

ATTACHMENT 3

Engineering / Traffic Response

Prepared by:

Neon Consulting

24 November 2023

Attention: Alan Irvin
Property Projects Australia Pty Ltd
PO Box 1264
New Farm QLD 4051

Council reference: DA/4677:AD2023/0004947
Our reference: 999-2201

Request for Further Information - 81 Savage Street, Cooktown

With reference to the Cook Shire Council information request letter dated 19 September 2023 we provide responses to items 17 to 30 below in *orange*;

17. Confirm the earthworks volumes required to reshape the site to the proposed design levels and if the earthworks require achieve a balanced cut to fill operation within the site or whether material is required to be imported/exported. The estimated number of truck movements to undertake the earthworks also requires confirmation.

The estimated earthworks volumes required to reshape the site to the design levels are;

Cut to fill 5,098m³

Imported Fill 5,558m³

It should be noted that this number is subject to change (reduce) as the design develops, detailed design has not been undertaken to incorporate pavement, building slabs, trenching for services etc. A suspended slab solution is being explored to reduce the volume of imported fill required.

The bulk earthworks application to Council considers only the cut-to-fill element initially.

18. Provide sections through the Harrigan Street and Savage Street Road verges and into the site and demonstrate the existing and proposed batters between the carpark and driveway levels and the existing road carriageway. Consideration is required of how the pedestrian corridors and accessibility to the site will be managed.

This information is included in the plans and sections in Attachment 1. No changes to the Savage Street verge are proposed except to provide access.

19. The design information must be revised to show the existing site levels along the northern boundary and include all batters or retaining walls required to manage the large level differences to the adjoining lot to the north.

This information is included in the plans and sections in Attachment 1.

20. Please revise the Engineering Services report and review the calculations and recommendations as Table 2 of the Engineering Services report incorrectly states the posted speed limit of Harrigan Street is 60km/h.

Attachment 2 contains revised traffic calculations and an intersection assessment of Hope/Harrigan/Savage Street.

21. An analysis of the changed operation and increased traffic at the Hope/Harrigan/Savage Street intersection must be completed to verify safe operation of the intersection following development.

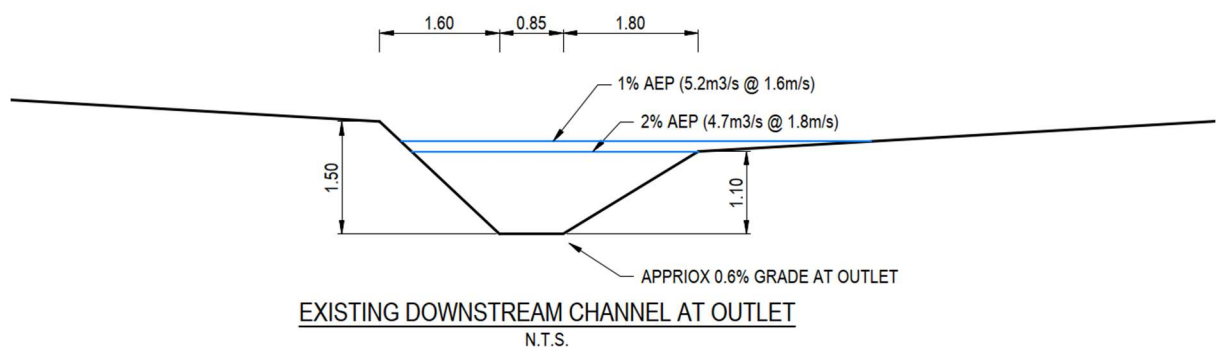
Attachment 2 contains revised traffic calculations and an intersection assessment of Hope/Harrigan/Savage Street. It is noted that the current arrangement of this intersection creates undue conflict points due to the cross intersection and the multiple lanes which could be improved through linemarking changes.

22 (duplicate). The applicant is to provide an intersection layout on Harrigan Street that facilitates auxiliary lanes from left and right turning traffic entering and exiting the development. In particular, a Channelised Right Turn and an Auxiliary Left Turn must be provided for vehicular traffic entering the site from Harrigan Street. A dedicated left turn exit must also be provided from the main exit onto Harrigan Street.

These treatments are not warranted from the traffic information provided by Council and the assessment undertaken. The intention of the applicant is to provide a safe and usable site and will consider all reasonable measures to achieve this. A development condition should be added to any approval including the requested additional upgrades.

23. Prepare a stormwater plan that considers how stormwater flows will be managed through the reprofiled site to the outlet to the gully at the western lto boundary. The design needs to address the significant level difference between the gully invert and the ground FFL. Runoff capture and conveyance will need to be for the 1% AEP event as discharging flows over the boundary retaining walls will not be acceptable. Drainage calculations should provide advice on the velocity of the discharge point and impacts on the downstream drainage path..

Stormwater plans are included in Attachment 1 noting that detailed design will be undertaken for future development applications. A piped solution with appropriate drops in structures is considered appropriate to manage the existing fall within the site. The piped outlet will be at the downstream invert level and include any appropriate velocity dissipation and scour reduction within the development site.



24. A concept engineering services plan by Neon Engineering (022-2201-00-SK0001) is including the Engineering Report and shows a schematic drainage network. The plan requires additional detail including invert levels, pit/pipe sizes, pipe grade. Information must also be provided on the intended depth, volume, batter slopes associated with the detention basin.

Stormwater plans are included in Attachment 1 noting that detailed design will be undertaken for future development applications. Pipe sizes and grades will be provided at the detailed design stage, sizes have been removed from the updated plans as they will be sensitive to the final detention basin sizing. The service plans have been updated with upstream and downstream invert levels which are the constraints, and a piped solution is capable of being designed around these upstream and downstream constraints.

25. Clarify the inconsistency between the detention basin footprint and shape presented in the concept engineering services plan (022-2201-00-SK-0001) compared with the development layout shown on Architects drawing DA03.

Stormwater plans are included in Attachment 1 showing the intended detention basin sizing. The detention basin and on-site works will be subject to an Operational Work application in the future where detailed design and calculations can be provided.

26. Provide drainage calculations (hydrology and hydraulics) in relation to pre and post-development runoff and information on how the post-development runoff will be collected and treated by the detention basin.

Stormwater plans are included in Attachment 1 showing the intended detention basin sizing. The detention basin and on-site works will be subject to an Operational Work application in the future where detailed design and calculations can be provided. Preliminary design shows that detention can be achieved, the size of the detention basin will however continue to vary during design as the outlet flows are determined by all of the site variables and is strongly influenced by the outlet pipes and the final shape of the basin. Initial calculations indicate that the detention basin will need to store in the order of 300m³ of stormwater. The basin shown in the plans attached has a volume of approximately 800m³. The earthworks on the concept plans show a basin with 1 in 4 batters.

27. The applicant is to advise how stormwater treatment for stormwater quality for the internal site areas will be achieved.

It is proposed to use an in-pit product such as the Atlan Stormsack <https://atlan.com.au/stormsack/> for ease of maintenance in the private carpark. The landscaped areas and grassed detention basin will provide some additional treatment. Bioretention or Gross pollutant traps are considered inappropriate for this area due to the standing water being breeding for Aedes aegypti mosquitos and the risk of mosquito born diseases. Bioretention can be added to the lower level of the detention basin if required.

28 Confirm the impact of the proposed development including the provision for water supply for firefighting purposes on the Council water supply network.

See below.

29 Further information is required to address the firefighting needs for a commercial development including the requirements to provide 30L/s firefighting flows for 4 hours. Council does not warrant the networks ability to provide sufficient pressure for commercial firefighting and there additional on site infrastructure may be required.

A hydrant flow test has not been able to be completed at the time of this response. It is expected from the water main sizing in the area that the 30L/s fire fighting flows required for the design of commercial development under the FNQROC may have an impact on the surrounding network and that on-site storage will be required to facilitate fire fighting flows without impacting the network.

The maximum possible size for a tank dedicated to fire fighting without drawing any flow from the Council network would be 500kL (432kL is 30L/s for 4 hours) which is generally 15m in diameter depending on the manufacturer. It is anticipated that the hydrant test will confirm that 15L/s is available at the site frontage in accordance with the FNQROC requirements for residential fire fighting and therefore the likely size of the tank will be in the order of 250kL.

The potable demands from the site are 9 equivalent domestic connections and is less than half of the demand expected from the site zoning (20 x 300m² dwellings are less than 50% site coverage in the Medium Density Residential Zone).

30 Provide additional information on the proposed sewer connection including but not limited to peak flows and daily volumes. It is noted that to connect to the Council gravity manhole on the north side of Harrigan Street, trenching or underboring of Harrigan Street will be required. An assessment of the capacity of the existing sewerage system to accommodate additional flows must be undertaken and the upgrades necessary to allow connection identified. The connection point to Council's sewerage system may need to be located further down the gravity pipe network to avoid costly sewerage replacement. The assessment must also identify the location and capacity of any downstream pump stations that may be impacted by additional sewerage loads.

Our records show that the council gravity manhole is located on the western side of Harrigan Street near the Savage Street intersection at the site frontage and will therefore not require trenching or underboring. Please advise if Council has alternate records.

