

Appendices

Appendix A - Traffic and Transport Assessment



Memorandum

3 April 2019

To	Townsville City Council		
Copy to	[REDACTED] (GHD)		
From	[REDACTED]	Tel	+61 7 [REDACTED]
Project	Lansdown Industrial Precinct		
Subject	Revised Traffic and Transport Assessment	Job no.	4220641

1 Introduction

GHD was commissioned by Townsville City Council (TCC) to prepare an impact assessment report for the Lansdown Industrial Precinct (Precinct) to assist with a major amendment of the planning scheme. This Traffic and Transport Assessment Memorandum provides information regarding developable area, potential land uses and traffic generation and indicative internal road network.

The Precinct is located west of the Flinders Highway in the locality of Calcium, approximately 35 km south of Townsville. From the Department of Transport and Main Roads (TMR) Options Analysis of the Flinders Highway, one Precinct access onto the Flinders Highway has been nominated at Ghost Gum Road, located at Tdist: 34.65 km. Refer Figure 1 below for locality plan.



Figure 1 Lansdown Industrial Precinct locality plan

1.1 Scope and limitations

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The opinions, conclusions and any recommendations in this memorandum are based on conditions encountered and information reviewed at the date of preparation of the memorandum. GHD has no responsibility or obligation to update this memorandum to account for events or changes occurring subsequent to the date that the memorandum was prepared. The opinions, conclusions and any recommendations in this memorandum are based on assumptions made by GHD described in this memorandum Section 3 of this memorandum. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this memorandum on the basis of information provided by Townsville City Council and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in

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2 Background

The purpose of this Traffic and Transport Assessment was to:

- Determine the usable, developable area to assist in evaluating the magnitude of the Precinct
- Provide an indicative internal road network suitable for B-Triple movements, to access industrial lots within the usable area
- Provide a high level assessment of the potential traffic the Precinct may generate at full development.

The Assessment included a review of previous Council provided reports, determining the developable precinct area by considering limitations from constraints mapping and generating high level traffic volumes. The Motorsport Precinct and Battery Plant known land uses have been specifically considered.

2.1 Flinders Highway/Ghost Gum Road intersection

The AECOM study for TMR provided the intersection configuration and likely resumption requirements for the Flinders Highway/Ghost Gum Road intersection. This intersection is an unsignalised seagull arrangement with overpass across the Flinders Highway and Mt Isa rail line.

For the purpose of this Assessment, the Flinders Highway/Ghost Gum Road intersection is the sole access point to the Precinct for Stage 1. Refer Attachment 1 for Stage 1 area and Attachment 2 for intersection layout.

3 Adopted parameters

The criteria below were adopted to forecast the potential magnitude of the Precinct:

- Single confirmed access to the Precinct via the Flinders Highway/Ghost Gum Road intersection as nominated by TMR/AECOM (refer Section 2.1).
- Resumption area at the Flinders Highway/Ghost Gum Road intersection as advised by TMR has been included as road reserve.
- Potential second access to Flinders Highway for Future Stage development, south of Ghost Gum Road.
- Specific land uses included in assessment:
 - Motorsport Precinct
 - Battery Plant.
- Remaining developable area is apportioned similarly between:
 - Medium impact industrial lots: 2,000 m²
 - High impact industrial lots: 5,000 m²

These are minimum lot areas as advised by TCC via email on 11 June 2018. These lot sizes have been used to provide the most conservative approach in terms of determining the maximum number of lots and traffic generation for the Precinct.

- B-Triple design vehicle:
 - 35.4 m, 12 axle vehicle used for turn paths to confirm internal road network suitability.
- 50 m road reserve. This width was approved by TCC via email on 17 January 2019.

- 44 m diameter cul-de-sac heads as advised by TCC via email on 17 January 2019
 - 65 m diameter road reserve cul-de-sac heads have been allowed.
- Precinct has been split into Stage 1 and Future Stage areas:
 - Stage 1 area is north of Ghost Gum Road access and encompasses the Motorsport Precinct and Battery Plant to the south of Ghost Gum Road
 - Future Stage area is south of the Ghost Gum Road access, Motorsport Precinct and Battery Plant.
- Usable Precinct area based on constraints mapping:
 - Mapping includes the following constraints
 - Flooding
 - Environmental
 - Air and noise
 - Heritage listed areas
 - Topography of the site has not been considered when identifying the developable area.
- The impact of the Precinct traffic on the Flinders Highway/Ghost Gum Road intersection has not been assessed.
- The traffic generation assessed is divided between Stage 1 and Future Stage. There is no provision for growth assessments or further staged scenarios.

4 Internal road network

An indicative internal road network has been drafted, connecting the usable and specific land use areas from the Flinders Highway/Ghost Gum Road intersection, providing a hierarchical road system to facilitate land development within the site.

For the Future Stage, a potential second access has been provisioned just north of the Manton Cemetery site, to alleviate the expected heavy demand on the Flinders Highway/Ghost Gum Road intersection at full development. The magnitude and design of the intersection is not assessed under this memorandum and will be pertinent to the timing and individual developments within the Precinct.

The potential second access has been used throughout this report to develop the internal layout road hierarchy. Without this potential second access, the impact at the Flinders Highway/Ghost Gum Road intersection would be substantial and would likely limit the ability to fully develop this Precinct.

4.1 Road reserve

A 50 m road reserve has been generically provided for all roads, as advised by TCC, with intersection and cul-de-sac areas suitable for B-Triple movements. The internal road network assists with determining the developable area and subsequent traffic generation of the Precinct. Dependent on the road hierarchy described below, the road reserve width required will vary. TCC's typical industrial cross section (standard drawing SD-005 B) is shown in

Figure 2 and consists of 3.5 m traffic lanes, on-street parallel parking, concrete kerb and verge. Shared paths may also be provided to accommodate pedestrians and off road cyclists along the verge, with a 1.5 m offset to the kerb. The verge shall also be wide enough to provide for all required services. Bus stops can be located within the 3.5 m shoulder area.

