plain Road. The closest of these southern receptors are 1, 5, and 6. Receptors 2, 3 and 4 are located east, northeast and north of the site, respectively. Receptors 2, 3 and 4 are the closest receptors to the gin site.

All other receptors identified on the plan are located between 1.3 km to 3.5 km away from the gin building. The following table presents a listing of receptor identification, location and receptor type.

Table 2: Listing of receptors within 3.5 km of the proposed cotton gin building

Receptor ID	Location	Receiver Type	Distance and Direction from Gin Building
1	Mulligans Lagoon Road	Rural residential	1.34 km South
2	Mulligans Lagoon Road	Farm residence	1.2 km east
3	Mulligans Lagoon Road	Farm residence	980 m northeast
4	Weaber Plain Road	Farm residence	655 m north
5	Weaber Plain Road	Residence on industrial site	1.42 km southwest
6	Weaber Plain Road	Rural residence	1.5 km southwest
7	Mulligans Lagoon Road	Rural residence	1.71 km south
8	Mulligans Lagoon Road	Rural residence	1.76 km south
9	Mulligans Lagoon Road	Rural residence	1.8 km south
10	Mulligans Lagoon Road	Rural residence	1.88 km south
11	Weaber Plain Road	Rural residence	1.91 km southwest
12	Weaber Plain Road	Rural residence	2.1 km south-southwest
13	Weaber Plain Road	Rural residence	2.2 km south-southwest
14	Weaber Plain Road	Rural residence	2.38 km south-southwest
15	Weaber Plain Road	Farm residence	2.42 km northwest
16	Weaber Plain Road	Farm residence	3.1 km northwest
17	Weaber Plain Road	Hoochery distillery tourist facility	3.47 km north

The description of receiver type has been included to provide some recognition of the different land uses around the identified receptors. For a rural residential receptor, there is limited other activity associated with the land other than light vehicle traffic and minor works. For Farm residences, the receptor would be located near land that is either cultivated or activities occur that may on occasion generate continuous noise from machinery or farming equipment.

The potential for additional receptors to establish in areas subject to prevailing wind directions from the gin facility is limited by land zoning and access. The land to the north, west and east of the site is either developed for farming or consists of open grazing land that is not suitable for farming. The potential for additional receptors to establish near the gin site is limited to the Weaber Plain Road corridor and semi-industrial development along this road corridor. This is extensively developed for industrial purposes. This includes trucking related facilities and depots. A northerly extension of local development around the gin site is limited by the presence of farming and ORIA infrastructure. The rural residential land available to additional receptors is located some 2.5 km or more to the south-southwest of the gin site. Only limited land is available for additional residences to be constructed.

Receptors R5 to R17 are located along Weaber Plain Road and therefore are exposed to traffic noise from this road. Receptors R1 to R4 are more isolated and therefore less background noise from vehicles or industries other than activity occurring on the properties.

4 Weather Conditions

Weather conditions can influence the travel of noise. Noise levels will be carried further with wind if the wind strength is moderate to gentle. Strong wind would create significant local environmental noise which may override noise from a specific noise generating development.

4.1 Wind Data

Appendix 2 presents wind roses generated for Kununurra from two sources. Ginning operations are anticipated to commence in late June. In June, July, August the prevailing wind direction is from the south-east quarter with some southerly and easterly winds. A minor frequency of northerly wind directions starts in August.

The wind rose data indicates that wind direction increases from the north for September, October and November. Southerly and easterly winds decrease in frequency during this period of the year. By October, approximately one quarter of the wind flow comes from the north. Minor wind flows continue from the south to east. A similar pattern occurs in November.

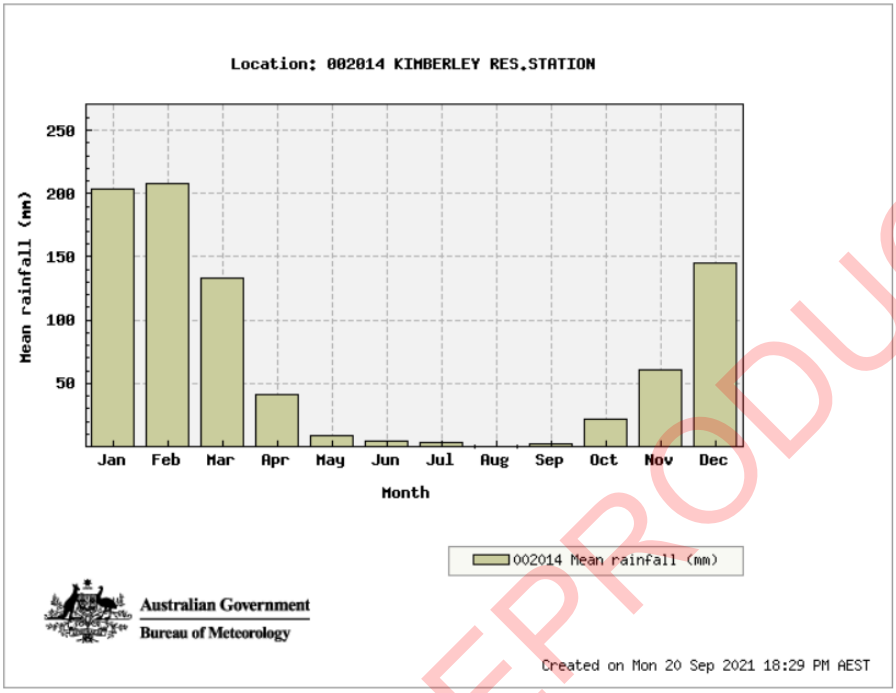
The change in wind pattern can be associated with the dry weather from June through to August. The humidity starts to increase in September and increases through to December in association with the wet season.

Ginning would generally be completed by the end of September/October (3 to 4-months) but may continue through to November in seasons with late harvest or delays in planting of cotton at the start of a growing year. The crop will be planted between January and March around weather conditions.

4.2 General Weather

Average annual rainfall for Kununurra over the past 40-years is 824mm. The majority of rain falls between December and March. The following graph presents the BOM summary of rainfall distribution.

Figure 3: Rainfall distribution for Kununurra



The Ginning season would start in June and run through to October in a normal year. Based on averages, the site would have minimal risk of rainfall during the majority of the ginning season but would be exposed to potential storm conditions during the months of October and November.

Temperatures have a relatively minor range with average temperatures during the ginning season between 26 ^{o}C in the early part of the season through to 32 ^{o}C late in the season.

Humidity records show increased humidity between the months of November through to March (i.e. the wet season). The months of June through to September have relatively low humidity. The wet season can commence in October with storms and be more significant in November through to March. Minimal activity will be occurring at the gin site through the wet season.

Table 3: Average Humidity for Kununurra (BOM, Airport data)

Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean 9am relative humidity (%)	68	71	60	42	34	32	28	28	36	40	48	60
Mean 3pm relative humidity (%)	51	56	44	31	26	24	20	18	21	24	32	45

5 Noise Emission Criteria

Noise emissions from an activity are limited by Regulations which aim to preserve the amenity of existing receivers located around the proposed development site. For the KCC Cotton Gin, the local area includes an industrial facility in the form of a grain receival facility. The surrounding area is occupied by residences associated with adjoining farms and rural-residential development.

The following table presents allowable noise emission thresholds under the *Environmental Protection (Noise) Regulations 1997*.

Table 4: Threshold Levels for noise emissions in WA

Type of premises receiving noise	Time of day	Assigned Level (dB)		
		$L_{A,1}$	$L_{A,10}$	$L_{A,max}$
Noise sensitive premises: highly sensitive area	0700 to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + Influencing factor
	0900 to 1900 hours Sunday and public holidays	40 + influencing factor	50 + influencing factor	65 + Influencing factor
	1900 to 2200 hours all days	40 + influencing factor	50 + influencing factor	55 + Influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + influencing factor	45 + influencing factor	55 + Influencing factor
Noise sensitive premises: any area other than highly sensitive areas	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90

According to definitions provided in the Regulations:

$L_{A\ 1}$ assigned level means an assigned level which, measured as an $L_{A\ Slow}$ value, is not to be exceeded for more than 1% of the representative assessment period;

$L_{A\ 10}$ assigned level means an assigned level which, measured as an $L_{A\ Slow}$ value, is not to be exceeded for more than 10% of the representative assessment period;

$L_{A\ max}$ assigned level means an assigned level which, measured as an $L_{A\ Slow}$ value, is not to be exceeded at any time.

Regulation 7 does not apply to noise emitted from a construction site as a result of construction work carried out between 0700 hours and 1900 hours on any day which is not a Sunday or public holiday, subject to appropriate limitation of the noise.

KCC will potentially operate from 5am during construction activity to align with heat issues in the Kimberley. This would align with all other surrounding developments as the normal day in a rural area would commence at 5am (daylight).

The cotton gin would be classified as an Industrial Premises. The residences in the local area would be classified as *Noise sensitive premises - highly sensitive area*.

According to the Regulation:

Highly sensitive area means that area (if any) of noise sensitive premises comprising —

a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and

b) any other part of the premises within 15 m of that building or that part of the building;

The Draft Guideline prepared by the Department of Water and Environment Regulation (DWER) in 2021 presents more detailed clarification for the differentiation of highly sensitive and sensitive areas. In basic terms, a highly sensitive premise relates to a facility where human activity includes sleeping. This can directly be associated with all residences.

The Regulation adopts an Influencing Factor which is determined by the calculation presented in Schedule 3 of the Regulation. The purpose of the influencing factor relates to land zoning and the proximity of sensitive receivers to land such as Industrial land and mixed use. The land has traditionally been utilised as an agricultural processing area. This was initiated by the sugar mill and continued through the development of a grain receival facility. Both activities involved extensive transport movements.

The calculation for influencing factor uses two concentric circles, having a radii representing 100m and 450m, centred on the measurement point from the noise sensitive premises.

In the case of the proposed development, only one receptor is located within 450m of the proposed Gin operation. The influencing factor is determined by the crossover of the circles across the proposed development area. Based on preliminary calculations, the Regulation indicates an Influencing Factor of 6 dB for this residence (Receptor 4). Part of the cotton trash storage yard is located within the 450m circle associated with Receptor 4. Appendix 3 presents an aerial image showing the proximity and influencing factor circles.

Based on the above table, all receptors in the local area would be classified as *Noise sensitive premises: highly sensitive area*, as they are residences used for the purpose of sleeping.

6 Noise Emissions from the Cotton Gin Site

6.1 Construction

Construction work will initially involve the use of a range of earthmoving equipment. This may include scrapers and laser buckets for bulk movement of soil. Once the bulking of soil and clay

material is completed, the equipment required will include graders, compactors, water trucks, gravel trucks, excavators and a range of light vehicles for construction of roads and gravel pavement areas.

The construction of the cotton gin will require a range of trucks delivering the construction materials. This will include shed components, ginning equipment, concrete trucks, cranes and gravel. Once the shed is erected, a range of smaller equipment including forklifts, cranes and scissor lifts will be required.

Construction work is expected to extend over an 18-month period, commencing with the initial clearing of the site and civil works associated with roads and building pads. The bale and gin sheds would then be constructed to allow delivery and installation of ginning equipment under the cover of the shed structures. A three-to-four-month cessation to construction works is expected in the wet season.

Noise emissions would occur from earthmoving equipment and truck activity delivering equipment to the site. This would occur in the initial stages of the project. Work hours for earthmoving equipment would commence at 5am and continue through to potentially 6pm Monday to Saturday. This activity would utilise similar equipment to adjoining farms and therefore be considered ancillary to agricultural activity in the surrounding area. Truck activity would be less frequent and non-continuous as the trucks would arrive, unload and then leave.

Once the civil works are completed and construction commences on buildings. Most heavy equipment will leave the site other than a crane and trucks delivering materials to the site. Activity will consist of construction of the sheds, pouring of concrete and assembling the cotton ginning equipment. The majority of equipment will be delivered in a pre-fabricated state and therefore assembling will consist of bolting and welding the equipment together, electrical work and trades activities.

6.2 Traffic and Module Areas during Operations

The following provides a general description of operational traffic during the ginning season:

- Inbound and outbound road train movements occurring daily with the transfer of cotton modules from trucks to cotton storage pads.
- Front-end loaders operating on site to unload trucks and move cotton modules from the storage area to the module loading bay into the cotton gin;
- Trucks for hauling of ginned cotton, cotton trash and cotton seed from the site.
- Staff vehicle movements including light vehicles carrying staff around the site during the ginning season for management and maintenance.

Internal haul roads will consist of gravel material. Sections of the road on which trucks will be loaded may be sealed or have a concrete surface to ensure stability when loading. This will be limited to the bale and seed loading areas for the purpose of providing a stable platform for forklifts to operate safely.

Under normal operations, vehicle speed within the site will be limited to less than 40 km/h. Truck revving will be avoided and the use of engine brakes will not be permitted.

Based on predicted traffic during design capacity ginning operations at a rate of 1,224 lint bales per day, peak daily truck movements in and out of the site will be in the order of 34-trucks. The movement of trucks will be governed by weighbridge operating hours. The weighbridge would normally be open between 5am and 7pm, providing a 14-hour period for truck movements. On average, the site would generate three (3) truck movements per hour during weighbridge operating hours once operations stabilise during the ginning season. A higher peak may occur at the start of ginning in association with the delivery of raw round bale cotton from farms. Once all round bales are received, traffic would potentially reduce to 18-trucks over a 12-hour period until ginning is completed.

Ginning operations will require approximately 17-staff during the peak of the cotton ginning season and a maximum of 8-staff during the remainder of the year. This is expected to generate approximately 10-light vehicle movements during ginning and 6-light vehicle movements for the remainder of the year.

6.3 Cotton Ginning Noise Emissions

The gin building is considered the primary noise emission source for the development. The building is to be orientated east-west with the primary noise source being the fan bay located on the northern side of the building. The ginning operation is generally undertaken with limited access points and most doors closed. The exception is the module receival bay which remains open for round bales to be loaded into the gin and the forklift access point to the press bay where the ginned cotton is compressed and then moved to the bale shed. Both of these areas will have internal walls to separate this activity from the internal gin operations. This avoids dust entry into the cotton gin and encloses the machinery operating within the gin.

The secondary source of noise emissions from the cotton gin will be air exhausted from the dust management system. The dust management systems are to be located on the north side of the building outside of the fan bay. The fan bay will have an overhanging roof and a shroud which will limit noise emissions to the east or west and the gin will block the noise to the south. The dust management system consisting of cyclones and the associated frame work in addition to a trash collection shed, will provide a barrier to deflect some noise from the fan bay.

The cotton seed and trash hoppers will operate as a separate structure from the cotton gin. The process of loading trucks with seed or trash will require a small motor to drive a hydraulic system for opening and closing of the hopper doors. This will be a small engine of less than 10 HP.

Equipment operating around the gin building will be limited to mainly forklifts for the transfer of cotton bales from the gin to the bale shed and for the loading of trucks.

External machinery will be fitted with reversing alarms in accordance with safety requirements. The alarms will be selected on the basis of safety and low noise emissions. Loud beeping alarms will be avoided. The general description of the reversing alarm system is “white noise” which emit sound over a large range of frequencies, and the sound dissipates faster and is localised so that sound doesn´t carry.

Based on data recorded during cotton gin assessments during previous studies undertaken by SMK Consultants, the following table presents representative noise emissions from equipment and machinery to be used during ginning operations.

Table 5: Typical noise emission levels for the cotton gin and related activity*

Description	SWL dB (A)
Gin building noise from internal equipment during ginning – vibration noise	78
Dust management cyclone rack and fan bay located on north side of gin – combined effect	91
Bale loading area on west side of bale shed – forklift operations	85
Front end loaders (modern) for general duties around gin site	85
Road train – revving during operations	100

Source: Advitech Environmental data records.

7 Emission Assessment

7.1 Traffic and Module Yard

Internal traffic within the cotton gin will be managed according to activities. Two main streams of truck traffic will occur. Module traffic will cross the weighbridge and then move to the unloading bay and then leave. The round bales will then be moved to the module yard by frontend loaders or specialised module machinery.

Cotton seed and lint cotton bale trucks will arrive empty, weigh, load and then leave. This will occur via primary internal road circuits. The seed trucks will load beneath the cotton seed hopper. The lint cotton bale trucks will be loaded at the bale shed. The gin would require one (1) semi-trailer or body truck for internal movement of cotton trash between the trash hopper and the trash yard. Trucks hauling cotton trash from the site would generally consist of a road train combination. They will load within the cotton trash yard and haul the trash to cotton farms within the ORIA.