Peak flows and daily volumes in accordance with FNQROC requirements were provided in the Engineering Report. The development will generate 9 equivalent domestic connections of sewage. The site is within the sewer catchment for the LGIP and is zoned as Medium-Density Residential. Under this zoning in the planning scheme, the site would be expected to generate at least double the sewage flows expected from this development (20 x 300m² dwellings are less than 50% site coverage). A trunk gravity sewer from Councils Trunk Infrastructure Plans is located within the site and the Harrigan Street frontage. As the expected sewage generation from the development is less than what would be expected from the site zoning and that only trunk sewer exists downstream of the site, it is expected that the sewage flows from the site have been considered and that any costly upgrades are included in the LGIP.

If the larger contentious issues involved with development are resolved, we can undertake a sewer capacity study prior to any operational or building works. If there are known issues with Council trunk sewer that are not covered by planned upgrades that can be resolved by connecting further down the system this can be considered to assist. The cost of additional rising main from the on-site pump station is negligible in the context of the rest of the development costs.

24 November 2023

Request for Further Information- 81 Savage Street, Cooktown

Should you require any additional information, please do not hesitate to me on 0402 568 698 or the email address below.

Yours sincerely



Craig Caplick

Principal Engineer | RPEQ 25102

craig@consultneon.com.au | 0402 568 698







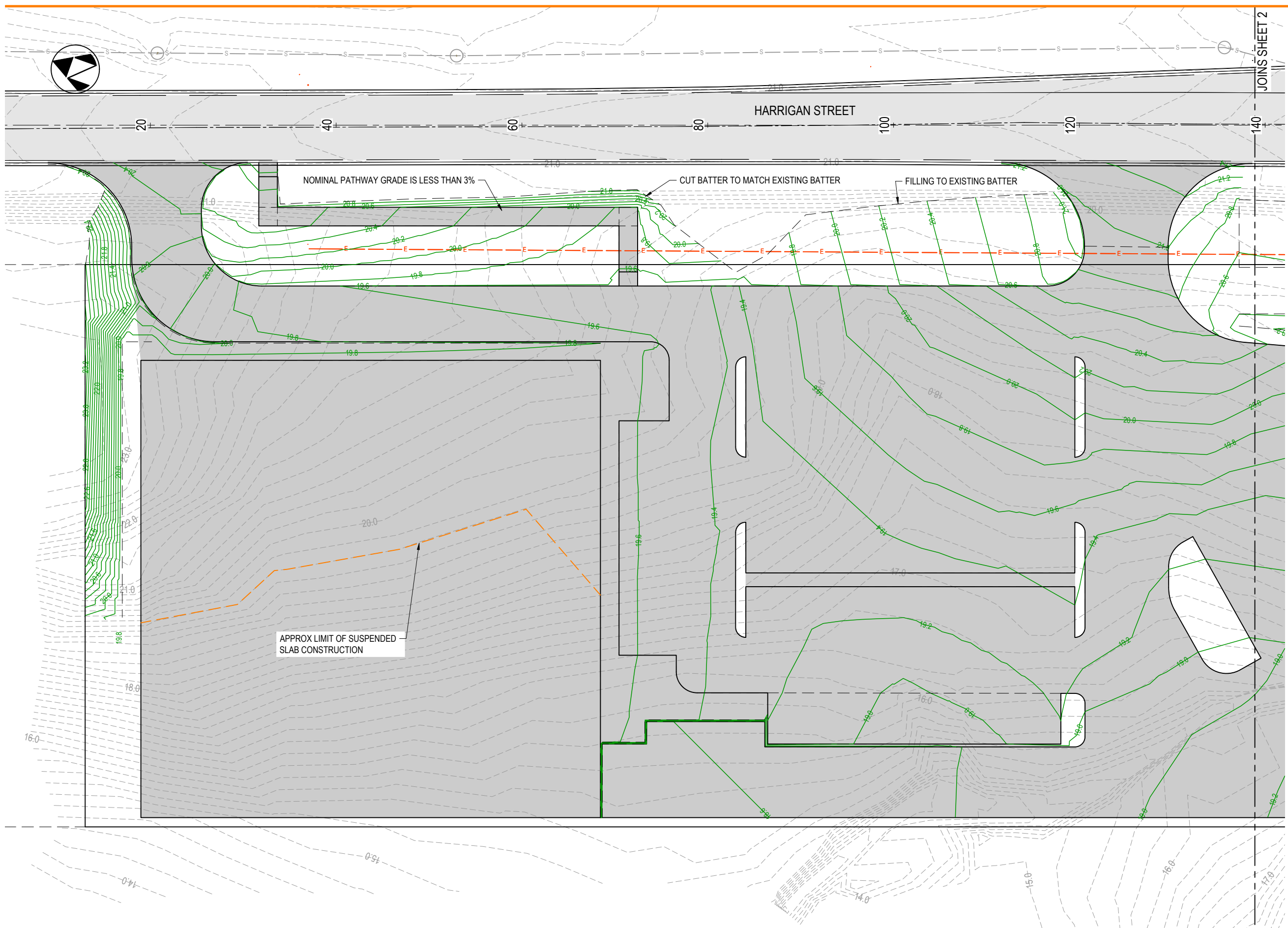
Plans & Sections



JOINS SHEET 2

HARRIGAN STREET

- LEGEND**
-  EXISTING SEALED ROADWAY
 -  PROPOSED HARDSTANDS & STRUCTURES
 -  DESIGN SURFACE CONTOURS (0.2m INTERVAL)
 -  EXISTING SURFACE CONTOURS (0.2m INTERVAL)



81 SAVAGE STREET, COOKTOWN

CONCEPT EARTHWORKS PLAN
SHEET 1 OF 2

A 24.11.23 INITIAL ISSUE

| Rev | Date | Revision Notes |
|-----|------|----------------|
| | | |

| Drawn | Design | Check'd | Appr'd |
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- LEGEND**
- EXISTING SEALED ROADWAY
 - PROPOSED HARDSTANDS & STRUCTURES
 - 7.0 DESIGN SURFACE CONTOURS (0.2m INTERVAL)
 - 7.0 EXISTING SURFACE CONTOURS (0.2m INTERVAL)