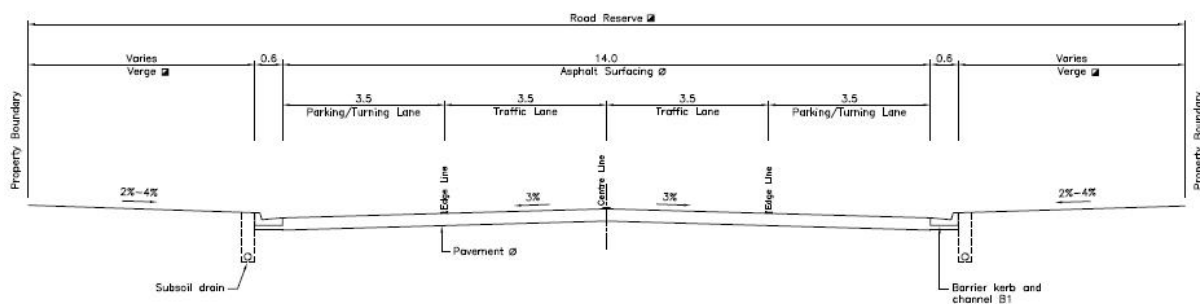


Figure 2 Typical cross section

4.2 Road hierarchy

The road hierarchy used within the internal road network has been determined from TCC City Plan Road Hierarchy and the traffic generated from the land uses. They have generally been split into:

- Sub arterial road up to 25,000 vpd – four lane
- Major collector road between 3,000 and 12,000 vpd – two lane
- Collector streets in industrial areas between 3,000 and 6,000 vpd – two lane
- Local streets <3,000 vpd – two lane.

Refer Section 8 for road hierarchy development based on anticipated traffic generation volumes and distribution.

Refer Attachment 1 for the high level internal road layout with indicative road hierarchy legend.

5 Staging

5.1 Stage 1

Stage 1 of the Precinct is the area to the north of the Ghost Gum Road intersection comprising a combination of medium and high impact general industrial lots and additionally encompasses the Motorsport Precinct and Battery Plant to the south of Ghost Gum Road.

5.2 Future Stage

The remaining Precinct area south of the Motorsport Precinct and Battery Plant is the Future Stage comprising of general industrial lots of both medium and high impact.

6 Developable area

The developable area has been determined as the remaining land after consideration of impacts from constraints mapping and the major internal road network road reserve. A further reduction in developable area of 40% has been allowed under this high level assessment for consideration of unusual shaped blocks, potential buffer zones and other lower order road networks that may be required.

As this is a high-level assessment, there is potential for additional constraints to arise during the individual development application process of each lot within the Precinct. This area has multiple constraint layers that will require confirmation during the development phase. There may also be areas that are undevelopable due to outcomes of detailed constraints investigation at a lot level. Additionally, topography constraints have not been considered under this assessment. Thus, at this high level assessment, a nominal 40% area reduction has been adopted to adequately cover further potential development constraints.

It is to be noted, that the developable area nominated for this Precinct directly impacts the number of blocks and thus the traffic that is able to be generated from this development.

Based on the criteria and constraints of Section 3, the total usable area is 1419.9 ha. Removing the areas already apportioned to the Motorsport Precinct and Battery Plant, 937.4 ha remains for the development of general industrial lots (including road reserve).

A summary of areas to assist with traffic volume generation is provided in Table 1 below.

Table 1 Land use areas

Land Use	Stage 1 (ha)	Future Stage (ha)	Total (ha)
Total Precinct Area	791.5	1283.3	2074.8
• Constrained area (undevelopable)	34.3	620.6	654.9
• Usable area	757.2	662.7	1419.9
Already apportioned to:			
- Motorsport Precinct	297.6	-	297.6
- Battery Plant	184.9	-	184.9
- Road reserve (*incl. TMR resumption)	73.0 [#]	114.1	187.1
Developable area (100%)	201.7	548.6	750.3
Air Quality Scenario (refer 7.3.1)			
• Medium impact lots	141.0	289.5	430.5
• High impact lots	60.7	259.1	319.8
90% High Impact Scenario (refer 7.3.2)			
• Medium impact lots	50.4	21.8	72.2
• High impact lots	151.3	526.8	678.1

[#]Excludes road reserve connecting Stage 1 to Future Stage as this area has been captured under the Motorsport Precinct and Battery Plant area.

7 Traffic generation

The Precinct's traffic generation has been determined from the available developable area for general industrial lots (medium and high impact) and specific information for the Motorsport Precinct and Battery Plant land uses. Traffic generation scenarios for the Motorsport Precinct and Battery Plant have been provided by TCC (refer Attachment 3 for information).

7.1 Motorsport Precinct

The Drive It North Queensland Motorsport Precinct is proposed to be located south of Ghost Gum Road on Lot 31 on E124247, Lot 19 on RP901592, Lot 38 on E124269 and Lot 39 on E124247 along the western boundary of the Precinct and will utilise 297.6 ha of the total Precinct area. This land use will facilitate daily traffic for driver education and karting, and weekend traffic for speedway, drags and major events.

7.2 Battery Plant

The Lithium Ion Battery Manufacturing Plant is proposed to be located south of Ghost Gum Road adjacent to the western edge of the Flinders Highway and east of the Motorsport Precinct, on Lot 34 on E124243 and two portions of Lot 19 on RP901592; utilising 184.9 ha of the total Precinct area.

7.3 Medium and high impact industrial lots

In addition to the Motorsport Precinct and Battery Plant, the remaining developable area of the Precinct will facilitate a number of medium and high impact industrial lots. To determine the traffic generated by each lot, 25% of the lot area has been adopted as the gross floor area (GFA).

The traffic generated is based on minimum land area requirements for medium and high impact industrial lots. This method is considered conservative as larger lots are not likely to maintain the same density of traffic generated from the smaller lots.

Assumptions used to qualify the remaining developable area into industrial lots include:

- Medium impact industrial lots have been located on the eastern side of the Precinct
- High impact industrial lots have been located on the western side of the Precinct
- The gross floor area (GFA), has been estimated at 25% of the developable lot area
- Daily traffic generation of 5 trips/day/100 m² GFA, as advised by TCC via email on 07 June 2019.
- Peak hour traffic generation of 0.5 trips/peak hour/100 m² GFA, (10% of daily traffic generation)
- Medium impact lots (2,000 m²) 25 trips/day/lot, 2.5 trips/peak hour/lot
- High impact lots (5,000 m²) 62.5 trips/day/lot, 6.25 trips/peak hour/lot.