The closest receptor is Receptor R4, located approximately 320m from the closest point within the cotton trash storage area and approximately 650m from the cotton gin building. The second closest receptor is R3 located approximately 950m from the closest point of the cotton gin and 790m from the closest point of the cotton module storage bay.

The following equation has been used to determine noise attenuation over the separation distance as the landscape between the receptor and noise source is open with no barriers.

$$L_2 = L_1 - 20\text{Log}(d_1/d_2)$$

(Source: Noise Guide for Local Government - epa.nsw.gov.au)

Where: d_1 = distance (m) between source and receiver
d_2 = distance (m) at which Sound Pressure (L_{pa}) measured
L_2 = sound pressure level at the distance d_1 from the source
L_1 = sound pressure level at distance d_2 from the source

For activity in the trash or module yard, the primary equipment generating noise will be a front-end loader being used to unload or load trucks, as well as collect the round modules stored on the module pad for ginning.

Using the above equation, noise attenuation of 30 dB and 38 dB will occur over the buffer distances for R4 and R3 respectively. The noise from a frontend loader will be in the order of 55 dB and 47 dB at R4 and R3 respectively. Allowing for the influencing factor of 6dB, the noise level criteria for R4 is detailed in the following table:

The following table presents an analysis of noise criteria throughout the day and the predicted noise level of a front-end loader at R4.

Table 6: Noise criteria at R4 allowing for influencing factor

Time of day	Assigned Level (dB)			
	$L_{A,1}$	$L_{A,10}$	$L_{A,max}$	Noise from Front-end loader activity
0700 to 1900 hours Monday to Saturday	51	61	71	55
0900 to 1900 hours Sunday and public holidays	46	56	71	55
1900 to 2200 hours all days	46	56	61	55
2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	41	51	61	55

The front-end loader would be a mobile noise emission. It would not remain at the closest points to R3 and R4 for more than a period of 5-minutes as a stand along noise. It would be mobile and involve reversing and manoeuvring whilst in operation.

The cotton gin would involve a 24-hour operation during the ginning season. If the representative assessment period is determined as a 24-hour period as a result of 24-hour operations, this would mean that $L_{A,1}$, and $L_{A,10}$ would be equivalent to 14.4-minutes and 144-minutes (2.4-hours) of continuous noise that is not to exceed the assigned level. $L_{A,max}$ is a maximum level not to be exceeded at any time.

At 55 dB, the potential noise impact at R4 does not exceed the $L_{A,max}$. It would potentially exceed the $L_{A,10}$ between 10pm and 7am if it remained operating within the northern part of the site for more than 2.4-hours throughout the day.

The noise level produced from the loader would exceed the $L_{A,1}$ level by between 4 and 14 dB if it operated for more than 14-minutes throughout the day in this northern sector of the cotton yard.

On the basis that the frontend loader is not used between 10pm and 7am and its presence at this distance does not exceed a period of longer than 1% of daily operational times, front-end loader operations in this area would be considered as compliant for the closest sensitive receptor at

R3. Some risk would occur for operation of the front end loader during the night time period after 10pm. Management options to avoid this should therefore be considered.

No influencing factor is applicable to R3.

Table 7: Noise criteria at R3 without influencing factor

Time of day	Assigned Level (dB)			
	$L_{A,1}$	$L_{A,10}$	$L_{A,max}$	Noise from Front-end loader activity
0700 to 1900 hours Monday to Saturday	45	55	65	47
0900 to 1900 hours Sunday and public holidays	40	50	65	47
1900 to 2200 hours all days	40	50	55	47
2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35	45	55	47

The above table provides a comparison of assigned noise levels and potential exceedance periods for a front-end loader to be operating at the closest point of the gin site to R3. Based on this analysis, operation of the loader in this eastern sector of the gin site would exceed $L_{A,1}$ throughout the day as the loader will be working between the module bay and the feeder bay into the cotton gin throughout the day. Direct noise from the front end loader working at the entrance to the module feeder bay (990m separation distance) is estimated to generate a noise level of 45 dB at R4. This is compliant form the majority of the day, but not through the night periods.

Cotton trucks will travel various internal routes around the cotton gin buildings before exiting the site. The closest point of access has a separation distance of approximately 320m from the closest receptor (R4) and possibly 650m from R3. Maximum noise level at R4 for the short travel time of these trucks (closest point of travel) will be in the order of 70 dB if the truck is revving. This is considered compliant for $L_{A,max}$. Truck engines would cause an exceedance for the remainder of the day if it generated this noise for more than 14.4 minutes.

The only trucks that need to rev and therefore generate this 100 dB of noise would be the trash delivery truck while unloading within the trash storage yard. This would occur twice per day if a semi-trailer were used. The unloading process would take less than 5-minutes for each trip.

All other receptors identified around the site are located at a minimum distance of approximately 1,200m from the closest road or frontend loader noise emission source within the cotton gin site. At a distance of 1,200m allowing for the direct travel of noise, the predicted noise level at this distance will be in the order of 38 dB for a front-end loader. This does not include any allowance for the obstructions which are present between the gin operational site and these receptors. The majority of the receptors to the southwest of the site will be protected by ridge and slope. These natural features will deflect and dissipate the travel of noise from the gin operation to the receptor.

Based on the above calculations, potential exceedances may occur when the gin commences operations at 5am. The period between 5am and 7am remains within the early noise time of day which the regulations, based on metropolitan working hours, would have residents remaining asleep during this period. This may not be the case for the location of the cotton gin, other than on a Saturday, Sunday or public holiday during the ginning season.

The gin site will be managed to limit noise emissions during the period of 5am and 7am when they intend to open the weighbridge to allow trucks to enter the site. Mitigation measures will include:

- Limiting speed or trucks to less than 20 km/h;
- Avoid all revving;
- No exhaust breaks to be used onsite;
- All trucks and equipment to use selected roads at an acceptable distance from R4 and R3 by remaining on the southern internal road loop.
- Obtain round bales from the closest module bays during the hours of 7pm through to 7am;
- Maintain internal roads in a smooth condition to avoid excess noise from trucks travelling empty.

No continuous noise emission source such as stationary motors will be required in the module yard area.

7.2 Cotton Gin Emissions

Cotton ginning equipment will be located inside the gin building to encapsulate the process and avoid the ingress of soil or other dust that may contaminate the cleaned cotton. Noise emissions from the gin building walls from a typical cotton gin have been recorded at 78 dB. This noise includes the noise of cotton being blown through the building and the processing through the gin stands. The internal equipment is run by either electrical motors or hydraulic motors. Once the gin reaches full operational speed, noise is continuous and mainly consists of noise generated from the blowing of cotton between processing equipment and noise causing vibration of the colorbond walls and roof structure. The equipment will be isolated from the colorbond wall sheeting to minimise this wall vibration. The gin is normally operated with closed doors.

The cotton gin building noise emission is continuous and would therefore be subject to $L_{A,1}$ as the assigned noise emission level.

Receptor 2 is located at a distance of 1.2 km from the cotton gin. R2 is approximately 11m higher than the gin site with some natural variations in topography between the two buildings. A substantial amount of gin noise travelling toward R2 will be deflected and absorbed by the terrain and therefore noise is predicted to be less than 30 dB which is compliant for the most stringent time of the day.

R3 is located approximately 980m from the cotton gin. Noise travelling toward R3 will be reduced by the presence of cotton bales in the module yard and a lower elevation at R3. With modules in the module yard and change in elevation as a barrier, gin building noise levels are estimated to be less than 30 dB at R3. If noise travels directly between the gin building and R3, it will reach a level of approximately 38 dB. This would represent an exceedance of 3 dB.

R4 is located 655m from the gin building. Using the above noise attenuation equation, gin noise at this closest receptor is predicted to be in the order of 41.7 dB for noise travelling directly from the gin to the receptor. This calculation indicates that the noise emissions from the gin building, if they flow directly to R4, may exceed the night time levels by 0.7 dB allowing for an influencing factor of 6 dB. Some noise travelling toward R4 will be deflected by the east half of the seed and trash hoppers and the dust management cyclone rack on the northern side of the cotton gin building. Deflection of the noise will reduce the potential noise level. Some noise will not be deflected.

The fan bay and dust management system for the cotton gin will generate the air flow to move cotton through the gin. This air is exhausted through the dust control cyclone system. Both components will be located on the north side of the cotton gin. The cotton gin building will shield the noise generated from the fans and cyclones for all residents to the south of the site. This will include receptors 1, 2, and 5 to 14.

The loudest noise emission from the cotton ginning consists of the air emissions from the cyclones, which is estimated to be in the order of 91 dB. This noise emission will occur at a height of potentially 15m above ground level. This will be a continuous non-tonal noise during ginning.

R3 is located at a distance of approximately 1 km from this continuous noise source. A direct noise emission from the cyclones will have a sound level attenuation of approximately 40 dB over this distance. The potential noise at R3 will therefore be in the order of 51 dB. If direct travel of noise can occur to R3, noise levels may exceed threshold levels for $L_{A,1}$ as this will be a continuous noise during gin operations.

R4 is located approximately 655m from the cyclones and therefore noise levels at R4 would be in the order of 55 dB if noise travelled directly from the cyclones to this receptor. An $L_{A,1}$ exceedance is predicted to occur if no mitigation measures are installed as part of the gin construction works.

For the cotton gin to operate without an $L_{A,1}$ exceedance at R3 and R4, a noise buffer must be constructed as part of the development. Continuous noise levels at these two residences must not exceed 35 dB. Preliminary calculations indicate for a multi-spectrum noise emission source with a total sound power level of 109 dB, a 3m high earthen bank located at a distance of approximately 100m from the receptor, will reduce noise levels below 35 dB. The inclusion of a noise berm in the form of a grassed earthen bank at 100m from R3 and R4 would therefore allow the gin to operate within compliance levels for $L_{A,1}$. The banks would be constructed from onsite spoil materials and be allowed to grass over to reduce visual impact. Specific design detail would be required for further analysis of the proposed embankments.

Additional mitigation measures in the form of noise deflection or insulation materials could potentially be installed at the emission point of the cyclones. This would be subject to design and air flow directional control. The potential exists to direct the noise vertically.

Noise from the fan bay and cyclones located in the northwest corner of the cotton gin building will be deflected from travelling toward the larger group of receptors. The gin building and the bale shed will deflect any direct noise emissions to the south. The noise generated from the fan bay and cyclone will be deflected north. No close receptors are present in this direction.

Bale shed activity will involve regular movement of forklifts between the cotton gin and the bale shed during ginning operations. It is anticipated that two forklifts will operate relatively continuously during ginning. The cotton bales will be stacked in the shed to await loading onto tautliner trucks for transport to Darwin.

Forklifts will need to be fitted with reversing alarms. To reduce noise, the alarms will need to be either “white sound” or broadband (quacker or croaker) alarms. The reversing alarm would be required by law and therefore quiet reversing alarms are required.

Based on available data, a forklift will generate approximately 85 dB during operations. The noise would not be constant as the forklift will be moving in and out of the cotton gin as well as within the stockpiled bales of cotton. When loading trucks, the truck would be located on the western side of the forklift which would provide a barrier to noise. The forklift operation would occur over a matter of 10 to 30 seconds where it may be exposed to direct noise emissions toward receptors. The relevant compliance level would therefore relate to short periods of noise where the forklift moves between barriers such as the stockpiled cotton bales or the cotton gin.

Receptor R1 has rock outcrops between the forklift area and the residence to deflect noise. R5 and R6 are the second closest receptors at distances of over 1300m. Under worst case conditions, noise levels at this distance could be 42 dB if no deflection occurs. A review of the topography between the forklift area and R5 shows a 6m ridge. This ridge will deflect or block the travel of noise and therefore forklift noise would not reach these residence to the southwest of the gin site.

Suitable mitigation measures are available for management to avoid continuous noise emissions from bale truck loading. These include stacking of bales to create a barrier wall for the constant movement of forklifts between the gin and the bale storage, in addition to loading the trucks from the eastern side so that the truck provides a noise barrier to minimise the direct emission of noise from loading.

8 Mitigation Measures

The following provides draft mitigation measures to be adopted for the purpose of minimising noise emissions from ginning operations:

Table 8: Noise Mitigation Measure available to reduce noise

Potential Impact Type	Methods to Control Noise Pollution
Operational Noise	• Scheduling the use of cotton transport vehicles for loading or unloading cotton modules in the outer perimeter module bays between 7am and 7pm. • Operating heavy vehicles and equipment so that a barrier such as round bales, a stockpile, or a building is located between the equipment and receptor. • Orienting equipment so that noise emissions are directed away from sensitive areas. (Vehicle exhausts) • Keeping equipment well-maintained and operating in an efficient manner. • Where required, install noise shielding on equipment or vehicles if noise emissions exceed the predicted levels. • Ensure noise emissions from cotton transport vehicles do not exceed 85 dB(A) if they are to operate for more than 15-minutes on a continuous basis around the perimeter of the module yard or trash storage yard. • Employing quiet practices when operating equipment (Example: positioning idling trucks in appropriate areas). • Running regular toolbox talks and staff training on the effects of noise and the use of quiet work practices. • Maintaining internal haul roads in a smooth condition to minimise road noise generated by empty trailers bouncing in potholes or corrugated sections of road.
Construction Noise	• Restrict construction of internal and access roads to standard work hours where possible. (7am to 7pm) • Restrict construction of areas closest to Receptors R2, R3 and R4 (i.e. the northernmost section of the site internal access road) to the least sensitive time of day. (7am to 7pm Monday to Saturday) • Inform impacted residents of the duration and noise level of the works and of any respite periods.
Road Traffic and Module Yard Noise	• Developing an effective traffic management strategy. • Maintain and operate vehicles in a manner that does not generate excessive noise. • Schedule haulage of products to maximise periods of respite. • Prepare a monitoring plan adherence protocol and deal with complaints. • Where possible, minimise the number of vehicular movements by using larger capacity vehicles. • Speed limit imposed to reduce engine revving.

Potential Impact Type	Methods to Control Noise Pollution
	• Truck driver induction to include requirement to avoid use of engine brakes and unnecessary engine revving. • Where trucks are waiting for an extended time to be loaded or unloaded, engines to be turned off.
Noise Barriers and Shielding	• Where noise emissions cannot be reduced around regularly used areas, install noise barriers such as cotton mote bales, thickened colorbond fencing or other insulating materials (soil mounds).
	• For emission points such as the fan bay and cyclone stand, use the option to install shielding to direct noise toward another building or stockpile of material, and ensure noise is not directed toward a sensitive receiver.

9 Discussion

The cotton gin produces two primary forms of noise emissions, mainly:

- Vehicle noise, and
- Gin production noise.

Vehicular noise would be generated by trucks, equipment used to unload or load trucks, and forklifts or frontend loaders used to move cotton bales between the cotton gin and the bale shed. This vehicle generated noise will be mobile and therefore vary in location and proximity to receptors.

The gin when operating will generate a constant noise emission during processing of cotton. Most equipment will be housed within the gin building. The exception to this is the fan bay and the cyclone/dust management system to be located on the north side of the gin. The gin will be operated with closed doors to minimise dust or other contaminants affecting the ginning process. By closing doors, noise can be contained from the internal ginning equipment, other than the vibration noise emitted through the building structure.

In relation to background noise levels, the majority of receptors are located in a rural setting. Background noise levels would be below 35 dB at night as there are very limited sources of noise in the area, other than environmental noise such as air conditioners, insects, birds, and wind in the trees.

According to Regulations, all 17 identified sensitive receptors around the gin site are classified as "*Noise sensitive premises: highly sensitive areas*" on the basis that they are residences used for sleeping. The Regulations impose a more stringent noise receival level for such residences on the basis of avoiding issues of sleep-disturbance during night-time periods.

Construction noise will be limited to daytime hours. The initial stage of construction will involve heavy machinery which will generate short peaks of noise that would be mainly audible at receptors 1, 2, 3 and 4. The noise from this equipment would be dependent on the direction of operation of the equipment. The noise would include trucks for delivery of gravel and ginning equipment. Once the earthworks are completed, noise levels would be limited to the erection of the buildings. Once the buildings are erected, the work areas would be relatively contained within buildings.