NEON
CONSULTING

81 SAVAGE STREET, COOKTOWN

CONCEPT EARTHWORKS PLAN
SHEET 2 OF 2

A 24.11.23 INITIAL ISSUE

Rev Date Revision Notes

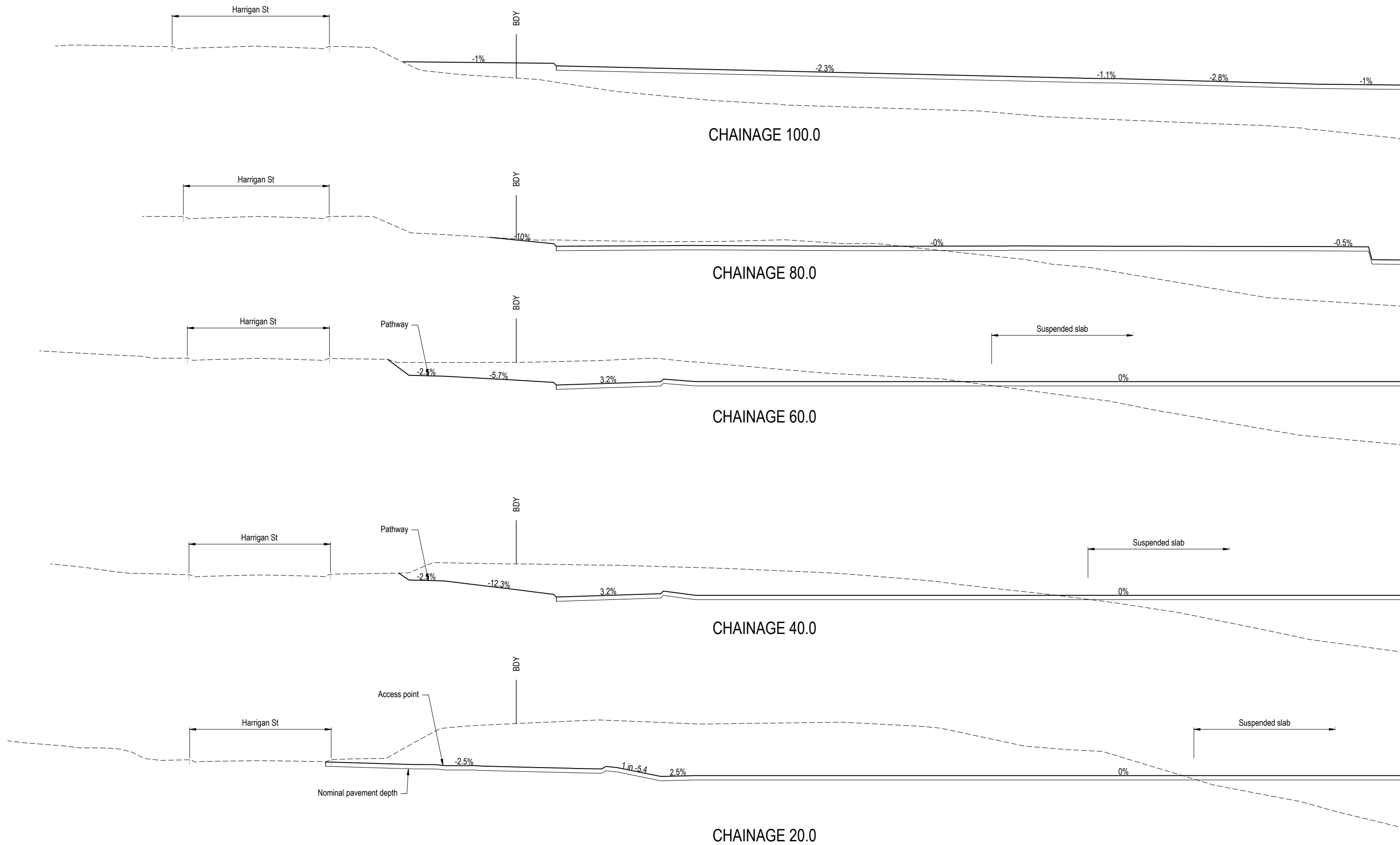
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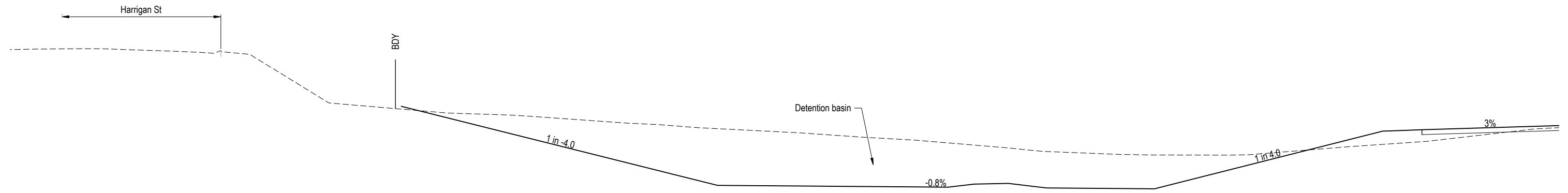
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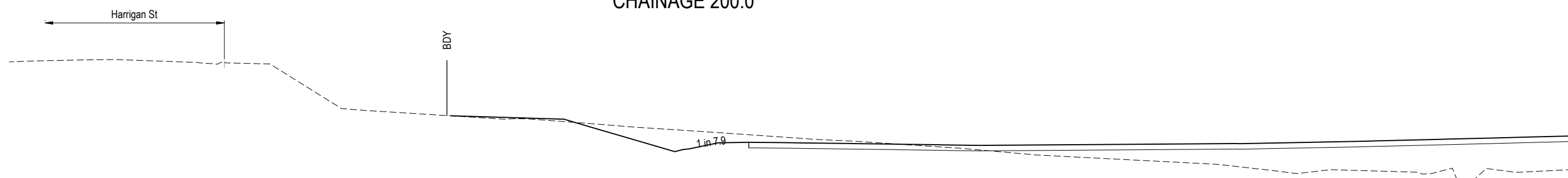
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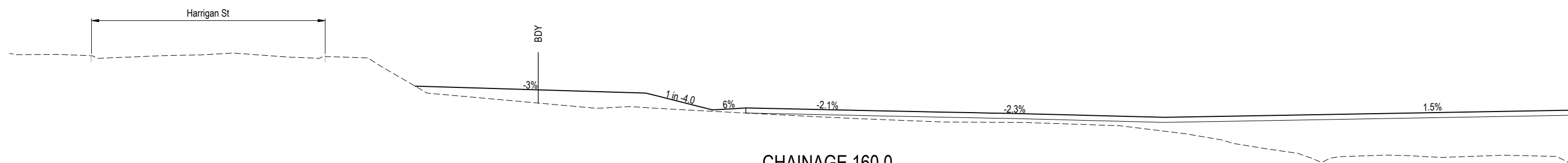




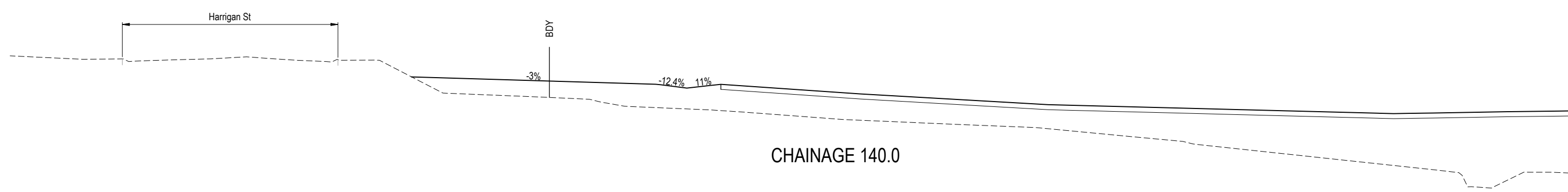
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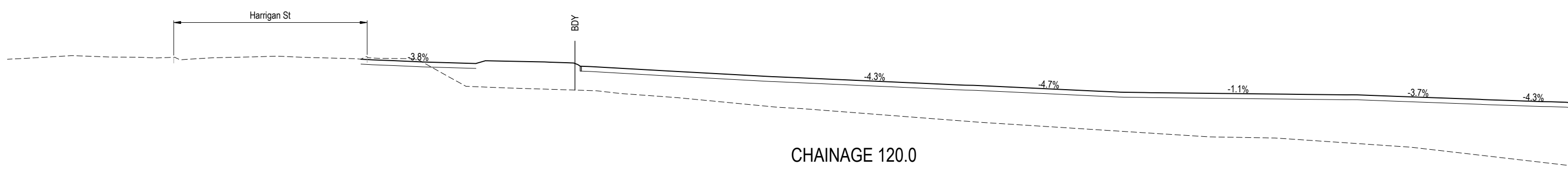
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81 SAVAGE STREET, COOKTOWN