To determine the road hierarchy required throughout the Precinct, the Future Stage has been divided into six components, refer Figure 3 below, to allow for separate traffic distribution for each.

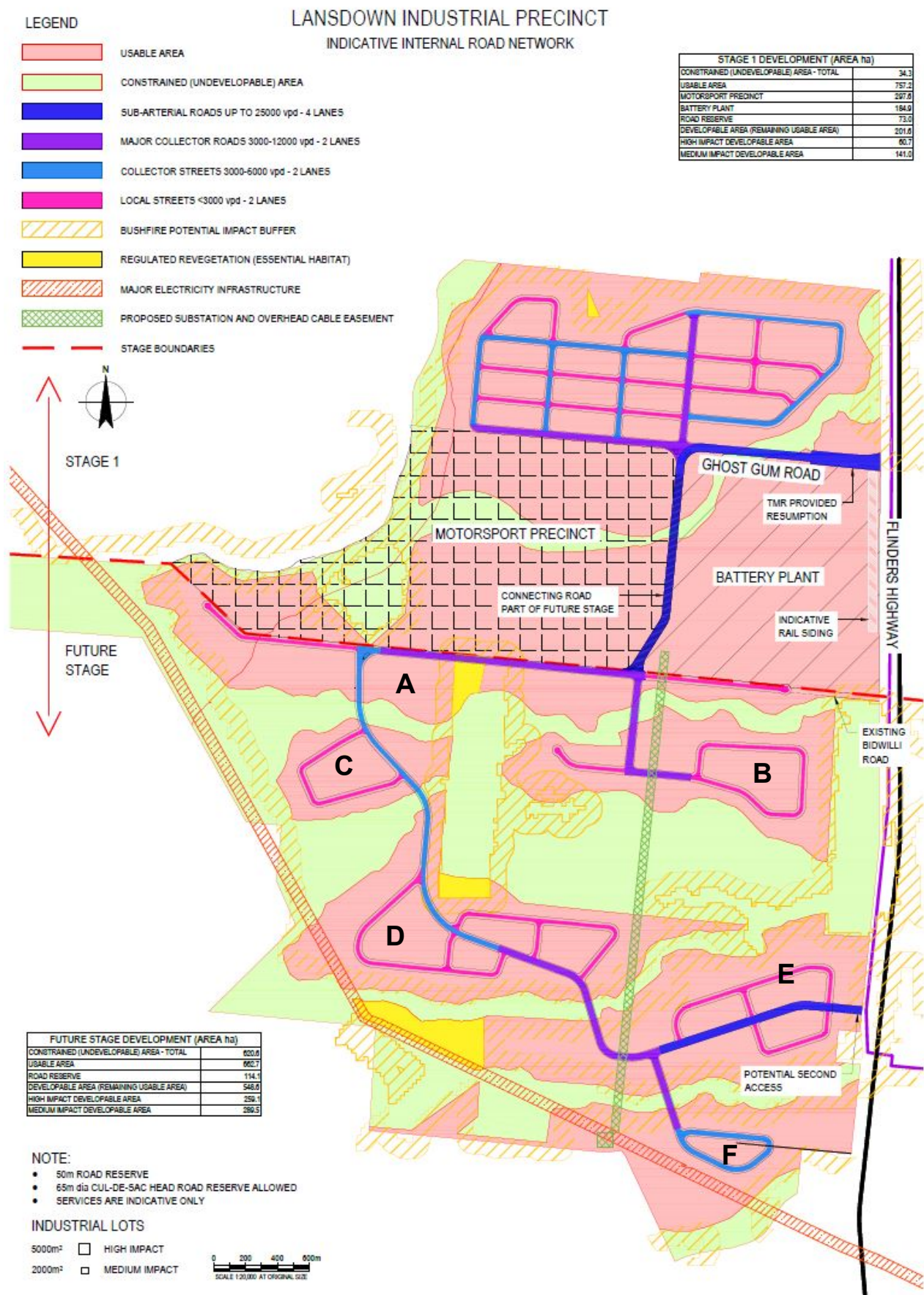


Figure 3 Future Stage component areas

Two scenarios have been developed to determine the anticipated traffic generation of this Precinct. The initial scenario is based on the high and medium impact lots as advised in the Air Quality Impact Assessment (refer Section 7.3.1). The second scenario is per Council's advice on 28 March 2019,

stipulating 90% of the developable area as high impact industrial lots with the remaining 10% allocated to medium impact lots (refer Section 7.3.2). Refer Attachment 1 for plans showing areas of medium and high impact lot locations for each scenario.

7.3.1 Air quality scenario

Figure 4 from the Air Quality Impact Assessment, GHD March 2019 shows the proposed zoning classification of the Precinct, with lower impact developments located on the eastern side, parallel to the Flinders Highway and high impact developments recommended to be on the western side of the Precinct. This figure has been considered when adopting a generally even split between high and medium impact industrial lots. The number of lots under each separate component is shown below in Table 2. Refer Attachment 1 for impact boundary used to determine the number of lots in each impact zone.

Table 2 Air quality scenario - medium and high impact lots per stage

Stage		Medium Impact	High Impact	Total
Stage 1		423	73	496
Future Stage		869	312	1,180
Via Ghost Gum Road	A	43	90	132
	B	208	20	228
	C	0	47	47
Via Potential Second Access	D	57	118	175
	E	332	25	357
	F	229	12	241
Total		1,292	366	1,658

The traffic generated for the Motorsport Precinct, Battery Plant and industrial lots for the Air Quality scenario are summarised in Table 3 below for Stage 1 with industrial lot traffic for Future Stage shown in Table 4.