The majority of ginning equipment would be pre-fabricated offsite and therefore the requirement for high noise activities during construction, such as cutting and grinding, would be limited. The majority of the gin construction noise would consist of operation of cranes, forklifts and stationary engines such as generators.

Intended ginning operations will extend over 24-hours per day for 7-days per week once the gin is completed and raw lint cotton is delivered to the site in June/July of each year. The gin will operate continuously for a period extending from June/July when cotton is received through to October/November, subject to the amount of cotton grown in the ORIA and the rate of ginning. In the first one or two years, the ginning season may be limited to 3-months. For ginning of up to 150,000-bales of cotton, ginning season could extend into October and potential carry over into November.

During the ginning season, the gin will generate noise over a 24-hour period. Therefore, noise limits applicable for gin operations is the $L_{A,1}$. This noise limit should not be exceeded for more than 1% of the representative assessment period. In this case, this period would be applicable for the whole day.

Noise regulations establish a strict level of noise limitations/thresholds. Noise criteria outside of daytime hours are more stringent to avoid sleep disturbance. The most stringent noise threshold level that should not be exceeded for more than 1-percent of time, is 35 dB between 10pm and 7am. The exception to this limit is Receptor 4 which is the closest residence to the gin operations. The Guidelines allow an influencing factor of 6 dB for this residence due to the proximity of the site. This means that the most stringent noise level is 41 dB for receptor 4.

Based on the data available and calculations undertaken using standard noise attenuation equations, the cotton ginning operation will need to adopt specific noise mitigation measures to be compliant. The specific noise emission identified to cause potential exceedances is the noise generated from the fan bay and dust management system of cyclones which will be elevated to a height of up to 15m. Noise attenuation calculations indicate that the noise levels

from this source need to be decreased by 15 dB to reach a compliance level of 35 dB for night time noise at receptor 3 to the east of the site. Options to reduce this noise emission level may include noise deflection at the outlet points which can shield noise travel toward either receptors 3 or 4. Additionally, to achieve compliance, the development proposal will include a noise barrier to deflect and absorb this noise to achieve the required noise reduction.

Preliminary calculations indicate that a 3m high earth bank located at a distance of 100m from receptors 3 and 4 will achieve the required noise attenuation. The design of the earth embankment will be subject to final survey to determine the optimum height.

The proposal for establishing the noise berm at a distance of 100m from both R3 and R4 relates to visual amenity so that the bank was not directly adjacent to the residences. The embankment as proposed would consist of a vegetated structure to reduce the visual impact. A bank constructed closer to the residence may be more acceptable if the receiver agrees to such.

Based on standard attenuation calculations, noise exceedances are possible during external operation of machinery. The required mitigation measures to achieve compliance have been determined from attenuation calculations. The intent is to adopt the required mitigation measures as part of standard operating procedures for the cotton gin. This mainly relates to restriction of vehicle movements at the perimeter of the module yard outside of the day time period of 7am to 10pm. This would extend through to 9am on Sundays and public holidays. This is regarded as a simple and achievable mitigation strategy through a process of managing external machinery movement by keeping it closer to the centre of the site during night time operations.

A range of mitigation measures have been presented in a draft schedule within this report. All measures are considered standard and achievable for management of the site. Additional mitigation measures are available in the form of additional shielding of the ginning equipment if this is required. This may include the placement of noise absorbing shielding near external motors or exhaust discharge points.

10 Conclusion and Recommendations

Kimberley Cotton Company commissioned SMK Consultants to undertake a preliminary Noise Impact Assessment for their proposed Kununurra Cotton Gin.

This assessment is based on preliminary site designs, available noise emission data from other cotton gins in eastern Australia and published noise emission data for a range of equipment such as fork-lifts and trucks. All cotton gins are similar in relation to processing of cotton and therefore the level of noise emissions from the equipment is similar. The difference in noise emissions relates to the location of the equipment, the type of building materials used for the cotton gin building and the proximity of sensitive receivers.

Noise attenuation calculations presented in this report have identified potential non-compliances. Primarily these relate to the continuous operation of the cotton gin, which is subject to noise criteria for $L_{A,1}$. This threshold relates to the limit of noise exceedance being less than 1-percent of time. The gin intends to operate on a 24-hour basis and therefore in real terms, the gin should not exceed this limit for more than 14.4 minutes per day.

Calculations for noise attenuation and deflection have indicated that a noise barrier can be constructed to deflect the direct travel of noise to receptors 3 and 4, located to the east and north of the gin site. The purpose of the barrier is to deflect this continuous noise emission to ensure compliance can be achieved. This is a simple option which is achievable to reduce noise. The barriers would be constructed on KCC land at an agreeable distance from the property boundary to minimise such issues as visual impact, drainage and microclimate at these two receptors.

Other noise emissions can be managed through the modification of vehicle movements onsite during various parts of the day. Noise calculations have indicated that by excluding movement between 10pm and 7am in the eastern sector of the site, the site would be compliant. This compliancy level refers to short periods of noise where a vehicle travels to a location and returns from a potential noise impact area to ensure that regulatory noise levels are not exceeded for more than 10-percent of time.

The first year of operations will provide KCC a shorter season due to a predicted smaller cotton crop. This will enable site monitoring to refine site operations in conjunction with the closer receptors. As indicated above, noise exceedances may occur for short periods. These can be checked, altered and then checked again prior to Year 2 when the gin operation may extend for a longer period of the year.

The cotton gin office intends to open the site from 5am. This is outside of the standard time of day identified in standard regulations. The regulations identify a standard starting time of 7am assuming surrounding receptors would potentially remain asleep until 7am. It is noted that rural activities in northern Australia, including the Kimberley have a standard start of day at 5am or earlier. This relates to daylight, daytime temperatures and the custom of working for as many daylight hours as possible to complete the work before the wet season commences. The surrounding region of farming activity to the north and east of the gin site would work similar hours.

The rural-residential receptors to the south of the site along Weaber Plain Road have little or no exposure to earlier vehicle movements on the gin site due to the available buffer distances which would ensure noise attenuation would occur. However, residences along Weaber Plain Road are considered susceptible to traffic noise from Weaber Plain Road. The majority of this traffic would relate to farming activities and therefore commence work at 5am or earlier.

11 Limitations

This Noise Impact Assessment:

- Has been prepared by SMK Consultants for the sole use of Kimberley Cotton Company;
- The report should be read in full, and no summary, conclusion or other section of the report may be used or relied upon in isolation or taken as representative of the report as a whole;
- May be provided to other third parties but such third parties' use of or reliance on the report is at their sole risk; and
- May only be used for the purpose as stated in Section 1.1 of this report and must not be used for any other purpose.

12 References

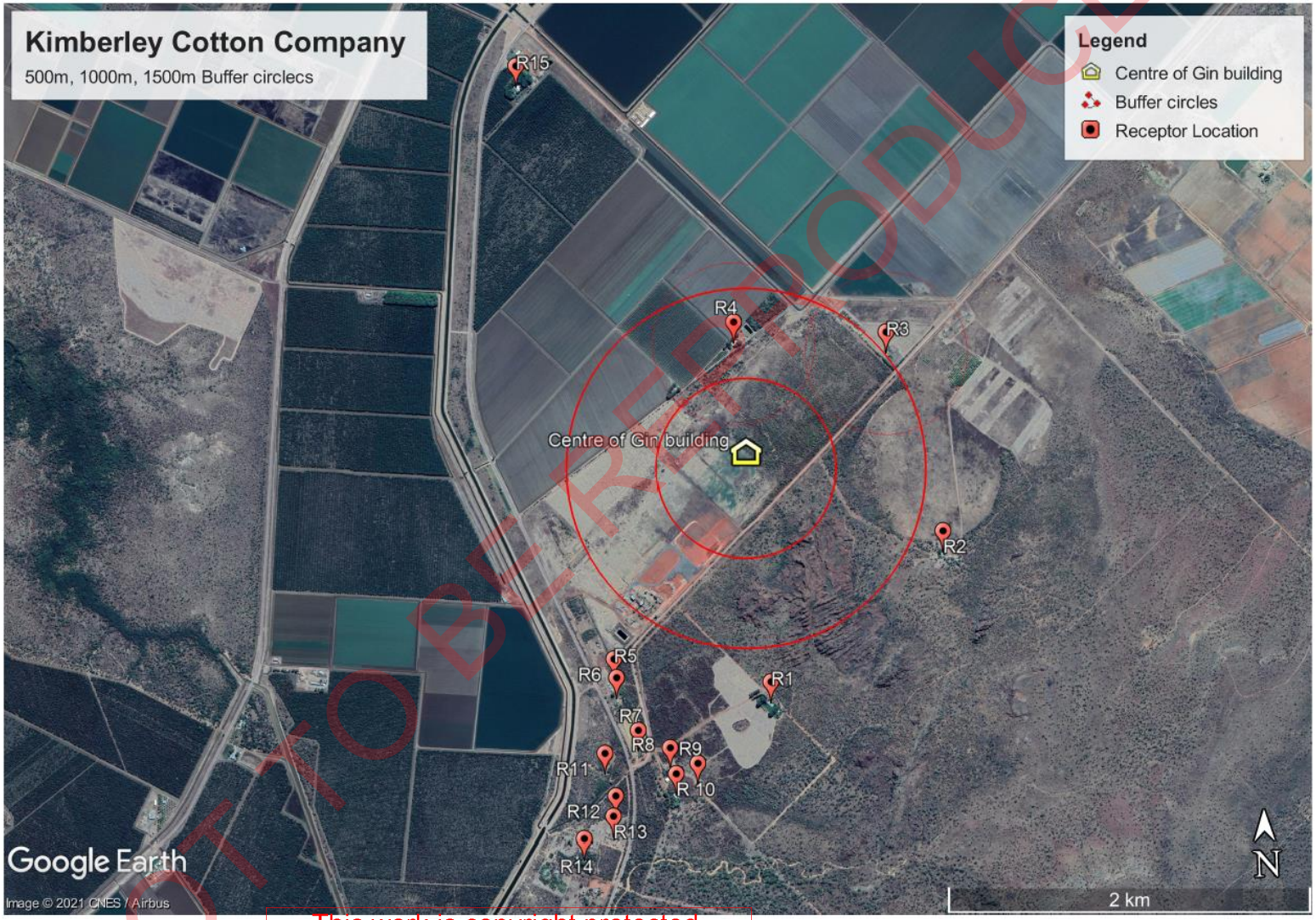
Department of Water and Environmental Regulation (2021), *"Draft Guideline – Assessment of environmental noise emissions*".

Department of Environment Regulation (2016), "*Draft Guideline on Environmental Noise for Prescribed Premises."*

Lloyd George Acoustic (2007), "Traffic Noise Assessment – The Victoria Highway Kununurra Heavy Vehicle Route".

Western Australian Government, *"Environmental Protection (Noise) Regulations 1997 – Schedule 3*."

Appendix 1: Receptor Locality Plan



Appendix 2: Wind Roses for Kununurra

The following wind roses have been obtained from Willy Weather to provide details of wind direction and speed throughout the ginning season.