CONCEPT EARTHWORKS SECTIONS
SHEET 2 OF 2

A 24.11.23 INITIAL ISSUE



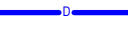




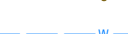

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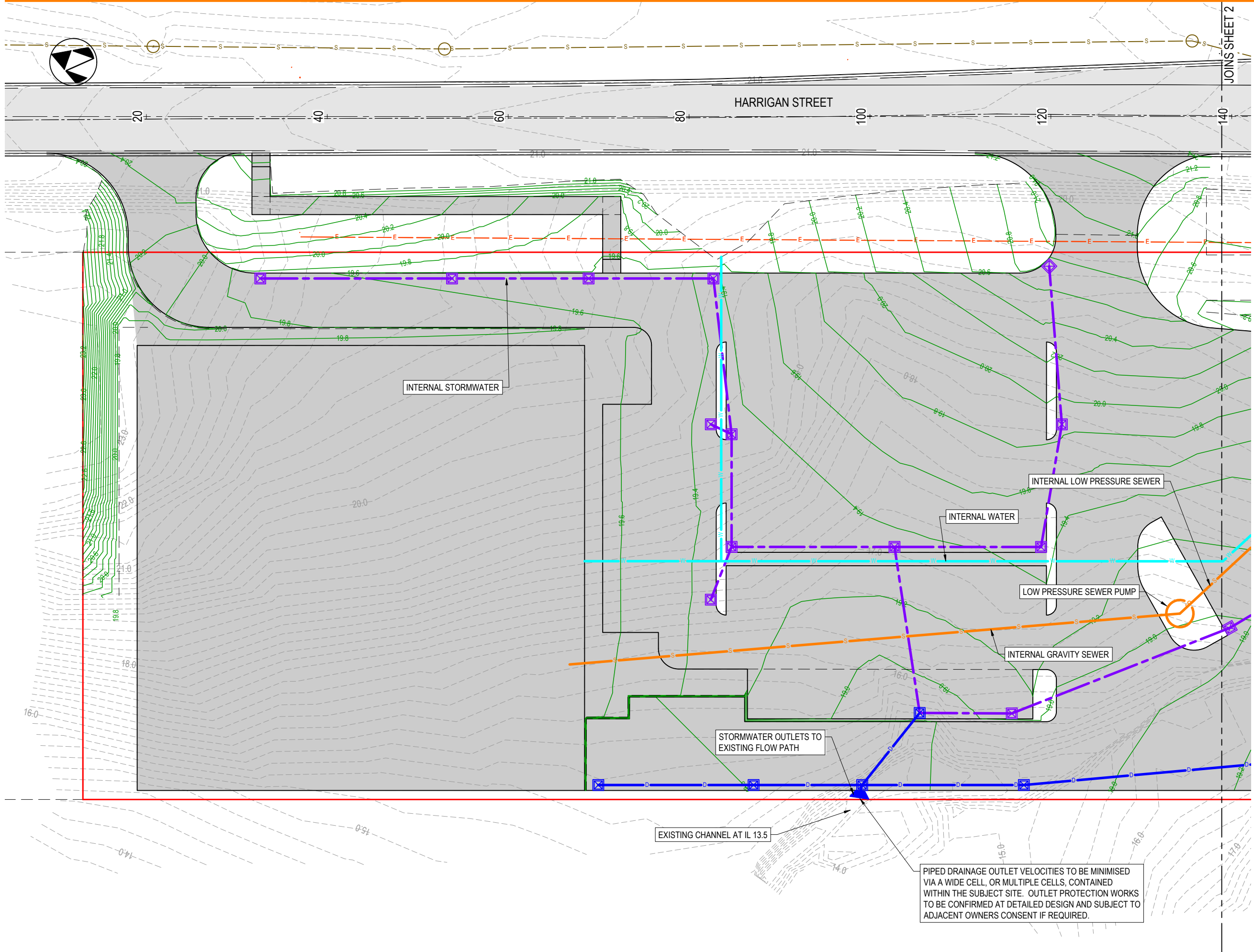
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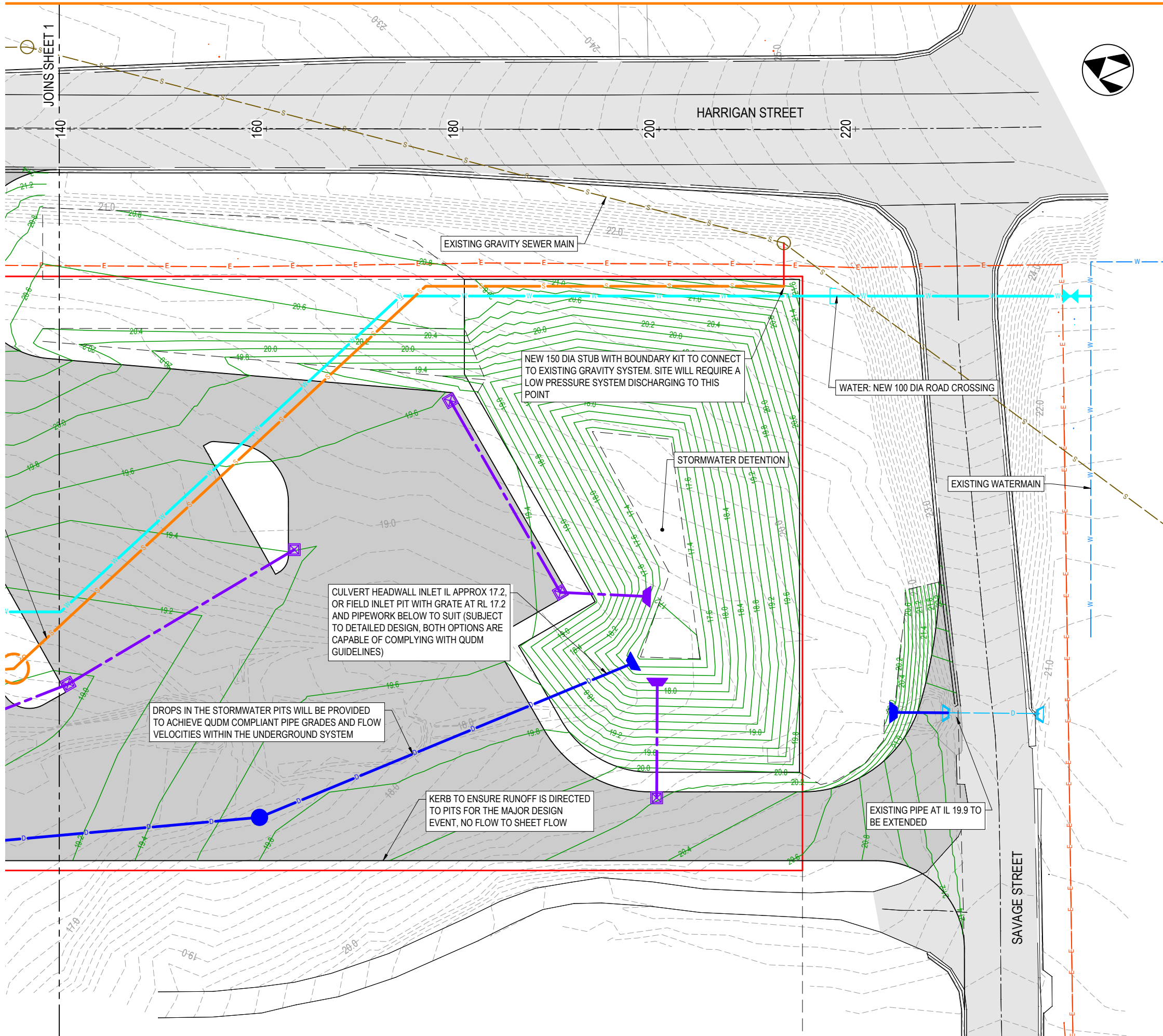
HARRIGAN STREET

- LEGEND**
-  EXISTING SEALED ROADWAY
 -  PROPOSED HARDSTANDS & STRUCTURES
 -  PROPOSED DRAINAGE LINE (MAJOR EVENT CAPTURED)
 -  PROPOSED DRAINAGE LINE (>MINOR EVENT CAPTURED)
 -  PROPOSED SEWER MAIN
 -  PROPOSED WATER MAIN
 -  EXISTING DRAINAGE
 -  EXISTING SEWER
 -  EXISTING WATER



PIPED DRAINAGE OUTLET VELOCITIES TO BE MINIMISED VIA A WIDE CELL, OR MULTIPLE CELLS, CONTAINED WITHIN THE SUBJECT SITE. OUTLET PROTECTION WORKS TO BE CONFIRMED AT DETAILED DESIGN AND SUBJECT TO ADJACENT OWNERS CONSENT IF REQUIRED.





- LEGEND**
- EXISTING SEALED ROADWAY
 - PROPOSED HARDSTANDS & STRUCTURES
 - PROPOSED DRAINAGE LINE (MAJOR EVENT CAPTURED)
 - PROPOSED DRAINAGE LINE (>MINOR EVENT CAPTURED)
 - PROPOSED SEWER MAIN
 - PROPOSED WATER MAIN
 - EXISTING DRAINAGE
 - EXISTING SEWER
 - EXISTING WATER

EXISTING GRAVITY SEWER MAIN

NEW 150 DIA STUB WITH BOUNDARY KIT TO CONNECT TO EXISTING GRAVITY SYSTEM. SITE WILL REQUIRE A LOW PRESSURE SYSTEM DISCHARGING TO THIS POINT

WATER: NEW 100 DIA ROAD CROSSING

STORMWATER DETENTION

EXISTING WATERMAIN

CULVERT HEADWALL INLET IL APPROX 17.2, OR FIELD INLET PIT WITH GRATE AT RL 17.2 AND PIPEWORK BELOW TO SUIT (SUBJECT TO DETAILED DESIGN, BOTH OPTIONS ARE CAPABLE OF COMPLYING WITH QUDM GUIDELINES)

DROPS IN THE STORMWATER PITS WILL BE PROVIDED TO ACHIEVE QUDM COMPLIANT PIPE GRADES AND FLOW VELOCITIES WITHIN THE UNDERGROUND SYSTEM

KERB TO ENSURE RUNOFF IS DIRECTED TO PITS FOR THE MAJOR DESIGN EVENT, NO FLOW TO SHEET FLOW

EXISTING PIPE AT IL 19.9 TO BE EXTENDED

JOINS SHEET 1

HARRIGAN STREET

SAVAGE STREET



81 SAVAGE STREET, COOKTOWN

CONCEPT SERVICES PLAN
SHEET 2 OF 2

A 24.11.23 INITIAL ISSUE

Rev Date Revision Notes

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Traffic Calculations and Intersection Update

24 November 2023

Attention: Alan Irvin
Property Projects Australia Pty Ltd
PO Box 1264
New Farm QLD 4051

Council reference: DA/4677:AD2023/0004947
Our reference: 999-2201

Updated Traffic Calculations and Intersection Assessment - 81 Savage Street, Cooktown

With reference to the Cook Shire Council information request letter dated 19 September 23 we provide responses to items 20 and 21 below;

20. Please revise the Engineering Services report and review the calculations and recommendations as Table 2 of the Engineering Services report incorrectly states the posted speed limit of Harrigan Street is 60km/h.

The below calculations and analysis consider Harrigan Street as 50km/h

21. An analysis of the changed operation and increased traffic at the Hope/Harrigan/Savage Street intersection must be completed to verify safe operation of the intersection following development.