Table 3 Air quality scenario - Stage 1 traffic generation summary

	Motorsport Precinct	Battery Plant	Industrial Lots		Total Trips
			Medium Impact	High Impact	
Daily Weekday Trips	84 (excl. large events)	1,021	10,575	4,563	16,243 trips/weekday
	1,446 (drag street meets 4/mth additional traffic)				17,605 trips/weekday
Peak Hour Weekday Trips	42 (excl. large events)	122	1,058	457	1,679 trips/weekday peak hour
	723 (drag street meets 4/mth additional traffic)				2,360 trips/weekday peak hour

Table 4 Air quality scenario - Future Stage traffic generation summary

Future Stage		Daily Weekday Trips			Peak Hour Weekday Trips		
		Medium Impact	High Impact	Total Daily Trips	Medium Impact	High Impact	Total Peak Hour Weekday Trips
Via Ghost Gum Road	A	1,075	5,625	6,700	108	563	671
	B	5,200	1,250	6,450	520	125	645
	C	0	2,938	2,938	0	294	294
Sub Total		6,275	9,813	16,088	628	982	1,610
Via Potential Second Access	D	1,425	7,375	8,800	143	738	881
	E	8,300	1,563	9,863	830	157	987
	F	5,725	750	6,475	573	75	648
Sub Total		15,450	9,688	25,138	1,546	970	2,516
Total Future Stage		21,725	19,501	41,226	2,174	1,952	4,126

7.3.2 Council advised 90% high impact scenario

Council has advised, a second development scenario to assess the Precinct, where 90% of the developable area is to contain high impact industrial development. Thus, this section investigates the traffic and lots generated by the Precinct to show the impact of this scenario. The number of lots under each separate component is shown below in Table 5.

Table 5 90% High impact scenario - medium and high impact lots per Stage

Stage		Medium Impact	High Impact	Total
Stage 1		151	181	332
Future Stage		65	633	698
Via Ghost Gum Road	A	0	107	107
	B	26	93	119
	C	0	47	47
Via Potential Second Access	D	0	140	140
	E	39	142	181
	F	0	104	104
Total		216	814	1030

The traffic generated for the Motorsport Precinct, Battery Plant and industrial lots for the 90% High impact scenario are summarised in Table 6 below for Stage 1 with industrial lot traffic for Future Stage shown in Table 7.

Table 6 90% high impact scenario - Stage 1 traffic generation summary

	Motorsport Precinct	Battery Plant	Industrial Lots		Total Trips
			Medium Impact	High Impact	
Daily Weekday Trips	84 (excl. large events)	1,021	3375	11375	15,855 trips/weekday
	1,446 (drag street meets 4/mth additional traffic)				17,217 trips/weekday
Peak Hour Weekday Trips	42 (excl. large events)	122	378	1138	1,680 trips/weekday peak hour
	723 (drag street meets 4/mth additional traffic)				2,361 trips/weekday peak hour

Table 7 90% high impact scenario - Future Stage traffic generation summary

Future Stage		Daily Weekday Trips			Peak Hour Weekday Trips		
		Medium Impact	High Impact	Total daily Trips	Medium Impact	High Impact	Total Peak Hour Weekday Trips
Via Ghost Gum Road	A	0	6,688	6,688	0	669	669
	B	650	5,813	6,463	65	582	647
	C	0	2,938	2,938	0	294	294
Sub Total		650	15,439	16,089	65	1,545	1,610
Via Potential Second Access	D	0	8,750	8,750	0	875	875
	E	975	8,875	9,850	98	888	986
	F	0	6500	6,500	0	650	650
Sub Total		975	24,125	25,100	98	2,413	2,511
Total Future Stage		1,625	39,564	41,189	163	3,958	4,121

8 Traffic distribution determining road hierarchy

To provide the road hierarchy for the internal network, the traffic generated from Stage 1 and Future Stage components was determined and labelled in alignment with TCC's Road Hierarchy, as per Section 4.2 above. Figure 4 below shows the anticipated volumes along the internal road network and the corresponding road hierarchy. Both development scenarios result in the same level of road hierarchy, as the generated traffic volumes are very similar.