Figure 1: 5-Year Windrose for Kununurra – *All months*

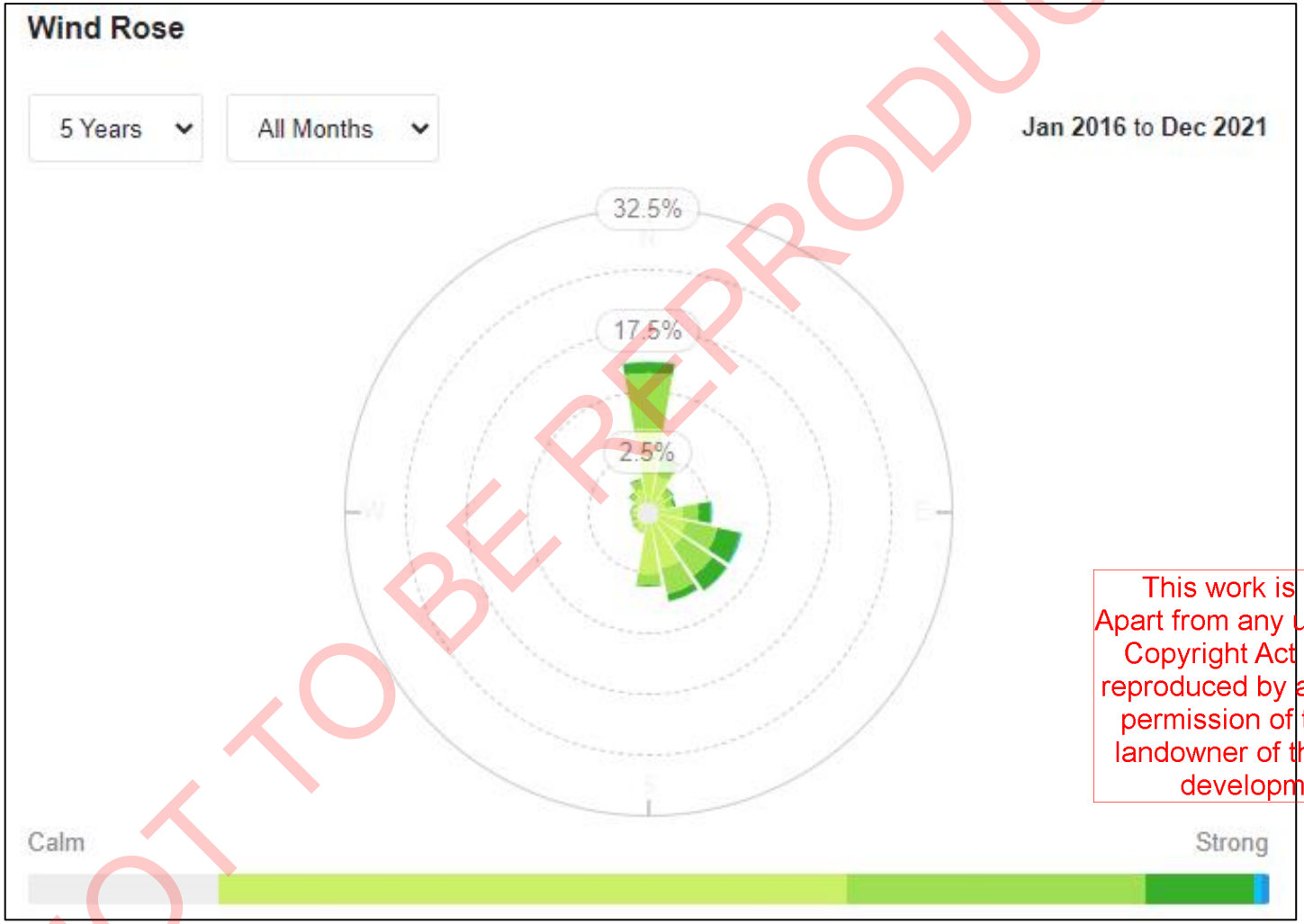


Figure 2: 5-year Wind Rose for June

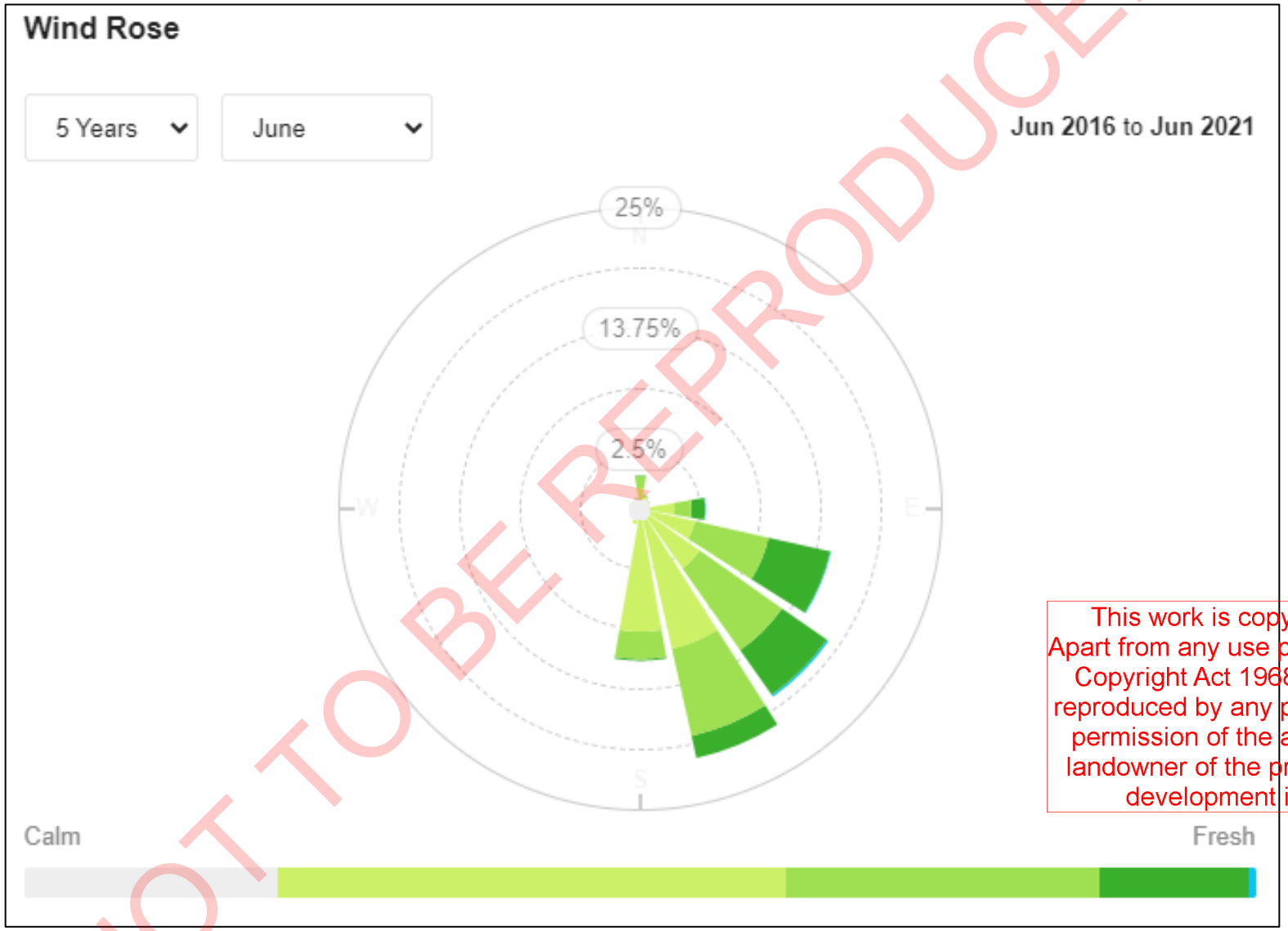


Figure 3: 5-Year Wind Rose for July

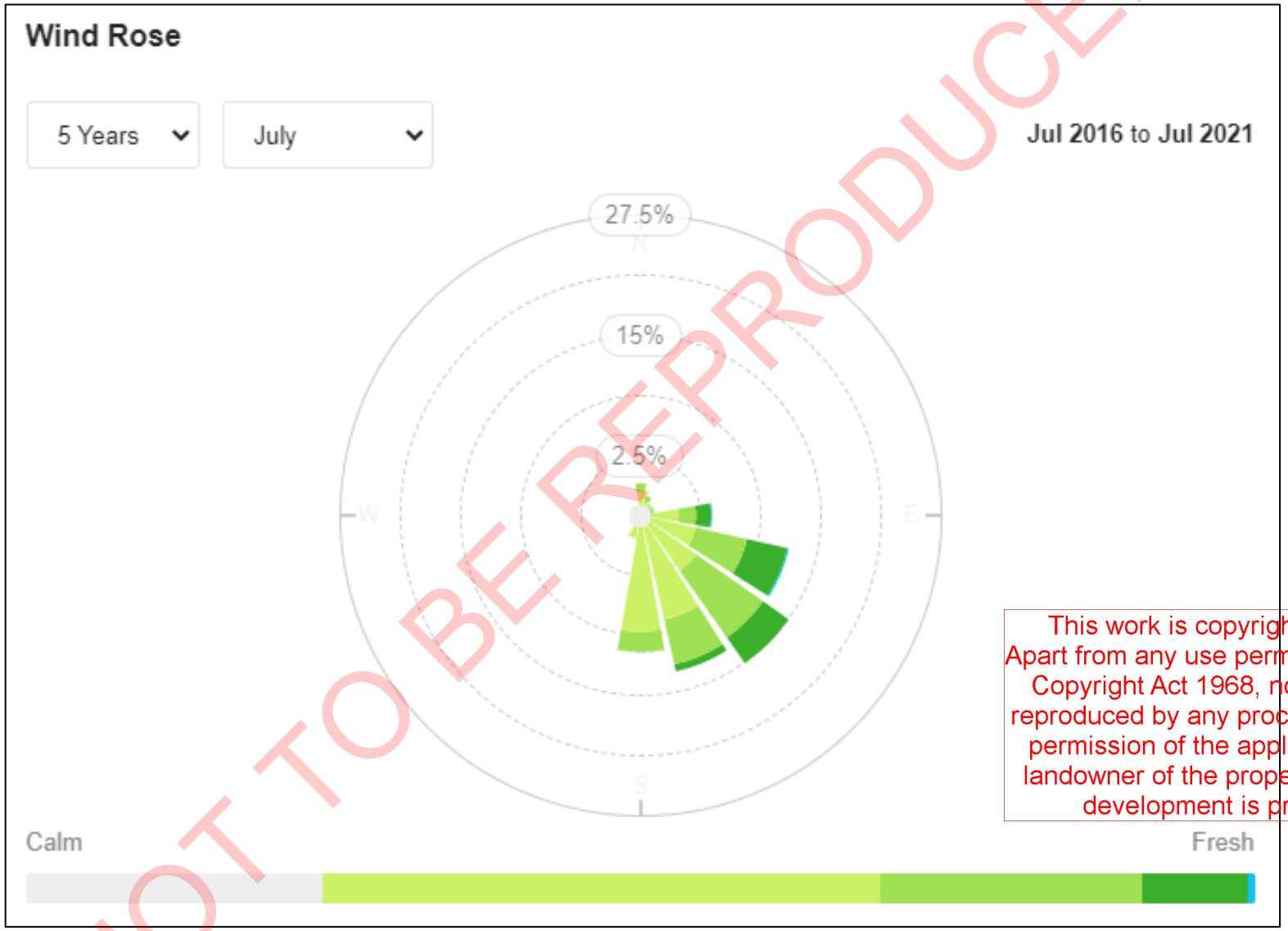


Figure 4: 5-Year Wind Rose for August

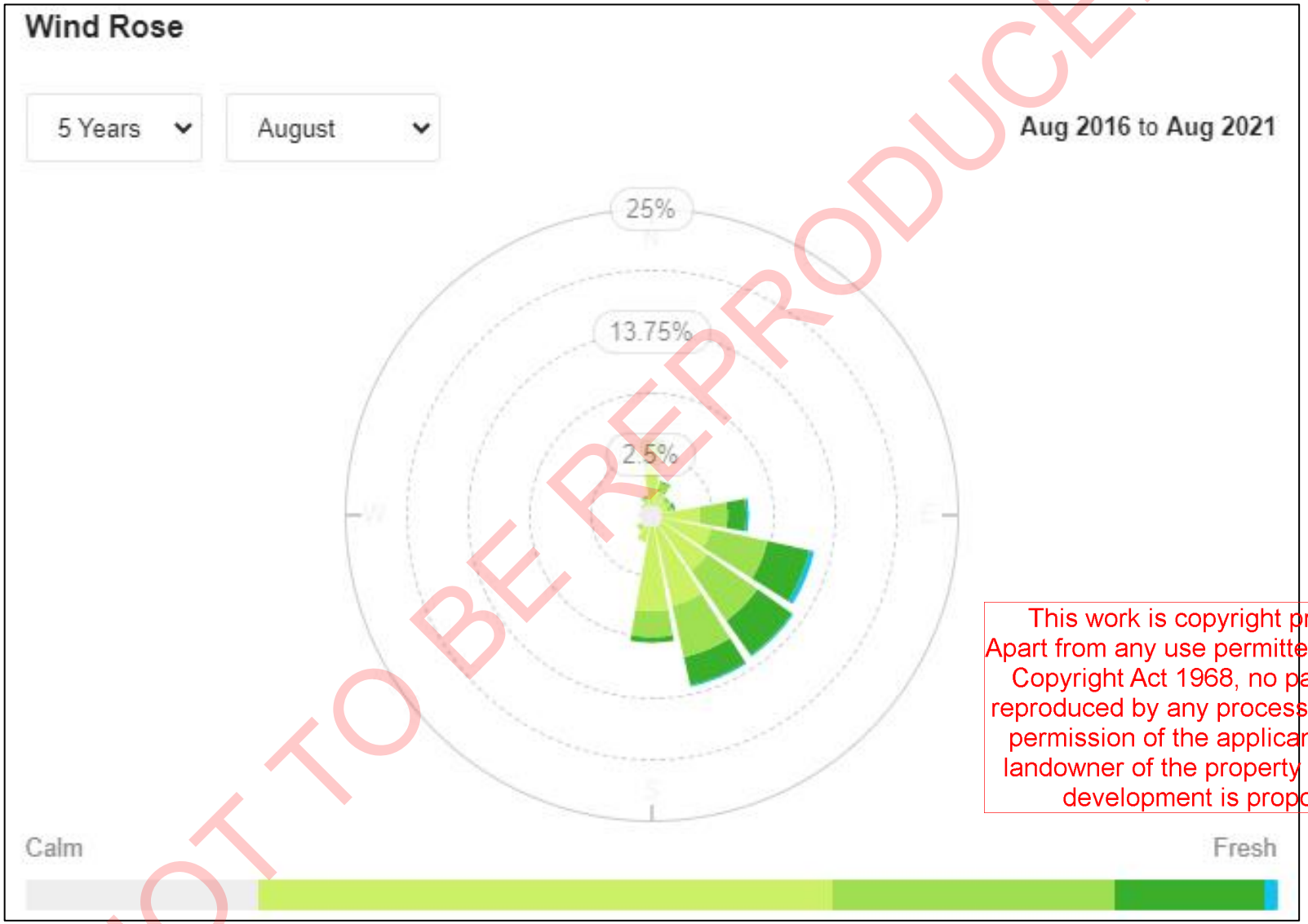


Figure 5: 5-Year wind rose for September

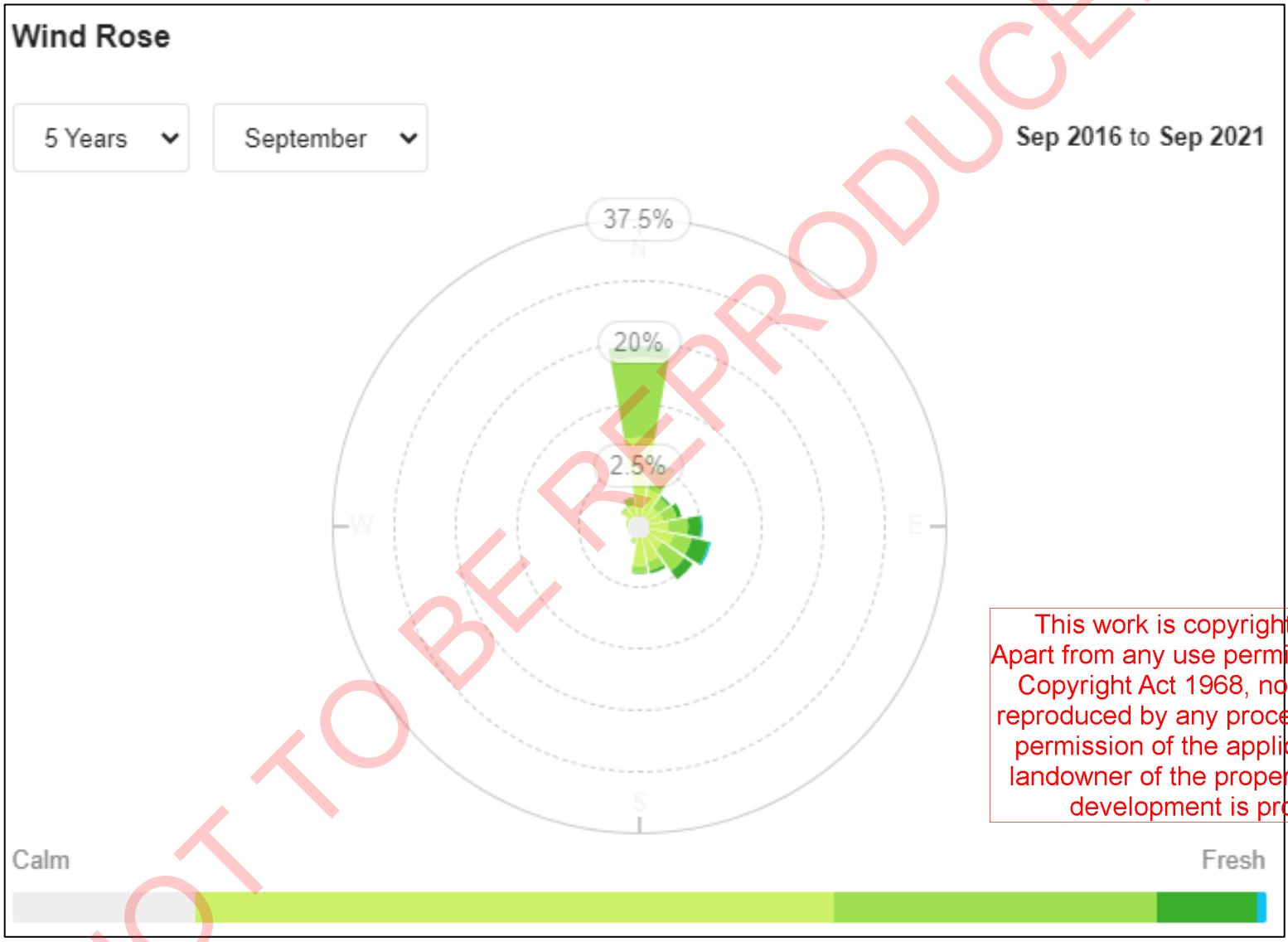
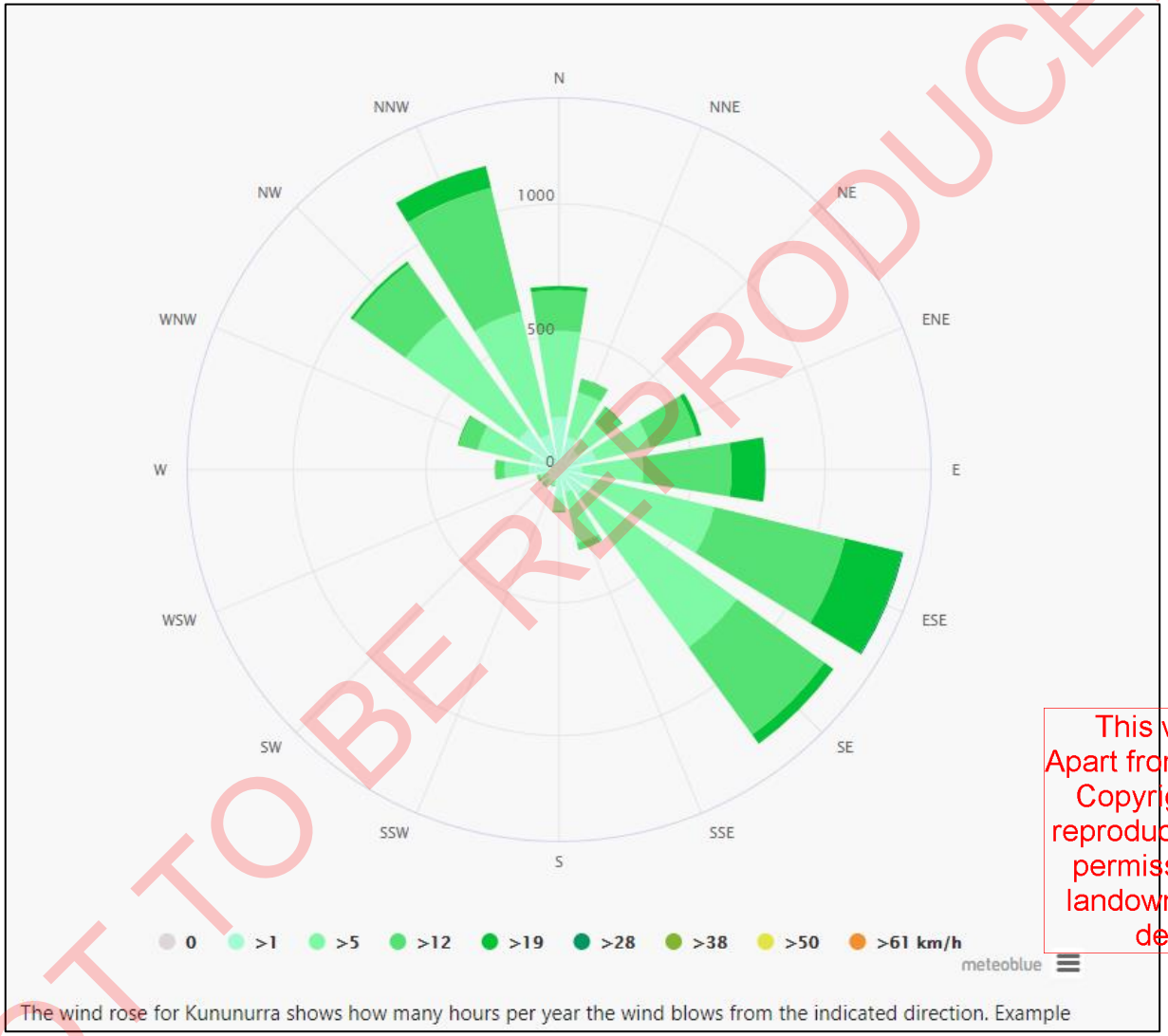