Below is a summary of the updated calculations and analysis of the Hope/Harrigan/Savage Street intersection

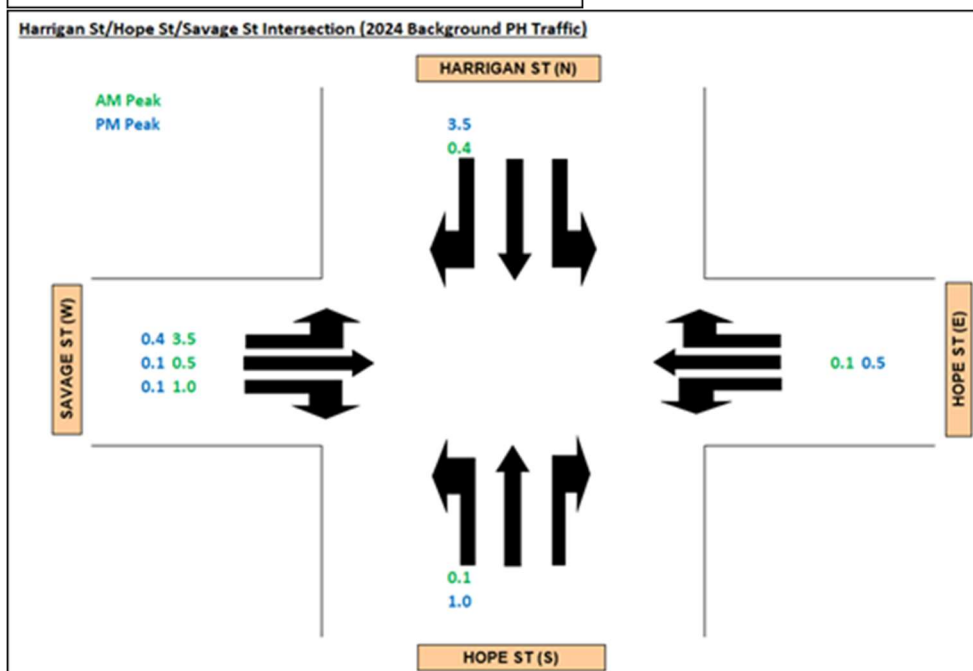
1) Savage St Traffic assessment

- Savage St currently provides access to seven (7) residential properties as shown below:



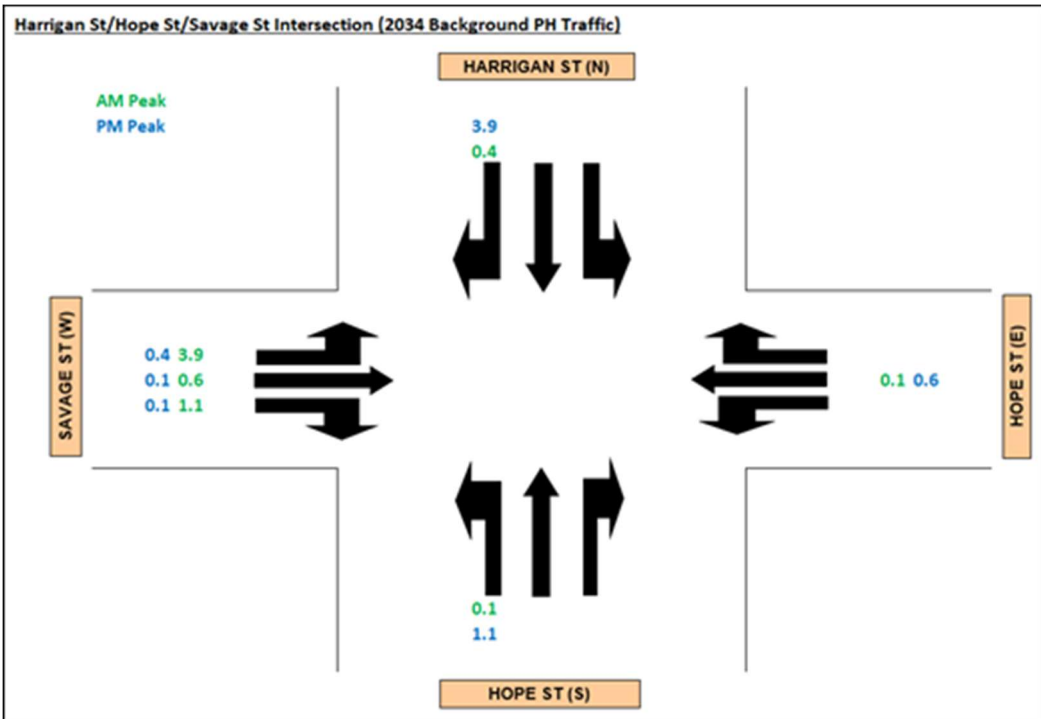
- Using a peak rate of 0.8 per dwelling (referenced from *TMR RPDM 1st Edition, Chapter 3 – Road Planning and Design Fundamentals – Table 3.5*) with 1% annual growth rate, the estimated peak hour traffic generation from Savage St is approximately:
 - Year 2024 - 5.6 veh/hr
 - Year 2034 – 6.2 veh/hr
- The following traffic movement distribution are assumed at the Savage Street (W) approach:
 - Year 2024:

| 2024 AM PEAK | | |
|-------------------------------|-------|-------------------------|
| Entering Traffic | | 10% of PH Traffic |
| Movement | Split | Peak Hour Traffic (vph) |
| LEFT IN from Hope St (S) | 20% | 0.1 |
| RIGHT IN from Harrigan St (N) | 70% | 0.4 |
| THROUGH from Hope St (E) | 10% | 0.1 |
| TOTAL | | 0.6 |
| Exiting Traffic | | 90% of PH Traffic |
| Movement | Split | Peak Hour Traffic (vph) |
| LEFT OUT to Harrigan St (N) | 70% | 3.5 |
| RIGHT OUT to Hope St (S) | 20% | 1.0 |
| THROUGH to Hope St (E) | 10% | 0.5 |
| TOTAL | | 5.0 |
| 2024 PM PEAK | | |
| Entering Traffic | | 90% of PH Traffic |
| Movement | Split | Peak Hour Traffic (vph) |
| LEFT IN from Hope St (S) | 20% | 1.0 |
| RIGHT IN from Harrigan St (N) | 70% | 3.5 |
| THROUGH from Hope St (E) | 10% | 0.5 |
| TOTAL | | 5.0 |
| Exiting Traffic | | 10% of PH Traffic |
| Movement | Split | Peak Hour Traffic (vph) |
| LEFT OUT to Harrigan St (N) | 70% | 0.4 |
| RIGHT OUT to Hope St (S) | 20% | 0.1 |
| THROUGH to Hope St (E) | 10% | 0.1 |
| TOTAL | | 0.6 |



➤ Year 2034:

| 2034 AM PEAK | | |
|-------------------------------|-------|-------------------------|
| Entering Traffic | | 10% of PH Traffic |
| Movement | Split | Peak Hour Traffic (vph) |
| LEFT IN from Hope St (S) | 20% | 0.1 |
| RIGHT IN from Harrigan St (N) | 70% | 0.4 |
| THROUGH from Hope St (E) | 10% | 0.1 |
| TOTAL | | 0.6 |
| Exiting Traffic | | 90% of PH Traffic |
| Movement | Split | Peak Hour Traffic (vph) |
| LEFT OUT to Harrigan St (N) | 70% | 3.9 |
| RIGHT OUT to Hope St (S) | 20% | 1.1 |
| THROUGH to Hope St (E) | 10% | 0.6 |
| TOTAL | | 5.6 |
| 2034 PM PEAK | | |
| Entering Traffic | | 90% of PH Traffic |
| Movement | Split | Peak Hour Traffic (vph) |
| LEFT IN from Hope St (S) | 20% | 1.1 |
| RIGHT IN from Harrigan St (N) | 70% | 3.9 |
| THROUGH from Hope St (E) | 10% | 0.6 |
| TOTAL | | 5.6 |
| Exiting Traffic | | 10% of PH Traffic |
| Movement | Split | Peak Hour Traffic (vph) |
| LEFT OUT to Harrigan St (N) | 70% | 0.4 |
| RIGHT OUT to Hope St (S) | 20% | 0.1 |
| THROUGH to Hope St (E) | 10% | 0.1 |
| TOTAL | | 0.6 |



- The traffic movement distribution has been allocated more traffic on the LEFT-OUT and RIGHT-IN considering the IGA development will attract more traffic on these turning movement.
- It is anticipated there will be minimal traffic travelling THROUGH from Savage St (W) onto Hope Street (E) however has allocated some traffic for sensitivity testing.

2) Hope St Traffic assessment

- The locations of the traffic counts provided by Council of the surrounding road network in vicinity of Hope Street (i.e. Howard, Boundary street and Charlotte Street) are shown below:



- The following assumptions were adopted to project Howard St, Boundary St and Charlotte St traffic to year 2024 (Opening Year) and 2034 (10-Years Design Horizon):
 - 1.0% traffic growth per annum (compound growth pattern); and
 - Average peak rate 9% of AADT/Daily Traffic.
- The projected 2024 and 2034 peak hour traffic for Howard St, Boundary St and Charlotte St is summarised in table below:

| Road | Traffic Data | | Annual Growth (%) | Base Year | Projected Year to Base Year 2024 | 2024 AADT (Opening Year) (veh/day) | 2034 AADT (Design Horizon) (veh/day) | 2024 PH (veh/hr) | 2034 PH (veh/hr) |
|--------------|--------------|----------------|-------------------|-----------|----------------------------------|------------------------------------|--------------------------------------|------------------|------------------|
| | Year | AADT (veh/day) | | | | | | | |
| Charlotte St | 2021 | 3275 | 1% | 2024 | 3 | 3374 | 3727 | 304 | 335 |
| Boundary St | 2008 | 484 | 1% | 2024 | 16 | 568 | 627 | 51 | 56 |
| Howard St | 2022 | 411 | 1% | 2024 | 2 | 419 | 463 | 38 | 42 |