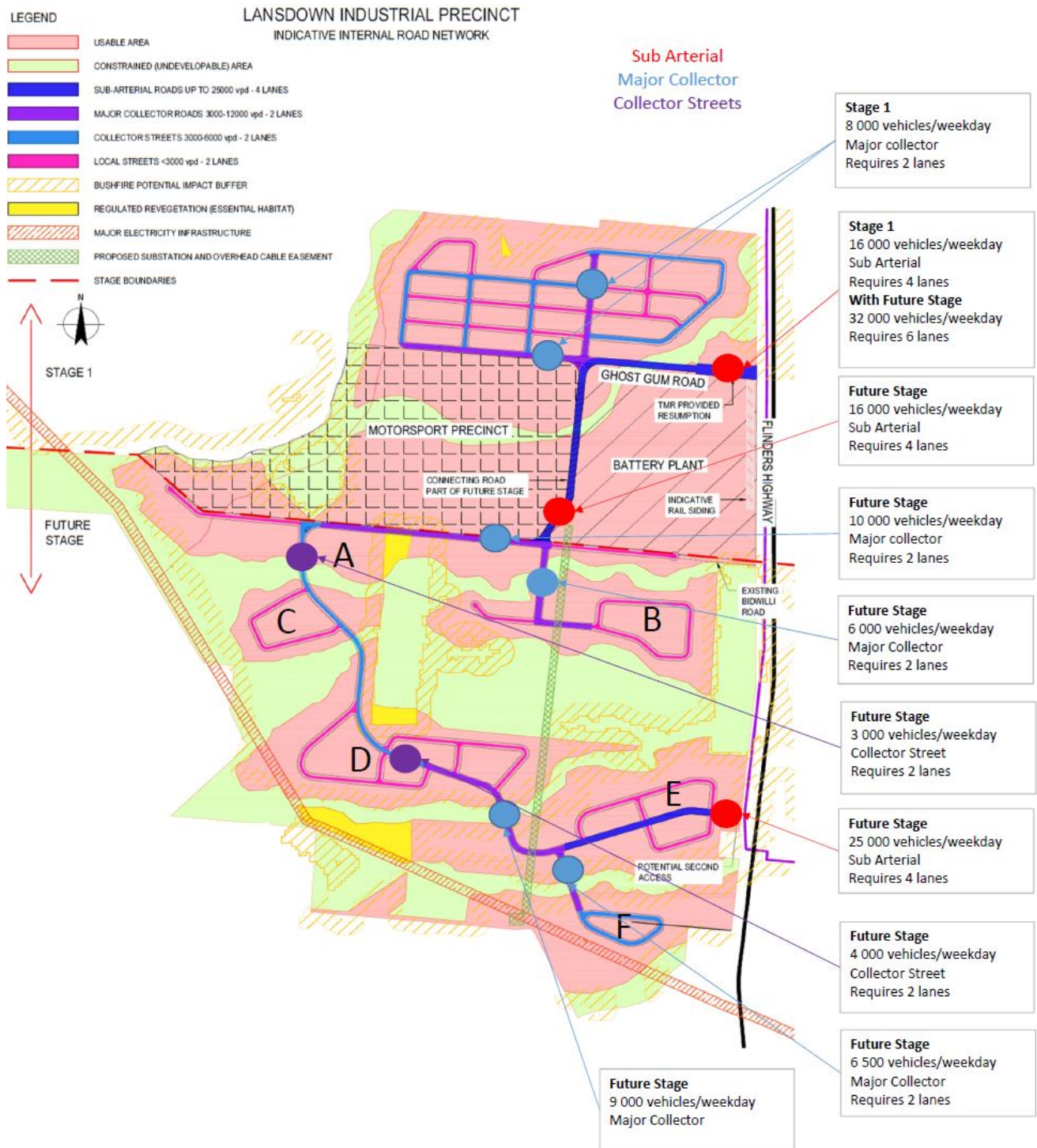


Figure 4 Road link traffic volumes

Attachment 1 also shows the internal road network, colour coded for the corresponding road hierarchy. Based on the assumptions made in this memorandum (refer Sections 3 and 7.3), under both scenarios a significant amount of traffic is generated from this Precinct, requiring significant road infrastructure at both the Ghost Gum Road access and the potential second access point to the south.

9 Scenario variances

As described above, two lot development assumptions and subsequent traffic generation scenarios have been investigated; Air quality scenario, where there is generally an even split between medium and high impact industrial lots and at Council's request, a scenario where 90% of the developable area is to be developed into high impact industrial lots.

The more high impact industrial lots within the Precinct, the less road reserve infrastructure is required, as the minimum lots sizes are larger.

Due to the traffic generation rates, both scenarios generate very similar traffic volumes, resulting in one road hierarchy plan for the Precinct. There is no significant traffic generation difference between the scenarios.

10 Railway crossing

TCC and Queensland Rail (QR) have an Interface Agreement for rail crossings. As part of this agreement, the Office of the National Rail Safety Regulators (ONRSR) does not support the construction of new rail crossings. Brownfield sites should also include assessment of the potential to close any existing railway crossings.

An indicative rail siding located south of Ghost Gum Road, parallel to the Mt Isa railway line on the western side of Flinders Highway is shown for size purposes only. The location is not defined.

The existing Mt Isa rail line and corresponding road crossings do not impact the calculations or outcome of this internal Traffic and Transport Assessment.

11 Conclusion

This Traffic and Transport Assessment memorandum has provided a high level assessment to determine the potential developable area of the Lansdown Industrial Precinct, taking into account proposed land uses, areas of constraint, design vehicle and nominated access point.

From this assessment, it is estimated that 937.4 ha of developable area in addition to the Motorsport Precinct and Battery Plant is available for use. From both scenarios, this allows for the development of between 1030 and 1675 industrial lots. This area, at full development, generates over 30,000 vehicles/day to the Flinders Highway.

This high level estimate generated substantial volumes of traffic, requiring significant, multi-lane road networks to cater for the demand. It is recommended that more detailed assessments be undertaken for each development application within this Precinct to determine more accurate impacts as the Precinct grows.

I trust this satisfies the requirements of TCC. Please do not hesitate to contact [REDACTED] of our Townsville office if you have any questions relating to this assessment.

Kind Regards

[REDACTED]

[REDACTED]

Senior Civil Engineer

Attachment 1 - High level internal road layout

Attachment 2 - Flinders Highway/Ghost Gum Road intersection layout (AECOM)