Figure 6: 5-Year wind rose for October

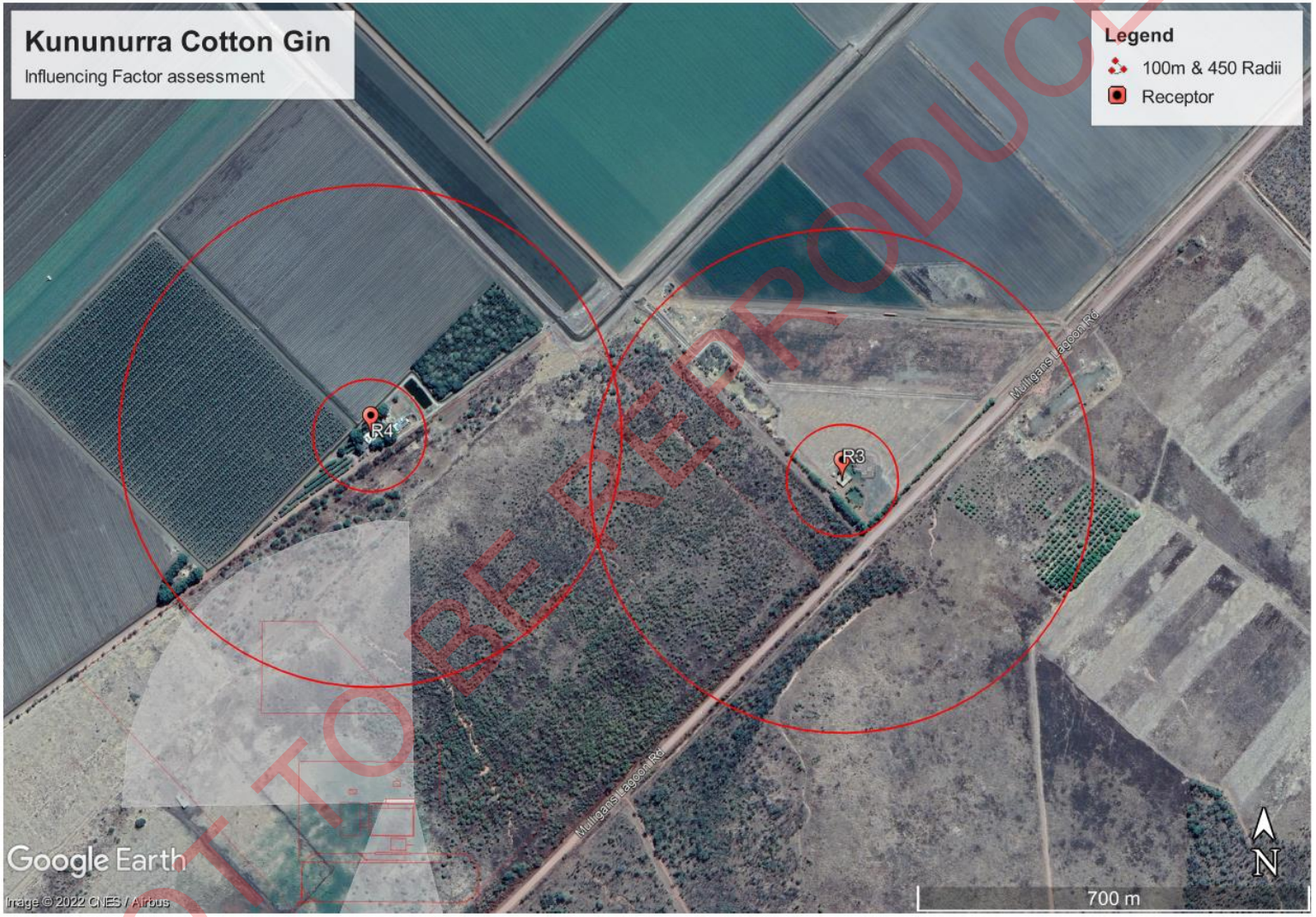
Figure 7: 5-Year wind rose for November

Figure 8: Kununurra Wind Rose for 12-month period



Source: Meteoblue weather data https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/kununurra_australia_2068110

Appendix 3: Influencing Factor calculations for R3 and R4



TRAFFIC IMPACT ASSESSMENT

ROWE GROUP

SMK

CONSULTANTS

surveying – irrigation – environmental – planning - engineering

Kununurra Cotton Gin

TRAFFIC IMPACT ASSESSMENT

Kimberley Cotton Company
PO Box 636, KUNUNURRA WA 6743

July 2022

Shire of Wyndham East Kimberley
Recieved: Monday 17 October 2022

SMK

CONSULTANTS

surveying – irrigation – environmental – planning - engineering

ABN 63 061 919 003

SMK

CONSULTANTS

surveying – irrigation – environmental - planning
ABN 63 061 919 003

39 Frome Street
PO Box 774
Moree NSW 2400
Ph 02 6752 1021
Fax 02 6752 5070
ptaylor@smk.com.au

www.smk.com.au

Kununurra Cotton Gin

TRAFFIC IMPACT ASSESSMENT

Kimberley Cotton Company
PO Box 636, KUNUNURRA WA 6743

July 2022

DOCUMENT CONTROL

Project Name	**Traffic Impact Assessment**
Proponent	Kimberley Cotton Company PO Box 636 KUNUNURRA WA 6743
Project Reference	21-235
Report Number	21-235-TIA
Prepared for	Kimberley Cotton Company PO Box 636 KUNUNURRA WA 6743
Prepared by	SMK Consultants 39 Frome Street Moree, NSW 2400
Contact	Peter Taylor E: ptaylor@smk.com.au Ph: 02 6752 1021

Author	
Name	*Peter Taylor* Peter Taylor BSc. MEIANZ LAA
Position	Environmental and Resource Consultant
Company	SMK Consultants

Revision History			
Version Number	**Date**	**Authority**	**Details**
0	November 2021	Peter Taylor	Issued to Client
1	December 2021	Peter Taylor	Revised Gin Layout
2	July 2022	Peter Taylor	Final Gin Layout

CONTENTS

1 Introduction

SMK Consultants has been engaged by Kimberley Cotton Company to prepare a Traffic Impact Assessment for the proposed construction and operation of a cotton gin on Lot 510 located on Mulligans Lagoon Road outside of Kununurra. The development is situated approximately 10.7 kilometres north of Kununurra.

The assessment has been prepared in accordance with the West Australian Government (WAG) *Transport Impact Assessment Guidelines* (Western Australian Planning Commission, 2016). This report considers the environmental impact of the development proposal in relation to traffic generation and road use.

1.1 Aims and Objectives

This assessment aims to identify the likely impact of the proposed heavy vehicle traffic upon the wider road network of the region. Impacts considered include impacts to the road network itself (road condition), the functionality of the road network (road safety and traffic volumes) and amenity impacts. The assessment also outlines traffic considerations in regard to the design of the proposed gin (adequacy of on-site parking provision, internal traffic circulation and site access to the public road network).

The objectives of Kimberley Cotton Company are to:

- Minimise adverse impacts upon the public road network; and
- Ensure the practicality and safety of traffic management on site.

1.2 Scope of Works

The scope of works includes preparation of Traffic Impact Assessment (TIA). The TIA will include the following:

- Determine the traffic volumes and vehicle types to be generated by the development;
- Determination of traffic peaks and average vehicle movement to be generated by the development;
- Determination of the key haulage routes;
- Assessment of the surrounding environment, existing conditions and road safety;
- Assessment of likely impacts associated with road haulage;
- Any mitigation measures required to minimise road impacts, e.g. dust and noise suppression;
- Recommendations for access onto local roads.

1.3 Definitions

The following report uses several terms associated with the cotton industry. The following provides a brief summary of these terms:

- Seed cotton – Cotton material picked from the field which is raw cotton buds which contain cotton seed, cotton fibre, and cotton plant matter;
- Cotton module or round bale – These are the round bales of cotton produced by cotton pickers and wrapped in plastic for storage and transport. They contain the seed cotton. A standard semi-trailer can carry 6-bales in one layer. Specialist trucks can stack the bales in two layers and can carry 9-round bales per trailer. The average weight of a round bale is 2.4 tonnes.
- Cotton seed – This is the seed contained within each cotton boll picked from the plant and makes up approximately 50-percent by weight of a cotton boll;
- Cotton lint – This in the cotton fibre which is pulled off the cotton seed during the ginning process. This is exported for processing into cotton cloth as there are no processing factories in Australia. The cotton lint is pressed into 227kg highly compacted rectangular bales and wrapped in hessian for transport from the Gin;
- Cotton mote bales – Small, broken, or immature seeds with fibres still attached. The gin removes the motes at a different stage from the mature, whole seeds. Motes can be sold as a poorer quality cotton material for use in products such as denim;
- Cotton trash – The ginning process includes several stages of cleaning the seed cotton to remove sticks, leaves and other foreign material collected in the seed cotton during picking of the cotton. Cotton trash is vegetative material which can be mulched and used as a soil conditioner to improve organic matter. The cotton trash can be stored on the gin site for processing or transported directly back to farms for on-farm processing.

The following flow chart, shown in Figure 1, was prepared by Barnhardt Purified Cotton company to show the processing of cotton and associated materials from the field to the cotton cloth stages.

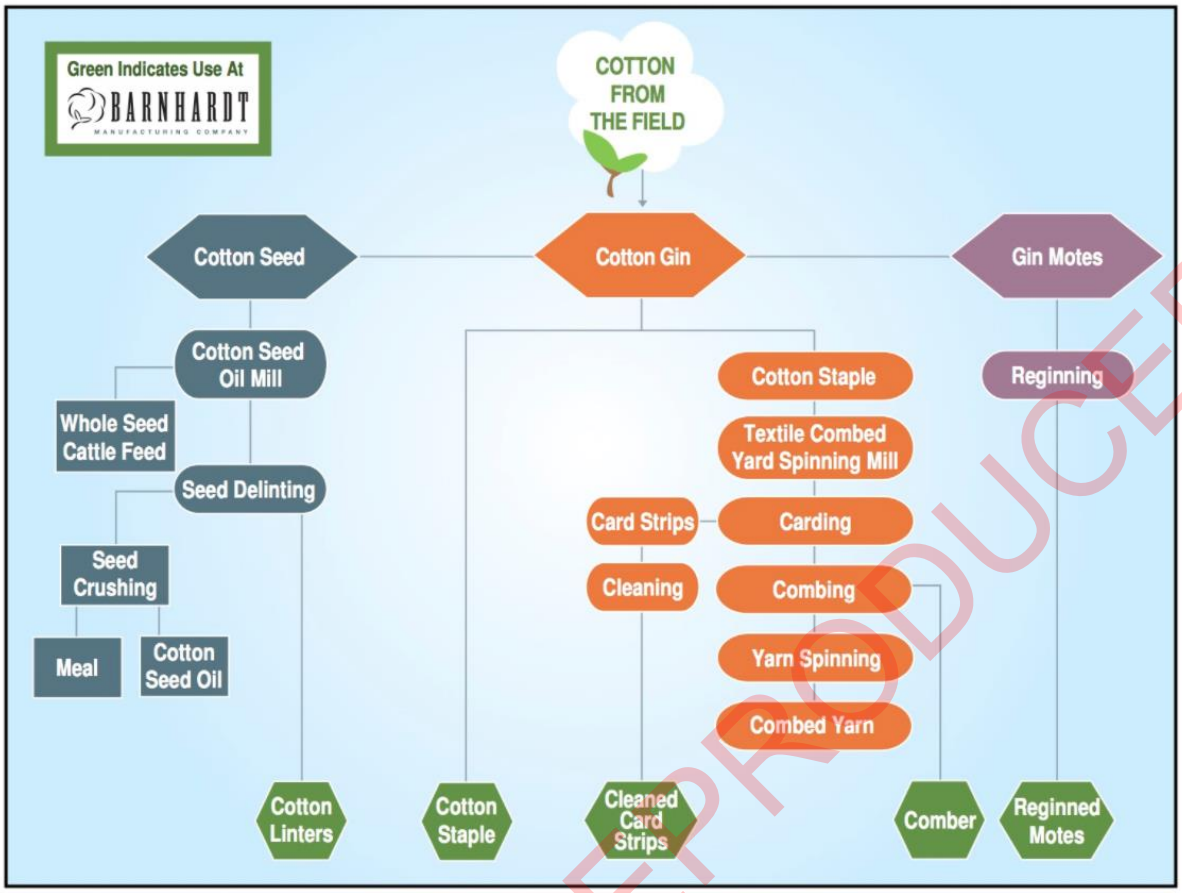


Figure 1: Cotton processing flow chart

Source: https://barnhardtcotton.net/blog/cotton-fiber-glossary/

The cotton ginning process separates the cotton seed, cotton staples and gin motes. The three products can then be processed into a range of products. Cotton seed is a high-quality stock feed but also can be used for cotton seed oil which is a high value vegetable oil material used for cooking and cosmetics. The cotton fibre is processed into yarn for cotton clothing. The mote cotton is further processed to extract the fibres and separate other organic material.

2 Existing Conditions

2.1 Development Site

The selected site is located off Weaber Plain Road and is accessible via Mulligans Lagoon Road to the south-east. The primary access to the site will be via Weaber Plain Road. The property was originally developed for the Ord Sugar Mill which has since been decommissioned. The Sugar Mill development included construction of an access road into the site which was designed and currently used by road train triples which is a common truck size in the region.

Since the Sugar Mill was decommissioned, the south-west section of the property has been developed as a grain receival facility, mainly for storage of corn grown in the Ord River Irrigation Area (ORIA). This grain bunker facility continues to be expanded.

The proposed cotton gin site is to be located to be northeast of the grain bunkers on land that had historically been cleared but now supports regrowth vegetation. The cotton gin and infrastructure will occupy an area of approximately 34 hectares. This will include the following components:

- Cotton Gin building to enclose the cotton gin and processing equipment;
- Office for staff and administration;
- Bale Shed to store lint cotton bales and protect the processed bales from dirt, rain and other material which may reduce the quality of the processed cotton;
- Cotton seed hopper for temporary storage of the daily production of cotton seed;
- Round bale or Module storage area consisting of formed rows for storage of round bales brought to the Gin from surrounding farms;
- Cotton trash composting area;
- Weighbridge for weighing all trucks in and out of the site;
- Sediment and stormwater management system for capture and settling of stormwater runoff from within the site.
- Internal road system for management of trucks delivering and removed cotton from the site.
- Staff parking area to be located adjacent to gin office and away from internal roads used by trucks.

2.1.1 Site Layout and Operations

A locality plan and preliminary layout of the proposed development site is presented in Appendix 1. The locality plan shows the location of the site in relation to Kununurra. The site plans show a concept layout of the site. The layout maybe slightly modified once a full civil works design is prepared. The basis of the design involves one-way internal roads for all truck traffic and a separate area for storage and handling of round bales delivered to the site.