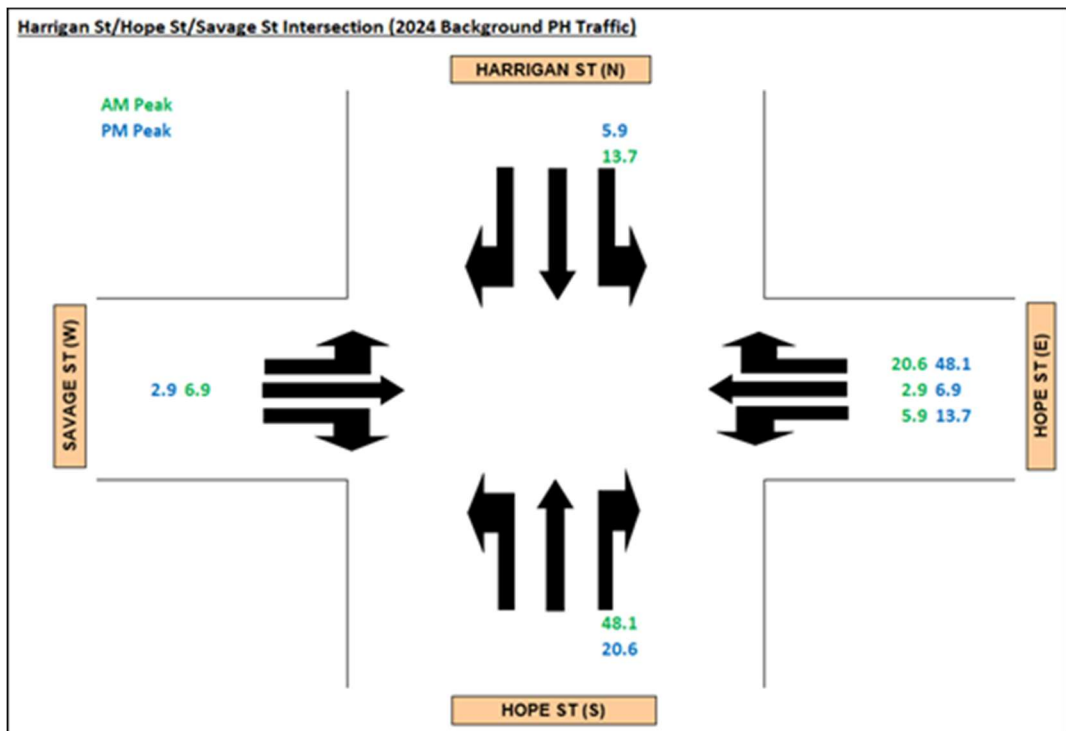
- Assumed 50% of the Howard St, Boundary St and Charlotte St traffic generated to/from Hope Street.
- The estimated Hope St traffic is summarised in below:

| Road | % generated to/from Hope St | Hope St Estimated Traffic | |
|--------------|-----------------------------|---------------------------|------------------|
| | | 2024 PH (veh/hr) | 2034 PH (veh/hr) |
| Charlotte St | 50% | 152 | 168 |
| Boundary St | 50% | 26 | 28 |
| Mulligan Hwy | 50% | 19 | 21 |
| | Overall | 196 | 217 |

- Assumed 50:50 directional split for the Hope St northbound and southbound traffic:
 - Hope St (Northbound):
 - Year 2024 – 98 veh/hr
 - Year 2034 – 108 veh/hr
 - Hope St (southbound):
 - Year 2024 – 98 veh/hr
 - Year 2034 – 108 veh/hr

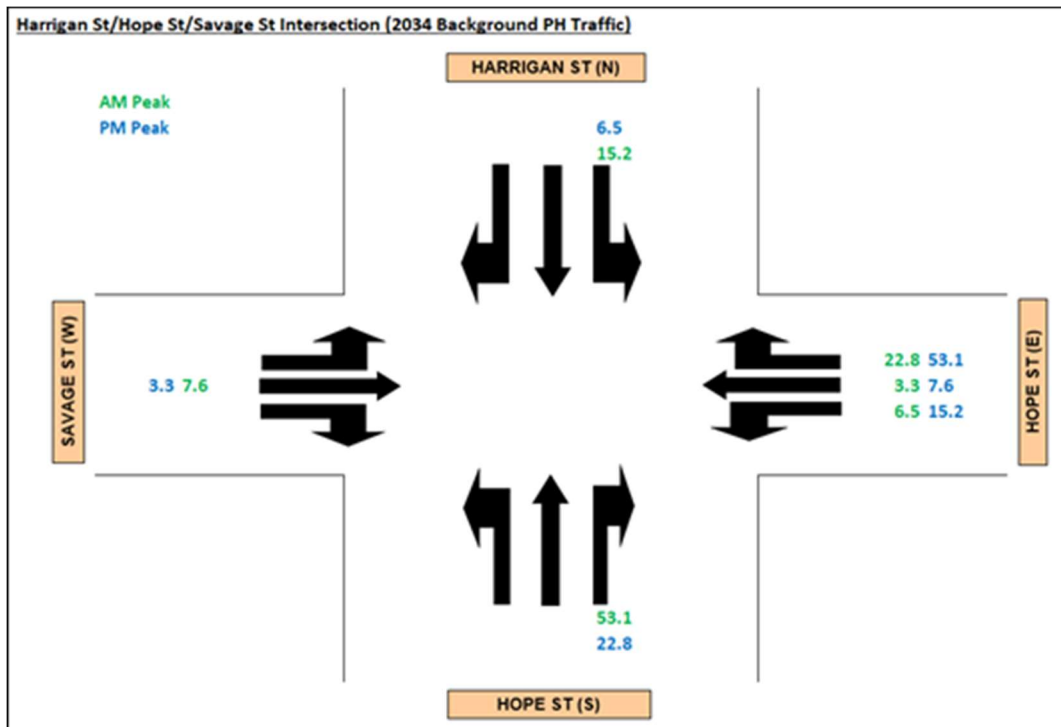
- The following traffic movement distributions are assumed at the Hope Street (E) approach:
 - Year 2024:

| 2024 AM PEAK | | |
|-----------------------------------|-------|-------------------|
| Entering Traffic | 70% | of PH Traffic |
| Movement | Split | Peak Hour Traffic |
| LEFT IN from | 20% | 13.7 |
| RIGHT IN from Hope | 70% | 48.1 |
| THROUGH from | 10% | 6.9 |
| TOTAL | | 68.7 |
| Exiting Traffic 30% of PH Traffic | | |
| Movement | Split | Peak Hour Traffic |
| RIGHT OUT to | 70% | 20.6 |
| LEFT OUT to Hope | 20% | 5.9 |
| THROUGH to | 10% | 2.9 |
| TOTAL | | 29.4 |
| 2024 PM PEAK | | |
| Entering Traffic | 30% | of PH Traffic |
| Movement | Split | Peak Hour Traffic |
| LEFT IN from | 20% | 5.9 |
| RIGHT IN from Hope | 70% | 20.6 |
| THROUGH from | 10% | 2.9 |
| TOTAL | | 29.4 |
| Exiting Traffic 70% of PH Traffic | | |
| Movement | Split | Peak Hour Traffic |
| RIGHT OUT to | 70% | 48.1 |
| LEFT OUT to Hope | 20% | 13.7 |
| THROUGH to | 10% | 6.9 |
| TOTAL | | 68.7 |



➤ Year 2034:

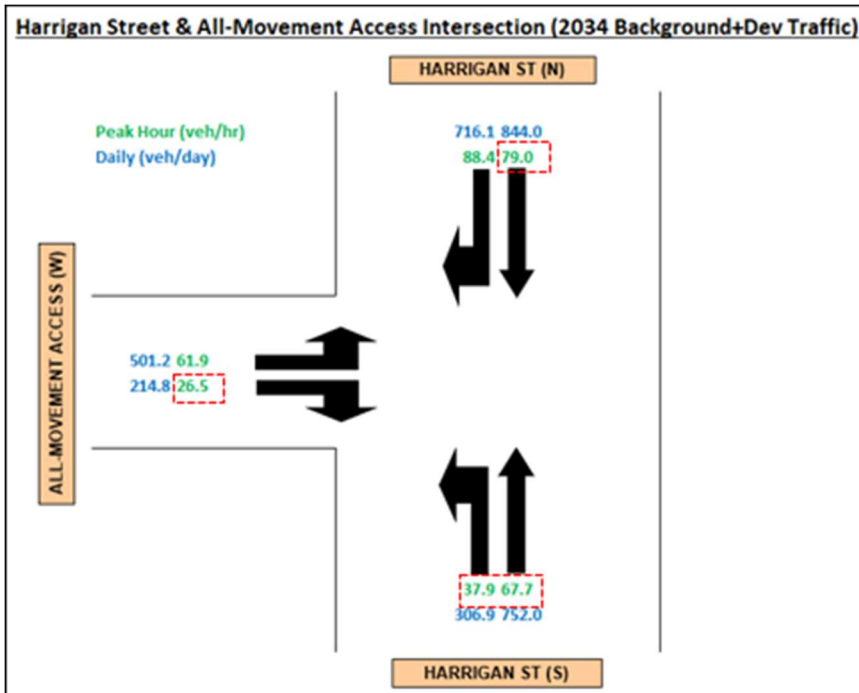
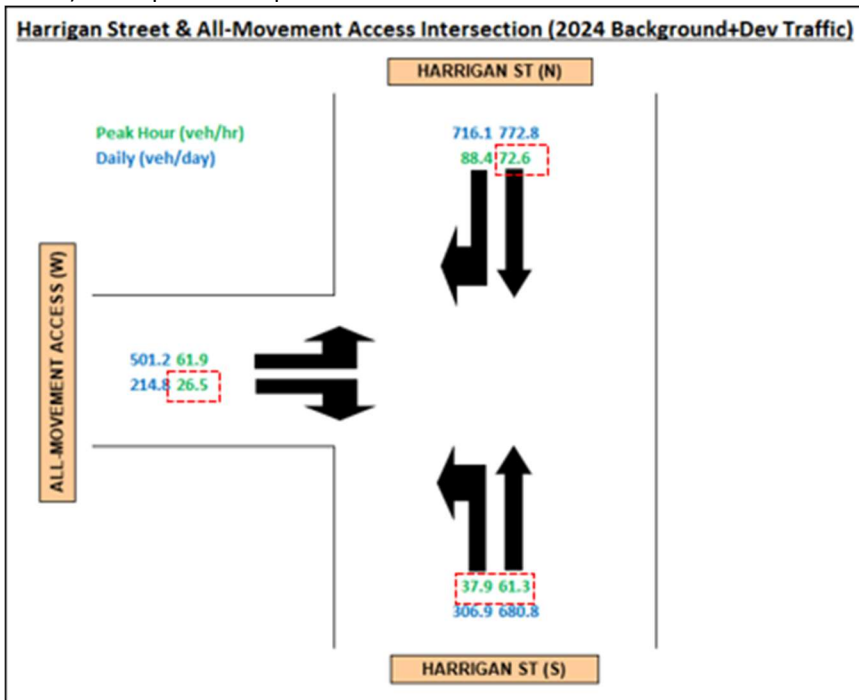
| 2034 AM PEAK | | |
|-----------------------------------|-------|-------------------|
| Entering Traffic | 70% | of PH Traffic |
| Movement | Split | Peak Hour Traffic |
| LEFT IN from | 20% | 15.2 |
| RIGHT IN from Hope | 70% | 53.1 |
| THROUGH from | 10% | 7.6 |
| TOTAL | | 75.9 |
| Exiting Traffic 30% of PH Traffic | | |
| Movement | Split | Peak Hour Traffic |
| RIGHT OUT to | 70% | 22.8 |
| LEFT OUT to Hope St | 20% | 6.5 |
| THROUGH to Savage | 10% | 3.3 |
| TOTAL | | 32.5 |
| 2034 PM PEAK | | |
| Entering Traffic | 30% | of PH Traffic |
| Movement | Split | Peak Hour Traffic |
| LEFT IN from | 20% | 6.5 |
| RIGHT IN from Hope | 70% | 22.8 |
| THROUGH from | 10% | 3.3 |
| TOTAL | | 32.5 |
| Exiting Traffic 70% of PH Traffic | | |
| Movement | Split | Peak Hour Traffic |
| RIGHT OUT to | 70% | 53.1 |
| LEFT OUT to Hope St | 20% | 15.2 |
| THROUGH to Savage | 10% | 7.6 |
| TOTAL | | 75.9 |



- The traffic movement distribution has been allocated with more traffic on the RIGHT-OUT from Hope St (E) considering the IGA development would attract more traffic.
- The traffic movement distribution has been allocated more traffic on the RIGHT-IN from Hope St (S) to assess the impact of the right turn waiting traffic to the following through traffic.
- It is anticipated there would be minimal traffic travelling THROUGH from Hope St (E) onto Savage Street (W) however has allocated some traffic for sensitivity testing.

3) Harrigan St & Hope St Through Traffic Assessment

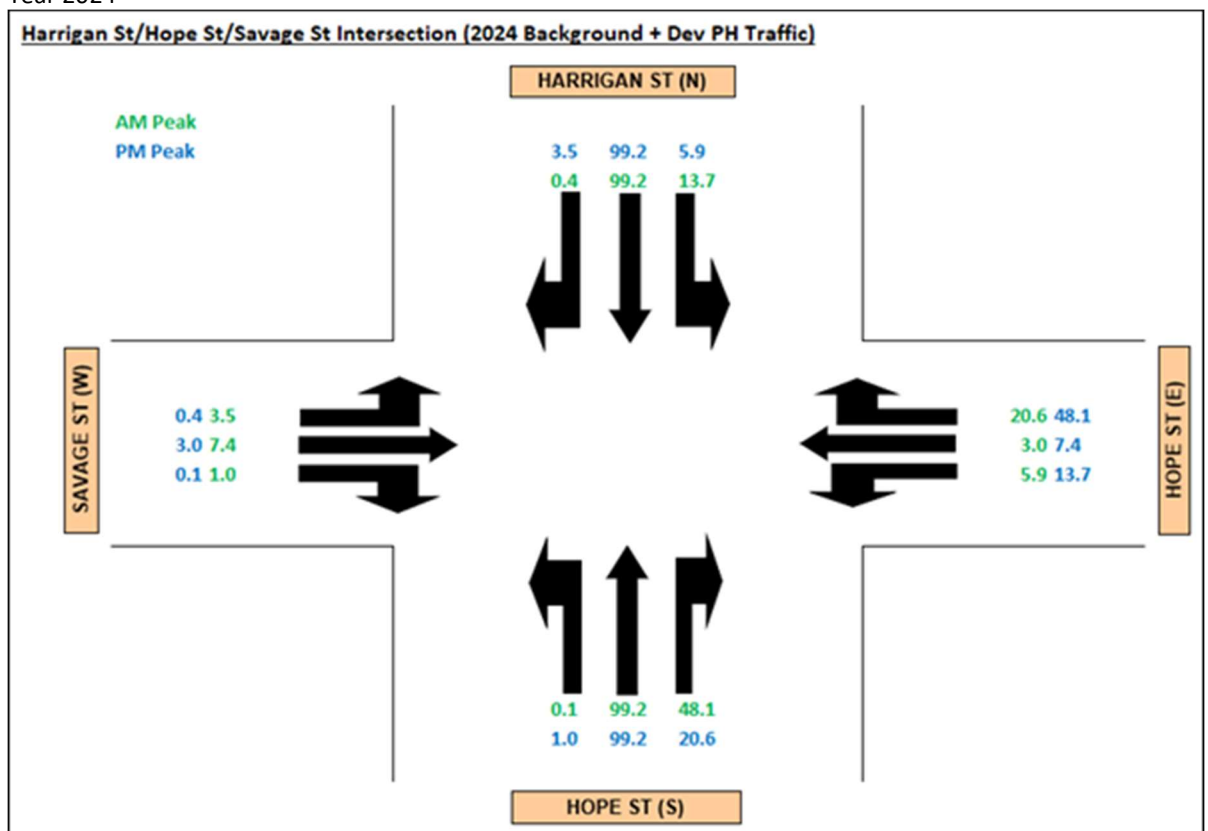
- The Harrigan St and Hope St peak hour through traffic was extracted from the traffic figures (shown below) in the previous report:



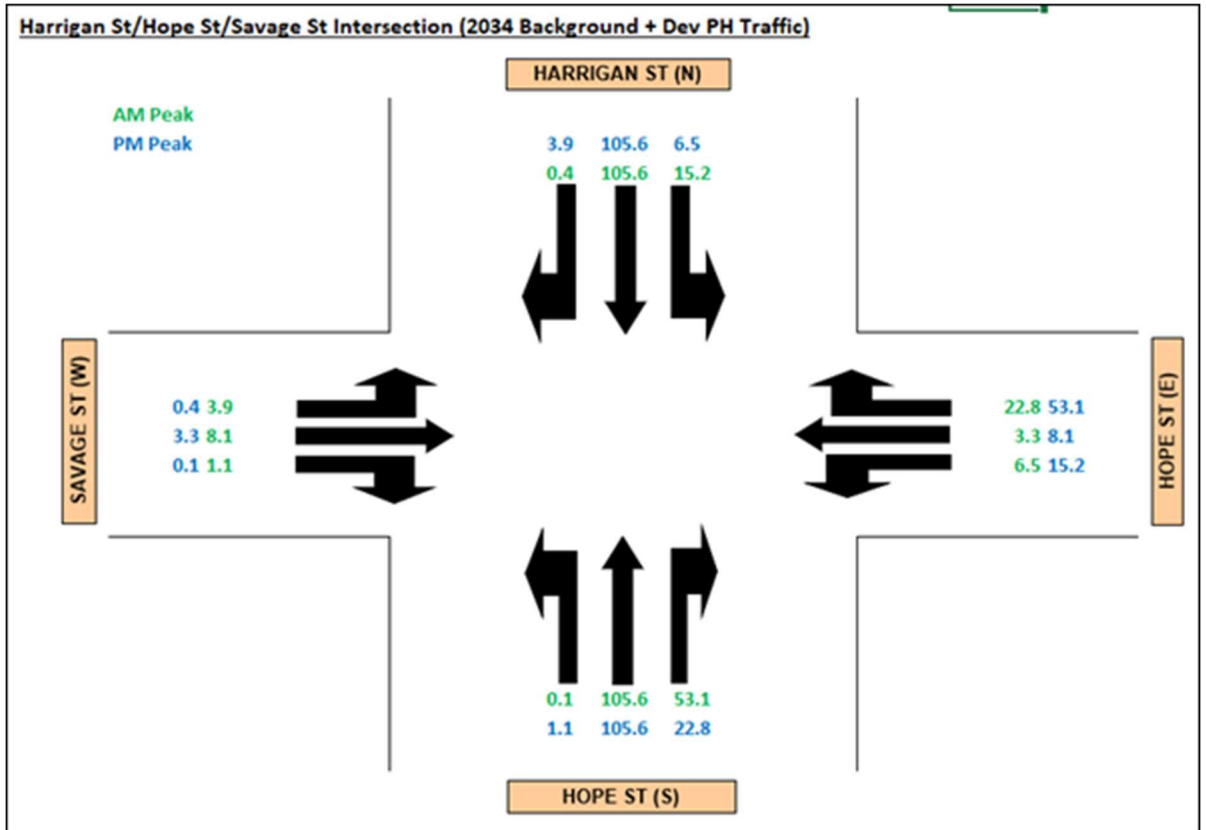
- Harrigan St (N) southbound through traffic:
 - Year 2024 – 99.2 veh/hr (i.e. 26.5 + 72.6)
 - Year 2034 – 105.6 veh/hr (i.e. 26.5 + 79)
- Hope St (S) southbound through traffic:
 - Year 2024 – 99.2 veh/hr (i.e. 37.9 + 61.3)
 - Year 2034 – 105.6 veh/hr (i.e. 37.9 + 67.7)
- Assumed same AM & PM peak hour traffic.