Attachment 3 - Areas calculations

Attachment 1 - High level internal road layout

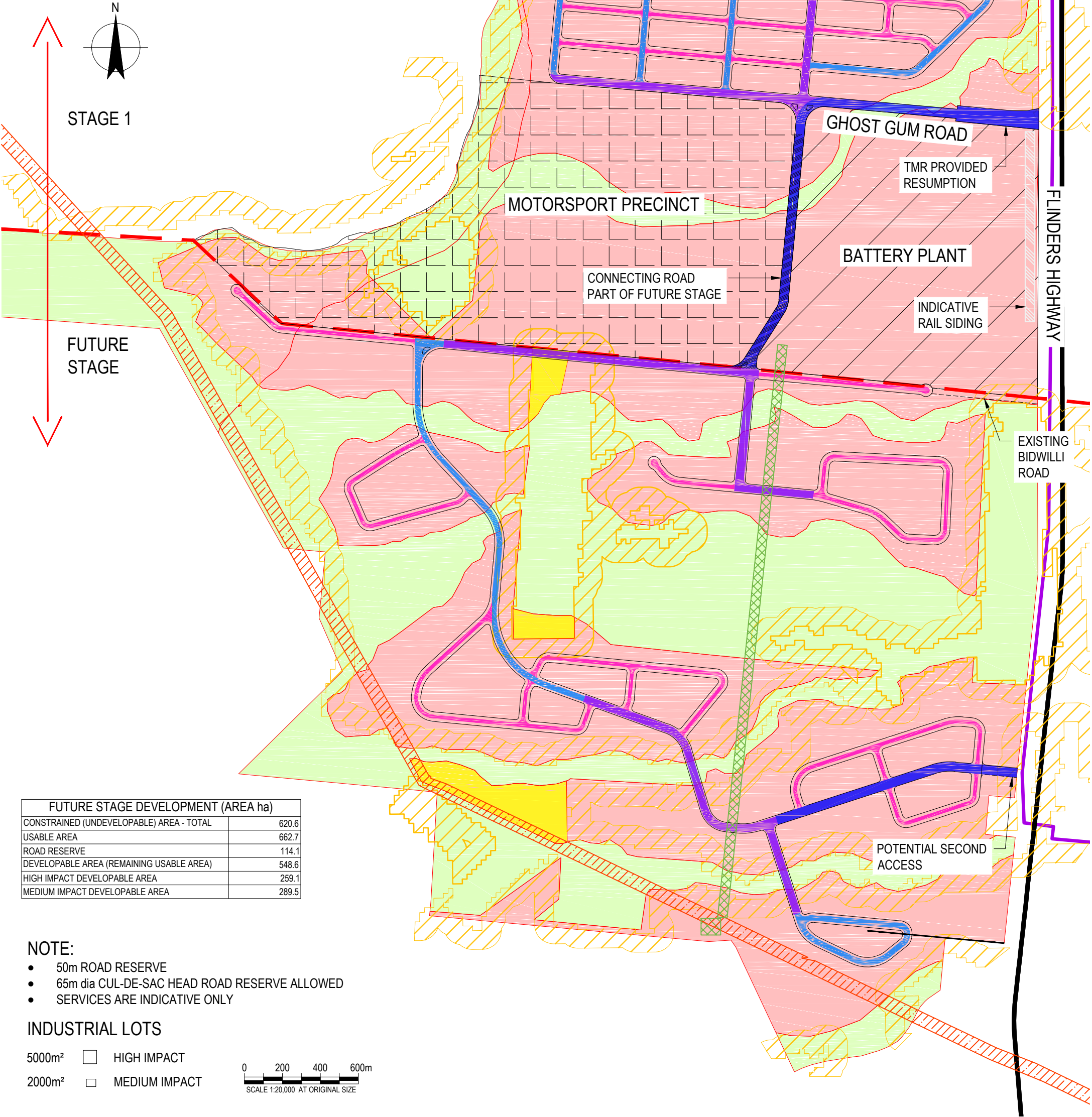
LANSDOWN INDUSTRIAL PRECINCT

INDICATIVE INTERNAL ROAD NETWORK

LEGEND

- USABLE AREA
- CONSTRAINED (UNDEVELOPABLE) AREA
- SUB-ARTERIAL ROADS UP TO 25000 vpd - 4 LANES
- MAJOR COLLECTOR ROADS 3000-12000 vpd - 2 LANES
- COLLECTOR STREETS 3000-6000 vpd - 2 LANES
- LOCAL STREETS <3000 vpd - 2 LANES
- BUSHFIRE POTENTIAL IMPACT BUFFER
- REGULATED REVEGETATION (ESSENTIAL HABITAT)
- MAJOR ELECTRICITY INFRASTRUCTURE
- PROPOSED SUBSTATION AND OVERHEAD CABLE EASEMENT
- STAGE BOUNDARIES












STAGE 1 DEVELOPMENT (AREA ha)	
CONSTRAINED (UNDEVELOPABLE) AREA - TOTAL	34.3
USABLE AREA	757.2
MOTORSPORT PRECINCT	297.6
BATTERY PLANT	184.9
ROAD RESERVE	73.0
DEVELOPABLE AREA (REMAINING USABLE AREA)	201.6
HIGH IMPACT DEVELOPABLE AREA	60.7
MEDIUM IMPACT DEVELOPABLE AREA	141.0



LANSDOWN INDUSTRIAL PRECINCT

INDICATIVE INTERNAL ROAD NETWORK



LEGEND

	USABLE AREA
	CONSTRAINED (UNDEVELOPABLE) AREA
	SUB-ARTERIAL ROADS UP TO 25000 vpd - 4 LANES
	MAJOR COLLECTOR ROADS 3000-12000 vpd - 2 LANES
	COLLECTOR STREETS 3000-6000 vpd - 2 LANES
	LOCAL STREETS <3000 vpd - 2 LANES
	BUSHFIRE POTENTIAL IMPACT BUFFER
	REGULATED REVEGETATION (ESSENTIAL HABITAT)
	MAJOR ELECTRICITY INFRASTRUCTURE
	PROPOSED SUBSTATION AND OVERHEAD CABLE EASEMENT
	STAGE BOUNDARIES

NOTE:

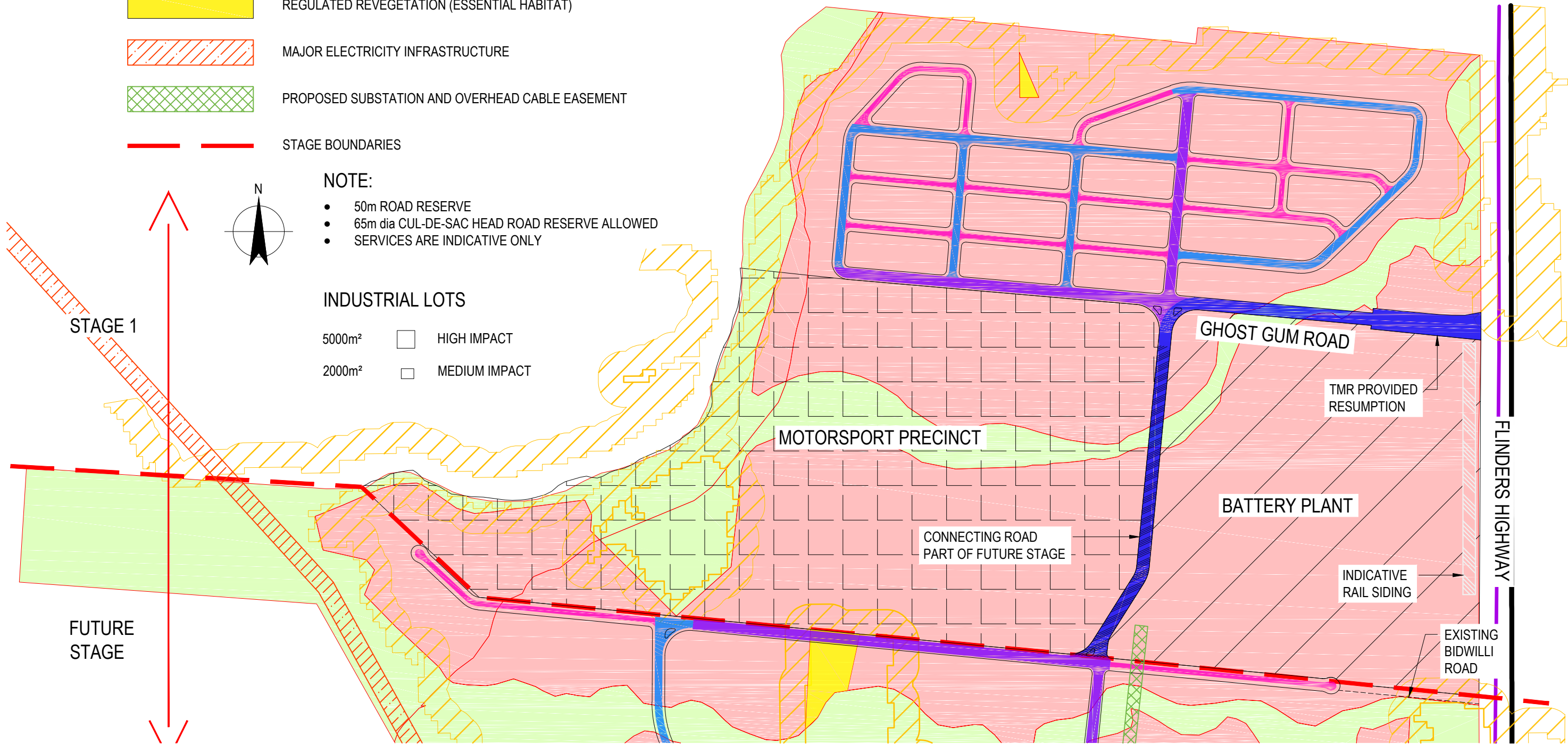
- 50m ROAD RESERVE
- 65m dia CUL-DE-SAC HEAD ROAD RESERVE ALLOWED
- SERVICES ARE INDICATIVE ONLY

INDUSTRIAL LOTS

5000m ²		HIGH IMPACT
2000m ²		MEDIUM IMPACT

STAGE 1 DEVELOPMENT (AREA ha)

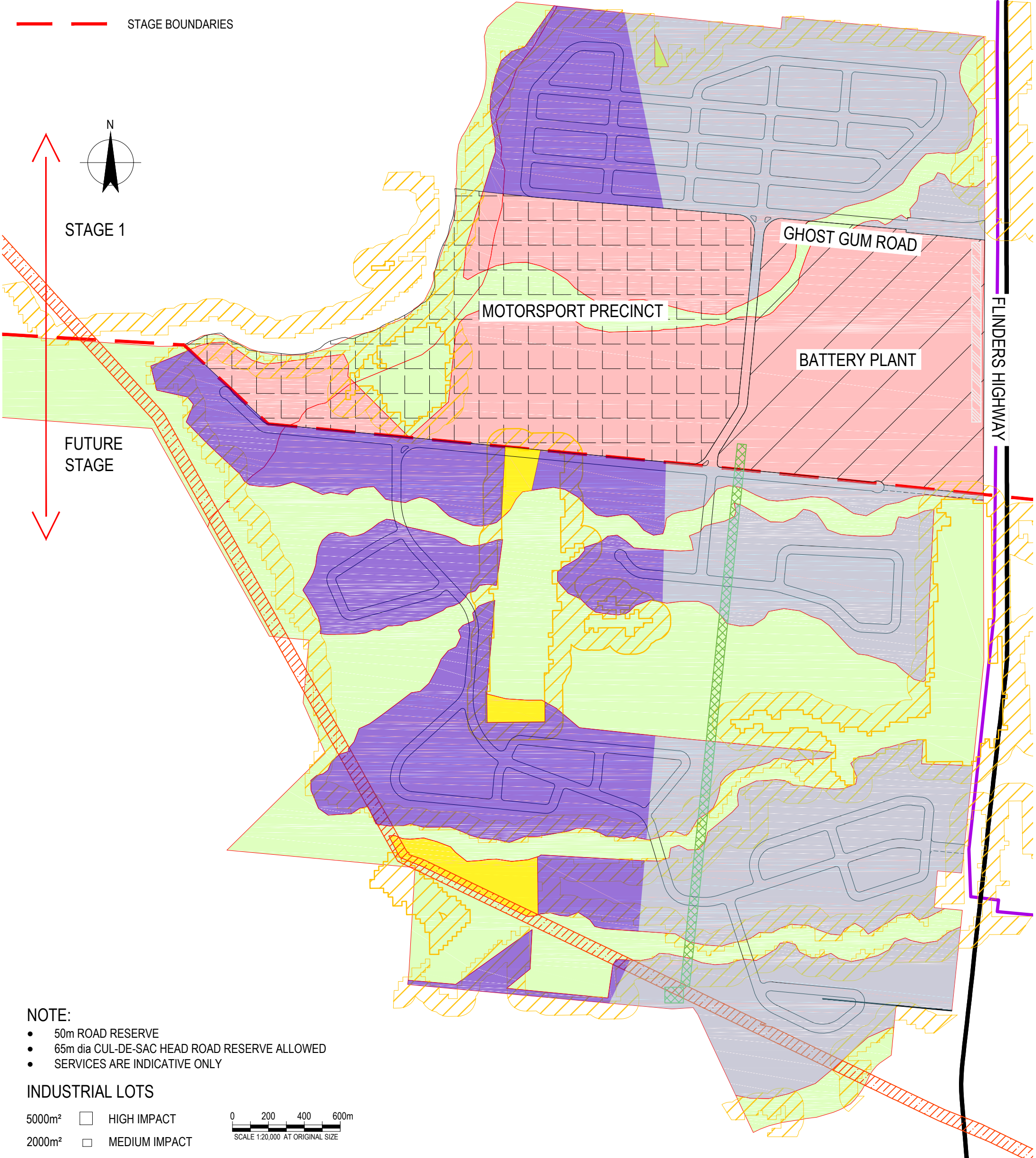
CONSTRAINED (UNDEVELOPABLE) AREA - TOTAL	34.3
USABLE AREA	757.2
MOTORSPORT PRECINCT	297.6
BATTERY PLANT	184.9
ROAD RESERVE	73.0
DEVELOPABLE AREA (REMAINING USABLE AREA)	201.6
HIGH IMPACT DEVELOPABLE AREA	60.7
MEDIUM IMPACT DEVELOPABLE AREA	141.0