The entrance to the site will follow an existing two-way internal main road through the adjoining grain storage facility. Trucks will enter a short section of two-way road on the gin site. Entering trucks will turn right into a staging area for unloading or loading of materials. This is a circuit road with trucks travelling in an anti-clockwise direction so that the driver is on the correct side of the truck when entering the weighbridge.

This large circuit includes a staging area for up to six road train triples to park and prepare for loading or unloading, or simply for trucks to stop and wait. All trucks must cross the weighbridge

for processing. To achieve this, they will continue in this main circuit, cross the weighbridge, and then move to their respective sections of the gin or exit the site.

Trucks will be generated to move three main commodities on the site. These include:

- Trucks delivering raw seed cotton entering the site for storage and processing;
- Trucks removing processed cotton from the site;
- Trucks removing cotton seed from the site.

Other trucks will be generated but form a minor volume of the overall truck movements for the site.

The cotton ginning operation involves delivery of raw seed cotton from farms in the ORIA. These deliveries occur once cotton harvest begins in July and continues through to potentially September in a normal year. The cotton is generally delivered by road trains carrying between 6 and 9 round modules per trailer. The cotton is weighed, recorded and then unloaded within the module yard. The delivery schedule involves filling the module yard over the first four to five weeks of cotton-picking season and then truck numbers reduce to the equivalent of the daily processing capacity of the Gin.

Each round seed cotton bale weighs approximately 2.4 tonnes and produces on average 4.2 standard cotton lint bales. The Gin has a design capacity for 1,224 processed lint cotton bales per day and therefore up to 350 round bales will be ginned each day. At the peak of deliveries, the site is expected to receive four road trains of round bales per hour over the weighbridge. This is a maximum rate of receival as it will require time to process each load across the weighbridge. Subject to the availability and use of scanners to scan bar codes on each bale, the time allowed for a truck to move through the main weighbridge circuit is 15-minutes from the point of entry to the unloading/loading point.

Once ginned, the processed cotton bales are stored in the bale shed or weather prevailing, on the concrete pavement at the bale shed if the bale shed is filled. Once sufficient cotton bales are processed, the lint cotton bales are removed from the site. This will occur by road train triples carrying an average of 106 bales per trailer. During full production, it is estimated that 4-cotton bale trucks will be loaded and despatched from the site each day. These trucks will travel through to Darwin Port facilities for export of the cotton.

The ginning process involves separating cotton seed, cotton lint, and waste material such as sticks, leaf, and dirt that is captured during the cotton-picking process. Cotton seed represents approximately 50-percent by weight of the raw seed cotton delivered from the field for ginning. Lint cotton is generated at a rate of 40-percent by weight of the raw cotton. The remaining

products include mote cotton which is poorer quality fibre captured during the ginning process and the waste material which is referred to as cotton trash. The motes and trash make up remaining 10-percent by weight of the raw cotton delivered to the site. The mote cotton can also be baled onsite for export.

On this basis, the gin may produce up to 312 tonne of cotton seed per day when the Gin is processing 1,224 bales of lint cotton. The cotton seed will be stored in a cotton seed hopper, then trucked from the site. For this facility, the majority of the cotton seed will be removed from the site for cattle feed in the Kimberley region. The potential exists to utilise road train triples for removal of the cotton seed. The required schedule for removal of cotton seed from the site will involve four (4) road train triples. These can operate during the day as the hopper size will allow overnight storage of the seed generated from night shifts.

Cotton trash will be temporarily stockpiled onsite in a prepared area. The trash will be returned to irrigation farms to be incorporated back into the fields as an organic matter additive. An area of approximately 3 Hectares has been included in preliminary plans for cotton trash storage. This will enable onsite storage of 2,000-tonnes or more of trash. This allows a delay in requirements for removal of trash from the site. Some of the trash can therefore be hauled to farms outside of the cotton picking season if required. The gin will generate up to 50-tonnes of cotton trash per day.

2.1.2 Staging

Kimberley Cotton Company anticipate that the cotton gin will operate at approximately half of the design capacity in the first year. The initial ginning rate will be approximately 612 bales over a 24-hour shift. This is anticipated to process the forecasted production of cotton in the ORIA in this first year, over a 3-month period.

Ginning requirements are anticipated to increase in year 2. KCC anticipate a demand to gin up to 102,000 bales in year 2 and this may extend to 150,000 bales by year 5 if the industry expands.

Traffic numbers are presented on this basis of staging of the processing capacity.

Actual ginning capacity can be highly variable due to the complexity of the ginning equipment and the range of seed cotton quality delivered. Ginning is also affected by weather. Temperature and humidity conditions will vary from a dry cooler start in July to a hot humid end of season between September to November if ginning is slow to progress or picking of crops is delayed.

2.1.3 External and Internal Traffic Circulation

The initial access point will utilise the existing intersection from Weaber Plain Road through the grain receival facility. This is a formal access point constructed for the sugar mill and now utilised for the grain receival facility. The intersection was purpose built to standards suitable for road train triples to access the site. It is bitumen sealed for a distance of approximately 30m into the site. The following provides an aerial image of this intersection on Weaber Plain Road.

Figure 2: Aerial image of intersection onto Weaber Plain Road to be used by KCC.

The internal roads within the grain receival facility are gravel roads built to a standard width of approximately 12m of pavement to allow trucks to park on the side and still maintain two-way through traffic. Once entering the cotton gin facility, all trucks and visitors will be directed to the office and weighbridge site. All trucks will drive over the weighbridge on the way in and out. The weighbridge will therefore form the control point for the site.

A separate site access will be constructed for staff and other light vehicles to gain direct access to the Gin from Mulligans Lagoon Road. This will be a restricted access point consisting of a standard property access designed for light vehicles only. Trucks will be excluded from entering the site from Mulligans Lagoon Road.

Movement of trucks to and from the site will be limited by the ability of the weighbridge staff to process each truck. This will include documentation of all products entering and leaving the site.

All internal roads will be gravelled to provide all-weather access within the site. Internal traffic flow will be managed to ensure trucks circulate in specified directions to unloading and loading points. The majority of internal road will be one-way. The exception to this is the front-end loader traffic generated to move cotton round bales between the module storage bays to the module feeder bay at the cotton gin. These roads will be separated from the main truck movements other than where the trucks are unloaded. Trucks moving through this area will move in the one direction.

The round bales are unloaded from trucks and lined up on the module pads in areas set aside for particular farms and processing schedules. The round bales will then be moved from the module bays to the gin using front-end loaders and other fork lift type equipment.

Seed trucks will circulate according to the traffic plan in the attached preliminary drawing. Lint bale trucks will circulate around the site to be loaded from the west side of the bale shed. Seed and bale trucks will need to recirculate over the weighbridge prior to departure.

The site is designed to operate with one-way roads. This minimises internal traffic conflict and avoids trucks approaching each other from blind sides or trucks travelling through areas where equipment carrying modules may have restricted vision.

Truck drivers attending the Gin will be inducted and be required to operate under a truck drivers code. The main principles of the driver's code are presented in the mitigation measures within this report. The code will include a *two-strikes and your suspended* policy. This will ensure poor truck driver behaviour will be eliminated.

2.1.4 Parking Supply

A parking lot for light vehicles will be available adjacent to Gin for staff and visitors. This will be designed to accommodate staff and visitors to the site. The preliminary intention is to provide approximately 30-spaces for light vehicles adjacent to the office.

The gin site is approximately 800m from the Weaber Plain Road intersection and therefore no vehicles will need to park or queue at this intersection, other than vehicles exiting the site onto Weaber Plain Road.

Trucks will be directed to travel to the weighbridge for weighing and documentation when they enter the site. Internal roads will be constructed as one-way roads to improve safety. One main staging area will be created for all trucks. This will allow trucks to prepare for weighing or securing loads before departure. This is located within the weighbridge circuit. A second area will be established for unloading of round bales delivered to the site. This is separate to all other traffic areas. Trucks loaded with round bales will firstly cross the weighbridge and then travel to their unloading area. This will be designed to allow four or more delivery trucks to park while being unloaded.

During the ginning season, no trucks will need to park on the site for an extended period.

During construction, a range of light vehicles will access the site. The majority of these light vehicles will be tradespeople who will park adjacent to their work site to provide access to their

tools. For larger contract vehicles, a parking area will be provided adjacent to the site office and lunch rooms.

The majority of heavy vehicles during construction will arrive, unload and leave the site. They will not require dedicated parking areas. This will be the same during the cotton ginning season. The exception to this may be the cotton trash truck which may remain onsite throughout the ginning season to transfer cotton trash from the cotton trash hopper at the cotton gin to the cotton trash yard area within the gin site. This truck is normally parked in the cotton trash shed.

2.1.5 Operating Hours

The proposed operating hours are presented in Table 1. The cotton gin aims to open the site at 5am in line with normal working hours in the Kimberley region. The loading of trucks to haul product can occur between 5.00am and 6.00pm during the ginning season. This may vary in year 1 during start-up operations. Once the site is fully operational, truck traffic will generally continue through a 12 to 14-hour day.

Table 1: Hours of Operation

Activity	Monday to Friday	Saturday	Sunday and Public Holidays
Ginning operations	24-hours	24-hours	24-hours subject to weekly maintenance requirements
Weighbridge hours for receival and despatch of trucks	➢ 5am to 7pm during ginning season ➢ 7am to 4pm outside of ginning season (Mon to Fri) ➢ Extended weighbridge hours – 24/7 for initial receival of cotton modules until module yard is filled (3–4-week period) in June		
Maintenance of plant and equipment during non-ginning season	7am to 5pm	7am to 1pm	Nil

When the cotton gin commences operations, management may allow 24-hour access for delivery of round cotton modules until the module area fills.

3 Existing Traffic Movements

3.1 Available Traffic Data

Data from two traffic monitoring stations were available on either side of Kununurra for traffic volumes on the Victoria Highway. Traffic from the cotton gin that will use this highway will be travelling both east and west of Kununurra. Cotton seed will be hauled to cattle properties in either direction. Cotton lint bales will be hauled east to Darwin.

The following table presents a summary of the Victoria Highway data.

Table 2: Traffic Data – Victoria Highway

Location	Total daily Monday to Sunday	Trucks	Cars
West of Kununurra	1,242	191	1,051
East of Kununurra	622	118	504

Council provided traffic data at various locations along Weaber Plain Road. This data is summarised in Table 3 below.

Table 3: Traffic Data – Weaber Plain Road

Location	Average Daily Traffic (ADT)	Trucks	Cars
Weaber Plain Road – Cocus Way 25/03/2013 – 28/03/2013	1,199	192 (16%)	1,007 (84%)
Weaber Plain Road – D4 Bridge 12/09/2012 – 15/09/2012	1,174	540 (46%)	634 (54%)
Weaber Plain Road - Ironwood Dr 12/12/2014 – 20/12/2014	2,512	879 (35%)	1,633 (65%)
Weaber Plain – Mulligans Lagoon Turnoff 07/06/2019 – 23/06/2019	395	16 (4%)	379 (96%)

The Council road survey was conducted over a 16-day period in 2019. This may or may not have measured a harvest period. The occurrence of only 16-truck trips per day in this period may be considered low. This may represent only 8-two-way truck trips to service a major part of the ORIA.

Main Roads WA is assessing a Heavy Vehicle Transport Route (HVR) in the form of a northern bypass around Kununurra. This proposed HVR crosses Weaber Plain Road approximately 5 km south of the cotton gin development site. As part of the investigation of the HVR, Main Roads WA engaged several consultants to investigate the proposal. The traffic data used for this report was generated in 2008 and provided only estimates for current traffic which were far in excess of the traffic counts provided by Council.

3.2 Traffic Safety

Road Safety data available for the Kununurra area shows two fatal crashes in the past 10-years. The crashes were to the north of Kununurra on roads that may be utilised by cotton truck related traffic moving from farms to the cotton gin. The data suggests road safety issues regarding fatal crashes occur from mainly road user error and not traffic conflict issues. The data suggests that road conditions are suitable for the traffic volumes or the type of traffic using the roads, which includes road train triples.

Statistical information available for the Kimberley region indicates that a large proportion of accidents (66%) resulted from single vehicles running off the road or single vehicles colliding with an object (excluding animals). Statistical analysis is not available for road geometry issues such as crashes at intersections resulting from poor road conditions or road design problems.

Major roads to be utilised by cotton related traffic are generally wide and relatively well maintained as part of the ongoing expansion of the ORIA. The roads are generally designed for road train triple use. The exception to this is internal farm roads which are private roads and therefore under the control of the landowners. The roads around irrigation farms are generally limited to two trailer road trains due to internal corners and pipe crossings. The initial proposal for collection of round bales from some cotton farm will involve establishing a stockpile area on the farms to allow the round modules to be accumulated on-farm prior to loading and despatch using larger trucks such as road train triples. This will occur where field access may be limited to semi-trailers only. The use of larger trucks to move the round bales from the farm to the gin will reduce the overall number of truck trips generated by the proposed development.

3.3 Proposed Developments in the Vicinity

At present, one new development involving a traffic generating proposal is identified in the area. This involves a seafood processing facility to be located on Research Station Road. According to a project summary, the development may generate up to 40 trucks per day. The trucks are to consist of 8-tonne rigid trucks per day for delivery of seafood product to the factory., The despatch of the product will generate 3-road trains per day. Up to 115-light vehicle movements associated with staff and services will also occur each day of operations. All of these vehicles will need to travel along Weaber Plain Road. The 40 by 8-tonne trucks will travel north to and from the seafood farm. All other traffic from this site will travel to and from Kununurra and beyond, via Weaber Plain Road.

The region is subject to ongoing development of irrigation from the ORIA. This would generate more traffic over time as additional land is brought into production. At present, this additional production is anticipated to be cotton related and therefore the heavy vehicles identified in this assessment are included.

The road corridor along Weaber Plain Road to the south of the cotton gin site is occupied by rural residential and small farms. Limited remaining open land suitable for extension of this rural residential development is available unless Council makes significant changes to land zonings. This is highly unlikely as the presence of irrigation farms and ORIA infrastructure will block a northernly extension of residential related development.

3.4 Pedestrians and Cyclists

The cotton gin site is located 10.7 km north of Kununurra. It is highly unlikely that pedestrian traffic occurs along Weaber Plain Road under normal conditions.

Weaber Plain Road may on occasion be utilised for cyclist traffic. This would generally be limited to an occasional cyclist. There is no allowance for cyclist paths or cyclist lanes along Weaber Plain Road. If cyclists are present, truck drivers will need to identify their presence to other drivers via two-way radio communication which is a standard inclusion in the driver's code of conduct.

4 Traffic Generation

The proposal involves the development of a cotton gin facility with a production capacity of up to 150,000 bales/year. To establish the impact of the development on the adjacent road network, traffic generation and trip distribution to the proposed development have been calculated. The traffic generated by the development will include heavy-vehicle traffic carrying cotton products and light vehicles transporting employees, visitors and service personnel. The following tables present predicted traffic numbers for both heavy and light vehicles.

The components of traffic generation for the proposed development are:

- Staff trips
- Visitor trips
- Haulage of construction and plant equipment
- Haulage of raw materials and cotton bales

Peak traffic movements will occur with shift changes for staff. The shifts are based on 12-hours, with the change over at either 6am or 7am. Peak traffic would therefore consist of light vehicles. Truck peaks are limited by weighbridge processing capabilities and therefore a minor peak may occur when the weighbridge opens at either 5am or 6am with trucks travelling to collect either cotton seed or ginned cotton bales arrive. Module trucks would need to collect the modules from the farm before arriving at the cotton gin of a morning.

Table 2: Kununurra Gin – Truck Movement Summary

Traffic Movements	Number of truck trips				
Seed Cotton deliveries from growers (even spread)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Round bales per day	146	291	291	291	291
Trucks per day	8	16	16	16	16
Note: Assume 2 trailers per trip = 18 round bales					
Lint Trucks to Darwin (even spread throughout the day)					
Lint bales per day	612	1,224	1,224	1,224	1,224
Mote bales per day	1	2	2	2	2
Trucks per day – Road Train triples to Darwin	2	4	4	4	4
Cottonseed Trucks to local Cattle Stations (even spread)					
Tonnes per day	156	312	312	312	312
Trucks per day	3	6	6	6	6
Note: Assume Road Train – 50 tonnes					
Trash Trucks					
Tonnes per day	29	59	59	59	59
Trucks per day	3	6	6	6	6
Note: Assume B double					
Total Trucks per day	**17**	**34**	**34**	**34**	**34**

Note: Figures have been rounded to the nearest whole number.

Table 3: Daily Staff Vehicles to be generated by the Cotton Gin

Staff – Light Vehicles	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Off-season with 6-staff and tradesman	10	10	10	10	10
Ginning season – additional staff and permanent staff	20	30	30	30	30

The following assumptions have been made in regard to traffic calculations:

- 45,000 bales/year of lint cotton processed at the Gin in year 1;
- 120,000 bales/year of lint cotton processed in Year 2;
- Peak production to reach 150,000 bales subject to area of cotton grown;
- Haulage vehicles will typically be a mix of road trains and road train triples;

- Peak truck numbers will occur when the Gin is at full operation (1,244 bales per day average) and the module yard is being filled;
- The site will operate on a 7-day week from year 1;
- One movement involves a truck entering and exiting the site;
- Ginning will commence in July and subject to cotton production, extend through to the end of October once full operational capacity is reached.

4.1 Light Vehicle Movements

Daily light vehicle movements are based on 3-4 people per vehicle travelling to the site in addition to an expected 10-trips by permanent staff and tradespeople attending the site. It is expected that during the ginning season, approximately 30 people will be employed. On this basis, approximately 20-light vehicle trips will be generated on a daily basis once the Gin is operational.

The majority of this traffic is predicted to occur between Kununurra town and the Gin. These light vehicles would generally use Weaber Plain Road and Mulligans Lagoon Road to access the site.

The total number of additional light vehicles is considered minor in relation to overall traffic numbers along local roads. The impact is therefore considered as minor.

4.2 Heavy Vehicle Movements

4.2.1 Construction Phase

Construction will involve civil works to construct the building pads, internal roads, module pads and drainage system. This would be undertaken by a range of earthmoving equipment with the final trim being undertaken by graders, compactors and water trucks. Once the civil works are completed, delivery of the gin equipment will commence. Building construction will involve concrete for construction of the gin and building foundations, and gravel for gravelling of roads. The process normally commences with construction of the cotton lint bale shed to store equipment and then construction of the cotton gin building. Seed storage facilities, offices and other buildings are generally constructed once the gin building is completed as the gin building is the priority. During this phase of building construction, the key internal roads and cotton storage areas will be gravelled, and the drainage system installed.

The gin equipment will generally be delivered once a shed is completed on the site. It is predicted that up to 50-trucks carrying building and gin equipment will be required over the 18-month building period for the Gin.

Once building foundation pads are ready, concrete will be delivered from Kununurra by truck. This would potentially involve 10-15 truckloads per concrete pour. Concrete would be poured once or twice per week over a 2-month period.

The development is expected to require in the order of 20,000 tonnes of gravel material in total. This would be delivered to the site over a three-month period at an expected average rate of 2,000 tonne per day. Using road train triple combinations would allow delivery of 75-tonnes per trip. Gravel truck traffic would therefore involve between 26-27 truck movements per day during civil works. This would occur in several campaigns for various sections of the site.

This period of construction would involve between 20 and 30 specialist builders in addition to project managers. This would generate between 10 and 20 light vehicle movements per day between Kununurra and the Gin site.

The traffic impact on local roads during construction would result in an increase in local light traffic at the start and end of each working day. The impact of this is considered minor.

The impact of heavy truck movements would consist of a range of truck peaks over a 3-month period during the civil works phase. The primary form of truck traffic would be gravel trucks at a rate of 26-27 movements per day on a campaign basis. This would involve a week on and week off type delivery schedule. All of this truck traffic will enter the site via Weaber Plain Road from gravel pits to the north of the site along Weaber Plain Road.

It is assumed that the gravel will only be accessed from approved gravel pits and therefore these sites would be subjected to similar traffic campaigns at present. On this basis, the impact on local roads between the quarry sites and the Gin would consist of traffic already utilising Weaber Plain Road. This impact would have been considered during the application phases for the approved quarry sites.

Heavy construction traffic delivering the cotton gin structure would consist of road train triples delivering mainly containerised loads of equipment via the Victoria Highway, through Kununurra and Weaber Plain Road.

4.2.2 Ginning Phase

Peak movement of heavy vehicles to and from the site will occur once the gin starts operating and the module yard is being filled. Once the module yard is filled, round bale deliveries will decline to the daily rate of ginning of the seed cotton bales. This is equivalent to approximately 8-truck loads per day. Once all available cotton is delivered, these 8-truck trips would cease.

Outside of ginning operations, trucks will be limited to three or four per day to move lint cotton bales, cotton seed and cotton trash from the site. This will decline to no trucks once all product is removed from the site. No activity will be occurring in the wet season.

These calculations allow for road trains and triples delivering to the site, and road train triples hauling product from the site.

Staff will generally be sourced from Kununurra. It is anticipated that staff will travel together to and from the site.

It should be noted that collection of round bales from farms may be restricted to two trailer road trains due to internal access issues on the farms. The potential exists to accumulate round bales at prepared stockpile points on farms which would then allow all external road haulage by three trailer road trains.

Once operational, the Gin is predicted to produce an average traffic volume of 34 trucks per day during peak operational conditions. Assuming that 70-percent of cotton will be grown to the north of this gin site, approximately 30-percent of this traffic (11-trucks) would enter the site from the north. The remaining 23-trucks would enter from the south through Kununurra.

The weighbridge would be capable of receiving approximately four trucks per hour which allows for weighing, administration and despatching the trucks. Allowing for peak weighbridge hours, the maximum number of trucks to be processed through the site would be 48 over a 12-hour period.

If weighbridge hours were extended, the proponent has indicated a maximum of 60-road trains could be processed through the site over a 24-hour period. This involves the truck arriving and the truck leaving as one truck movement. The rate of truck movements to and from the site would remain at approximately 4-trucks per hour. This rate of movement is the critical parameter in relation to road safety measures.

4.3 Haul Routes

The primary haul route will be Weaber Plain Road, both to the south and north of the site. It is anticipated that the total land available for cotton cropping will be in the order of 15,000 Ha once cotton cropping reaches the anticipated capacity of the cotton gin. The location of this 15,000 Ha will vary from season to season as the production of cotton will require a system of crop rotations. It is therefore anticipated that approximately 70-percent of the crop will be grown to the north of the gin site and the remaining 30-percent to the south.

Weaber Plain Road becomes Moonamang Road at a distance of 10 km to the north of the Gin site. Moonamang Road services the northern and expanding end of the ORIA. The following list of local roads service a major part of the northern irrigation area that may be utilised to grow cotton:

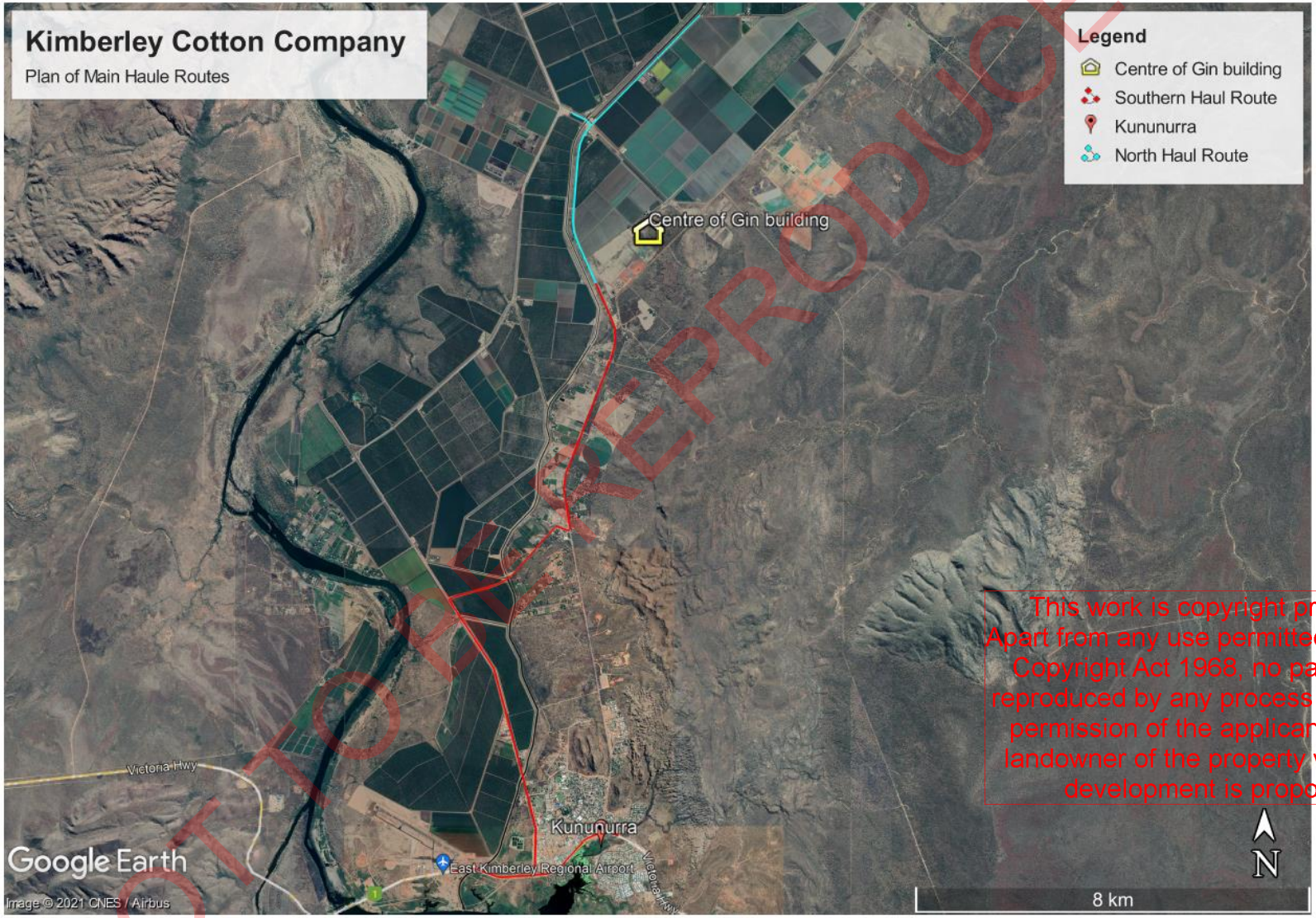
- Stock Route Road Research Station Road;
- Carlton Hill Road.

Road's servicing local farms to the south include Mills Road but a large proportion of the fields in this area are supporting sandalwood. Traffic moving cotton bales from the site will utilise Weaber Plain Road to the south of the site to and from Victoria Highway. Cotton seed transport will be highly variable, but the majority would be transported to the south along Weaber Plain Road and then travel west or east along the Victoria Highway.

The southern end of Weaber Plain Road is not rated for heavy vehicles. Trucks needing to travel on the Victoria Highway will utilise the approved truck route around the town area. This will mainly occur via Ivanhoe Road onto Mills Road. This approved heavy vehicle route connects to the Victoria Highway on the western edge of Kununurra. Trucks travelling east toward Darwin will travel along the edge of Lily Creek Lagoon with all other Victoria Highway traffic. Trucks travelling west will cross the Kununurra Diversion Dam. Such trucks would include trucks carrying cotton seed and cotton trash to farms, trucks carrying round bales from farms located on the western side of the Ord River if they produce cotton.

The following aerial image identifies the main haul routes to and from the cotton gin. The options for haul routes are limited to these roads described above as the ORIA is generally developed in a linear form along the scheme's main channels.

Figure 3: Main Haul Routes for the Proposed Development



5 Impacts on Road Condition

Assessment of potential impact on road conditions needs to include an assessment of existing use compared to proposed use if the Gin is developed.

5.1 Existing Road Use

Existing use of local roads is dominated by trucks moving products to and from farms in the region. At present, one of the bulk products in the region is corn which is moved to the corn storage via Weaber Plain Road. The corn or grain storage is adjacent to the cotton gin site. This traffic is therefore delivering product to the same location as the cotton gin. The

Cotton production will result in reduced corn or grain production as a result of crop rotations and a potential higher value for production of cotton. The change from grain production to cotton production is expected to generate a similar number of truck trips from the farms to a storage and processing facility. The grain is stored at the Weaber Plain Road grain bunkers and then trucked to various locations including cattle farms for cattle feed. The same will occur for cotton once it is processed. Cotton seed will be trucked to farms. Lint cotton will be trucked to Darwin for export.

When wet weather occurs, the Gin would limit or suspend delivery of seed cotton modules to avoid potential damage to internal roads and the module storage area under wet weather use. Access to farms during wet weather would also be limited. Trucks removing lint bales and seed could continue as they remain on bitumen sealed roads in the region.

Using recent Council ADT's for Weaber Plain Road at Mulligans Lagoon Road turnoff over a 12-hour period for a working day, the existing hourly traffic movement along Weaber Plain Road at the gin site would be in the order of 33-vehicles per hour. This is movement both north and south. Based on vehicle percentages available in the traffic data, this would include 5-trucks per hour and 28-light vehicles per hour.

The primary traffic on Weaber Plain Road would consist of traffic that is generated by farms within the ORIA in addition to occasional traffic generated by cattle properties further north and northwest of the ORIA. Weaber Plain Road does not provide a major route to other destinations to the east or west of Kununurra. On this basis, the primary traffic on this road is agriculture related traffic.

The Cotton Gin in expected to generate 4 to 6 trucks per hour. This is a similar hourly rate predicted for existing truck traffic on a normal day. It cannot be determined whether the existing truck traffic consists of trucks servicing the agricultural activity within the ORIA but it assumed that the majority of these trucks would be carrying produce or materials to farms in the ORIA as this is the dominant industry in the local area. On this basis, operation of the cotton

gin would potentially re-route some or all of these existing truck movement during the harvest season as cotton would be replacing the previous crops grown on the same farms.

All corn stored on the adjoining development would eventually be hauled south along Weaber Plain Road to the Victoria Highway. Production of corn is anticipated to reduce and therefore existing truck traffic associated with the current corn crop will be replaced with trucks hauling cotton.

Light vehicle trips generated from the gin will occur in peaks, primarily with a morning start at 5am - 6am and an evening finish or shift change at 6pm. This would potentially coincide with current traffic peaks associated with light vehicle trips to and from local farms for residents living in Kununurra.

The increase in overall traffic to and from the north needs to be considered in relation to existing and proposed development. Irrigation development proposals to the north include a known area of more than 5,000 Ha to be developed. According to local knowledge, this is to be developed for furrow irrigation which will enable production of cotton and numerous other crops. This new development would result in additional light and heavy traffic associated with workers and materials being delivered to the farm development project.

5.2 Impact on Road Condition

Weaber Plain and Moonamang Roads have been built as wide bitumen sealed roads to support heavy traffic associated with the ORIA development and production of crops resulting from the development. Lane widths are generally 4m with a 1m sealed shoulder. This is considered suitable for heavy vehicles. The road is raised and therefore good drainage occurs on both shoulders to avoid saturation and deformation of the shoulder seal area.

As a result of the raised road, the potential areas for trucks to pull over to the side of the road is limited to only the purpose-built areas or turn-offs. These are limited in number, however the truck travel distance for cotton related trucks is relatively short and therefore the requirement for trucks to stop along raised roads is limited. If stops are required, these would generally occur on farms or at the gin site. A stopped truck on a narrow road would be considered an issue for other traffic.

The condition of Weaber Plain Road is considered suitable for an additional 34-truck movements per day. This will involve potentially 11-trips north to and from the site and 21-trips south.

The additional 11-trips would generate 22-two-way movements. Council records show 16-two-way movements of trucks during the recording period. Allowing for potentially half of the 16-two way existing vehicles to be trucks that would carry cotton during the season and replace the corn trucks, the net increase in truck traffic is predicted to be an additional 14-trucks movements and an overall increase in total traffic from 395-vehicles to 409-vehicles using Weaber Plain Road to the north of the cotton gin site. The condition of Weaber Plain Road is considered suitable for this increase.

During the cotton ginning season, cotton traffic using Weaber Plain Road to the south of the site is predicted to include 42 two-way truck trips and a maximum of 30-two way light vehicle trips (assuming an average of two people in each light vehicle).

Truck traffic will generally be directed via Mills and Ivanhoe Roads to the Victoria Highway. Some of this truck traffic may continue south into Kununurra via Weaber Plain Road to access the town services and Victoria Highway.