LEGEND

- KNOWN LAND USE AREA
- CONSTRAINED (UNDEVELOPABLE) AREA
- MEDIUM IMPACT AREA
- HIGH IMPACT AREA
- BUSHFIRE POTENTIAL IMPACT BUFFER
- REGULATED REVEGETATION (ESSENTIAL HABITAT)
- MAJOR ELECTRICITY INFRASTRUCTURE
- PROPOSED SUBSTATION AND OVERHEAD CABLE EASEMENT
- STAGE BOUNDARIES

LANDSDOWN INDUSTRIAL PRECINCT
AIR QUALITY SCENARIO

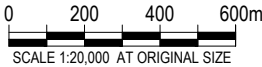


NOTE:

- 50m ROAD RESERVE
- 65m dia CUL-DE-SAC HEAD ROAD RESERVE ALLOWED
- SERVICES ARE INDICATIVE ONLY

INDUSTRIAL LOTS

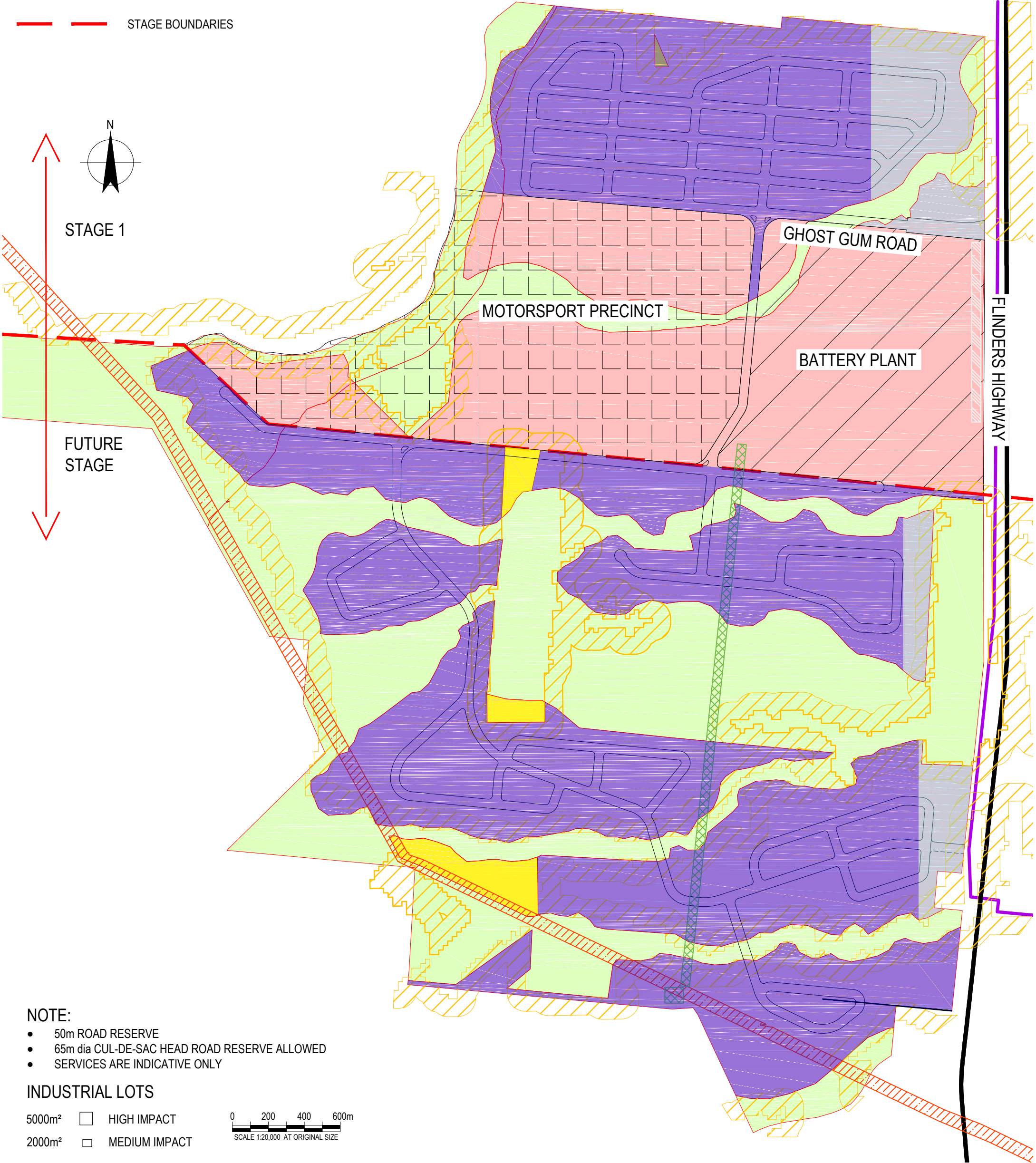
- 5000m² ☐ HIGH IMPACT
- 2000m² ☐ MEDIUM IMPACT



LEGEND

LANDSDOWN INDUSTRIAL PRECINCT
90% HIGH IMPACT SCENARIO

- KNOWN LAND USE AREA
- CONSTRAINED (UNDEVELOPABLE) AREA
- MEDIUM IMPACT AREA
- HIGH IMPACT AREA
- BUSHFIRE POTENTIAL IMPACT BUFFER
- REGULATED REVEGETATION (ESSENTIAL HABITAT)
- MAJOR ELECTRICITY INFRASTRUCTURE
- PROPOSED SUBSTATION AND OVERHEAD CABLE EASEMENT
- STAGE BOUNDARIES



Attachment 2 - Flinders Highway/Ghost Gum Road intersection layout (AECOM)