Council data indicates a significant increase in ADT further to the south of Mills Road. An ADT of 2,512 vehicle movements was recorded at the northern edge of the main residential area within Kununurra (Ironwood Drive). This included 1,633 light vehicles and 879 heavy vehicles.

This area would be impacted by staff vehicles movements which would be in the order of 30-light vehicles per day during the ginning season which is equivalent to approximately a 1.2-percent increase in traffic. This is considered as negligible.

The majority of trucks travelling to and from the south of the cotton gin would use the heavy vehicles bypass via Mills and Ivanhoe Roads. As this is identified to be a heavy vehicles route, road condition is considered suitable for an additional 42-truck movements. No data is available to determine the current use level.

As indicated above, the hourly frequency of these truck movements is limited by the processing time across the weighbridge. This is expected to be 15-minutes per truck and therefore generate an average of 4-truck movements per hour. This is considered minor and would not create issues of congestion on the road at intersections.

Local roads are already subject to trucks hauling farm produce. Many of these local roads include gravelled sections of road which are maintained by Council. The width of these roads is considered suitable for the trucks. The farms are producing crops already and therefore the cotton trucks will generally replace other existing truck movements to and from the farms. The impact of the cotton trucks on road conditions will be similar to the current traffic as the volume of produce from the farms being serviced by the roads will be similar.

It should be noted that the cotton ginning season occurs in the dry season. During the dry season, roads conditions are not vulnerable to soakage of sub-pavements or issues of pavement failure due to moisture entering the pavement and subgrade materials. Few if any trucks would be generated by the cotton gin in a wet season, when roads are more vulnerable to weather damage.

5.3 Impact on Traffic Safety

The majority of traffic generated by the proposed cotton gin will utilise the local main road, being Weaber Plain Road. This road has no visible traffic issues in relation to road geometry or narrow sections. Intersections have been designed to cater for large trucks. Road width is considered suitable for large trucks.

The crash data shows minimal issues of road safety other than a small number of single vehicle incidents. The crash data does not include any incidences at the intersection into the cotton gin site or along the heavy vehicle route to the Victoria Highway.

Speed limits in this section of Weaber Plain Road is 100 km/h. Lower speed limits are present when vehicles get closer to Kununurra. The road is open to road train triples north of Mills Road. Such trucks generally travel slower than the speed limit. Truck traffic is diverted via Mills Road and Ivanhoe Road to connect with Victoria Highway. This limits the presence of large trucks in any residential parts of Kununurra, including school areas.

There is no reported history of traffic accidents resulting from narrow sections of road or traffic conflict.

Local roads are regularly used by heavy vehicles for hauling of materials to and from farms. The use of larger trucks such as road train triples (Class 2 - A-triple) is generally limited to the main shed/depot farm area. Access to irrigated fields is usually limited by narrower roads and pipe crossings associated with irrigation works. Access is mostly limited to main haul roads for a standard road train (Class 2 – A Double). The use of smaller trucks on-farm will reduce potential incidences of truck roll-over around irrigation channels.

The local road network is regularly use by road trains. The potential safety issue on these local roads would relate to traffic peaks during haulage of raw cotton from the farms when two trucks may meet on a narrower section of road. Such an issue has been considered in the driver's code of conduct. The identification of any specific sites would need to be included in the driver induction procedures and then truck drivers could then utilise radio communication to notify other truck drivers that they are entering such an area identified by other drivers, farmers or gin management. At present, there are no areas of concern, however it would be

expected that some seasonal issues would develop and therefore the drivers code of conduct would be instigated by way of communication between drivers and tool-box meetings as required.

6 Mitigation Measures

6.1 Internal Traffic Management

Several regulations will be imposed of staff and contractors who drive within the Gin site. The primary regulations aimed at managing traffic and avoiding internal traffic conflict include:

- Site communications will occur via two-way radio to manage vehicle movements and maintain communications between drivers;
- Machinery moving round module bales have right of way at all times due to potential lack of visibility of other road users from the driver's seat;
- Restricted entry areas will include working areas between the gin and bale shed and the module feeder bay and internal haul roads;
- A maximum internal speed limit of 40 km/h will be imposed with options for slower speeds where required and during night operations;
- Drivers are to follow sign posts as directed for one-way use of internal roads for unloading and despatch sites.
- Internal set-down, unloading and loading areas are included in the internal road network to provide safe stopping areas for trucks to unload or prepare for departure. These areas will be designated for stopped vehicles.

6.2 Truck Driver Code of Conduct

The Truck Driver Code of Conduct extends to the behaviour of truck drivers both onsite and offsite. The code specifically identifies driver behaviour on the local road network when travelling to and from cotton farms. It is noted that the Gin will require a complaints policy. This policy will require a complaints line that is publicly available to report incidents including truck driver issues.

The following provides the general principles for a truck driver code of conduct for all truckdrivers delivering or removing product from the cotton gin site:

- Acknowledge this Driver Code of Conduct is enforced as a 'Two Strikes and you're out' policy;
- Report any complaints, incidents or reports to the Gin Manager;

- Report any sections of roads which are considered to have a traffic conflict issue relating to road width, turning angles, road condition, dust, and other road users/farm activities which may impact traffic flow;
- Abide by KCC Drug & Alcohol Policy by presenting to work with 0.00 BAC;
- Adhere to Site Operating Conditions for Traffic Management and Noise Restrictions and Operating Hours;
- Strictly comply with all traffic rules and regulations;
- Ensure there is no loading above registered gross mass;
- Comply with all posted speed limits on all roads;
- Comply with the School Zones and bus stop requirements;
- Always drive in a manner that is in accordance with road conditions;
- Decrease truck speeds to minimise dust and noise around private dwellings, road works, people on the ground and stationery vehicles;
- Avoid engine brake noise to respect the community through which they are driving;
- Respect the environment by not littering;
- Encourage professional and appropriate use of two-way radios;
- Remain calm and courteous when in contact with other road users and members of the public;
- Acknowledge courteous acts by others.

Adoption of the above mitigation measures is considered to have the potential to limit the impact of trucks hauling cotton products to and from the Gin. This will need to be an adaptive policy when the Gin starts processing cotton and potentially other matters are raised by either the general public or people associated with the operation of this site.

Internal traffic management will be closely monitored and controlled. The site is designed with one-way roads for trucks hauling materials to and from the site. This is the primary safety measure to be adopted on this site to avoid traffic conflicts from issues such as vehicles approaching each other on their blind sides or trucks mixing with machinery carrying cotton bales between the module yard and the gin. Trucks will be excluded from the area between the gin and bale storage shed to avoid all conflict within this area.

7 Conclusion and Recommendations

The following conclusions are drawn from this traffic impact assessment:

- Traffic hauling cotton to the proposed cotton gin will replace existing vehicle movements for haulage of product from existing irrigation farms as cotton cropping replaces some other crops;
- The imposition of a truck driver code of conduct and regulations directing trucks to travel to main sealed roads will reduce the impact on local roads where possible;
- Traffic frequency to and from the Gin will be limited to the ability of the weighbridge to process each truck as it arrives and as it leaves. The Proponent has indicated a rate of approximately 4-trucks in and out per hour. The impact of this rate of truck movements (8-one-way movements per hour) is considered to have a limited impact on traffic volume on Weaber Plain Road or other local roads, in relation to both road safety and road impacts.
- No trucks will use Mulligans Lagoon Road;
- The cotton gin will utilise an existing intersection which has been designed and currently utilised by A-triple trucks which is the largest truck size anticipated for use by the cotton gin.
- Management of internal traffic is the subject of regulations. A "*two strikes and you're out policy*" will ensure the regulations are conformed to.

Overall, the impact of the proposed development upon the road network is considered minimal. Based on this investigation, the road network developed for servicing the ORIA has been planned for extensive traffic generated from farm production. The traffic generating potential of the proposed development is therefore not considered to pose a significant risk to the amenity, safety, functionality or accessibility of the wider region as a large part of the heavy traffic generated to and from this site is considered as traffic generated by existing farm operations.

8 Limitations

This Traffic Impact Assessment:

- Has been prepared by SMK Consultants for the sole use of Kimberley Cotton Company;
- The report should be read in full, and no summary, conclusion or other section of the report may be used or relied on in isolation or taken as representative of the report as a whole;
- May be provided to other third parties but such third parties' use of or reliance on the report is at their sole risk; and
- May only be used for the purpose as stated in Section 1.1 of the report (and must not be used for any other purpose).

References

Western Australian Planning Commission (2016); "*Transport Impact Assessment Guidelines".*

9 Appendix 1: Preliminary Layout of Cotton Gin

Figure 4: KCC Cotton Gin locality plan

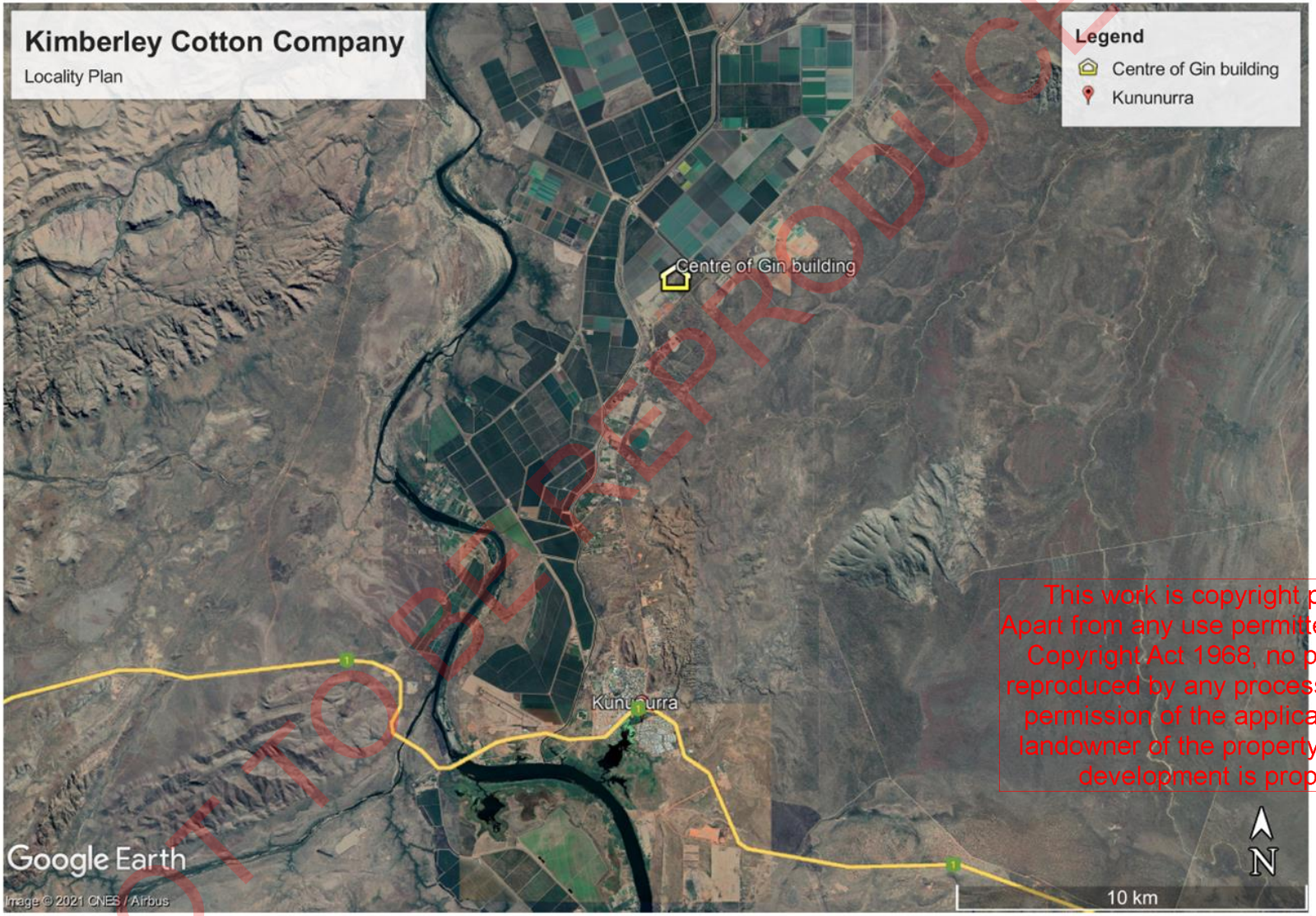


Figure 5: Schematic layout of proposed cotton gin

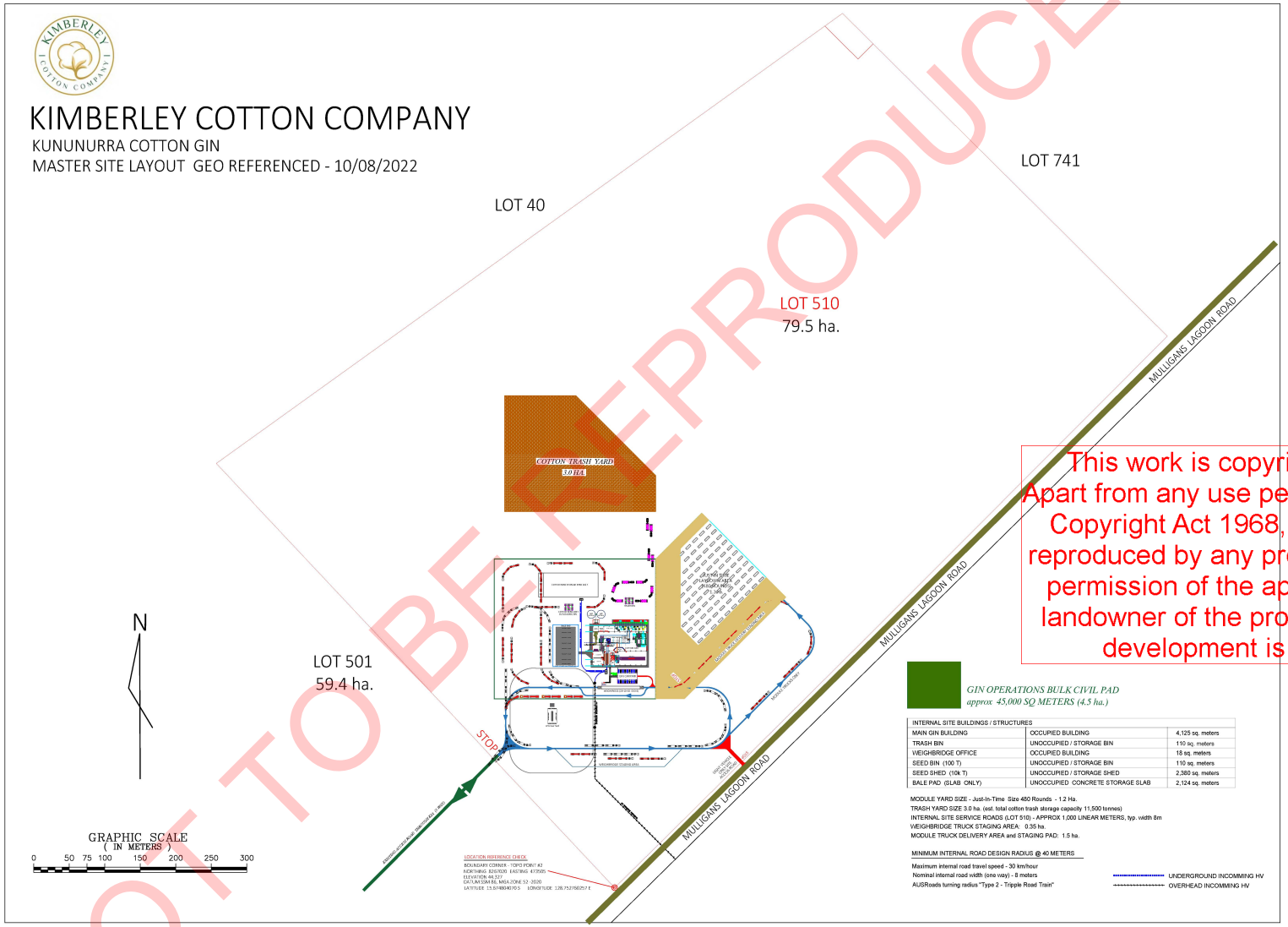


Figure 6: Preliminary Layout of Kununurra Cotton Gin