4) **Overall Harrigan St/Hope St/Savage St Intersection Traffic Generation and Distribution (Background + Development)**

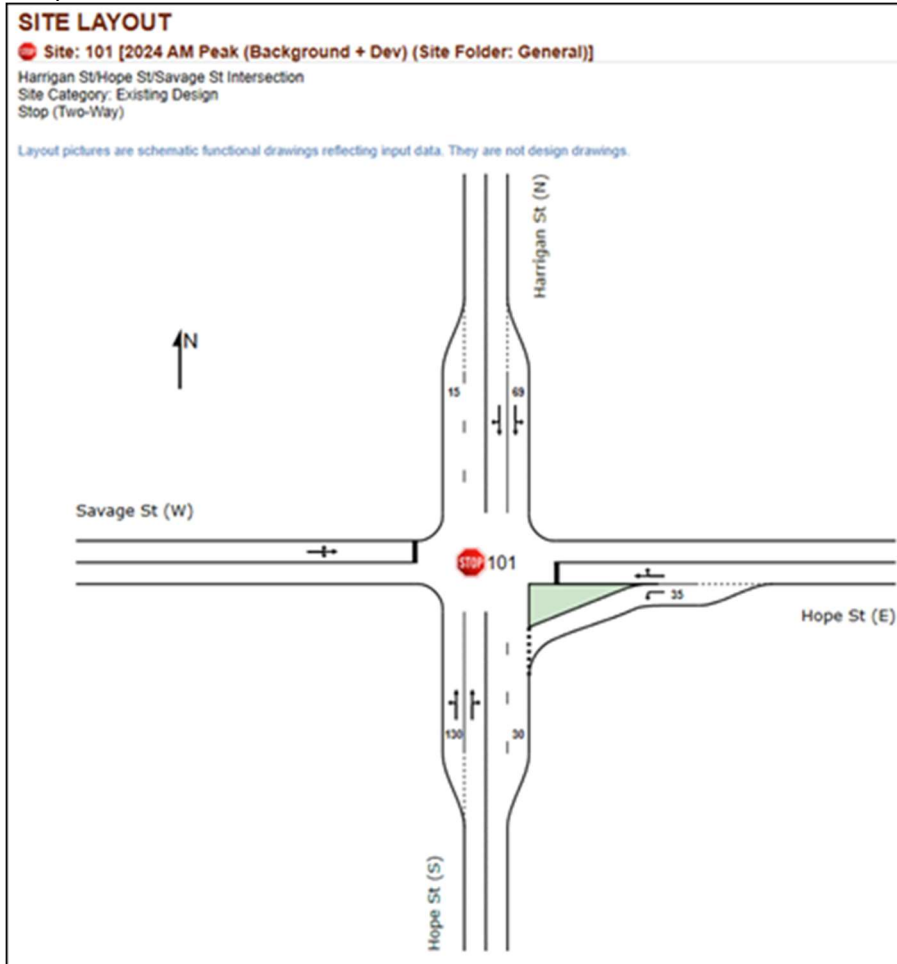
- Year 2024



- Year 2034



SIDRA Layout



1) 2024 AM Peak

MOVEMENT SUMMARY
 Site: 101 [2024 AM Peak (Background + Dev) (Site Folder: General)]
 Output produced by SIDRA INTERSECTION Version: 9.1.2.202
 Harrigan St/Hope St/Savage St Intersection
 Site Category: Existing Design
 Stop (Two-Way)

| Vehicle Movement Performance | | | | | | | | | | | | | | | |
|-------------------------------|------|-----------|--------------|------|---------------|------|-----------|-------------|------------------|-------------------|--------|-----------|----------------|---------------------|-------------|
| Mov ID | Turn | Mov Class | Demand Flows | | Arrival Flows | | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue | | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
| | | | [Total | HV] | [Total | HV] | | | | [Veh. | Dist] | | | | |
| | | | veh/h | % | veh/h | % | v/c | sec | | veh | m | | | | km/h |
| South: Hope St (S) | | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.017 | 4.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.02 | 0.00 | 47.9 |
| 2 | T1 | All MCs | 104 | 10.0 | 104 | 10.0 | 0.083 | 0.0 | LOS A | 0.3 | 2.5 | 0.14 | 0.20 | 0.14 | 46.6 |
| 3 | R2 | All MCs | 51 | 10.0 | 51 | 10.0 | 0.083 | 5.7 | LOS A | 0.3 | 2.5 | 0.20 | 0.27 | 0.20 | 42.9 |
| Approach | | | 156 | 10.0 | 156 | 10.0 | 0.083 | 1.9 | NA | 0.3 | 2.5 | 0.16 | 0.22 | 0.16 | 45.2 |
| East: Hope St (E) | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 6 | 10.0 | 6 | 10.0 | 0.005 | 4.6 | LOS A | 0.0 | 0.1 | 0.04 | 0.47 | 0.04 | 42.0 |
| 5 | T1 | All MCs | 3 | 10.0 | 3 | 10.0 | 0.046 | 10.8 | LOS B | 0.2 | 1.3 | 0.46 | 0.89 | 0.46 | 38.6 |
| 6 | R2 | All MCs | 22 | 10.0 | 22 | 10.0 | 0.046 | 11.2 | LOS B | 0.2 | 1.3 | 0.46 | 0.89 | 0.46 | 29.3 |
| Approach | | | 31 | 10.0 | 31 | 10.0 | 0.046 | 9.8 | LOS A | 0.2 | 1.3 | 0.38 | 0.81 | 0.38 | 33.8 |
| North: Harrigan St (N) | | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 14 | 10.0 | 14 | 10.0 | 0.013 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.34 | 0.00 | 37.5 |
| 8 | T1 | All MCs | 104 | 10.0 | 104 | 10.0 | 0.053 | 0.0 | LOS A | 0.0 | 0.1 | 0.01 | 0.03 | 0.01 | 49.4 |
| 9 | R2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.053 | 4.7 | LOS A | 0.0 | 0.1 | 0.01 | 0.01 | 0.01 | 46.9 |
| Approach | | | 120 | 10.0 | 120 | 10.0 | 0.053 | 0.6 | NA | 0.0 | 0.1 | 0.01 | 0.07 | 0.01 | 45.2 |
| West: Savage St (W) | | | | | | | | | | | | | | | |
| 10 | L2 | All MCs | 4 | 10.0 | 4 | 10.0 | 0.018 | 8.1 | LOS A | 0.1 | 0.5 | 0.26 | 0.85 | 0.26 | 33.3 |
| 11 | T1 | All MCs | 8 | 10.0 | 8 | 10.0 | 0.018 | 10.8 | LOS B | 0.1 | 0.5 | 0.26 | 0.85 | 0.26 | 38.8 |
| 12 | R2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.018 | 10.8 | LOS B | 0.1 | 0.5 | 0.26 | 0.85 | 0.26 | 40.9 |
| Approach | | | 13 | 10.0 | 13 | 10.0 | 0.018 | 10.0 | LOS B | 0.1 | 0.5 | 0.26 | 0.85 | 0.26 | 37.4 |
| All Vehicles | | | 320 | 10.0 | 320 | 10.0 | 0.083 | 2.5 | NA | 0.3 | 2.5 | 0.13 | 0.24 | 0.13 | 44.5 |

24 November 2023

Updated Traffic Calculations and Intersection Assessment- 81 Savage Street, Cooktown

2) 2024 PM Peak

MOVEMENT SUMMARY
 Site: 101 [2024 PM Peak (Background + Dev) (Site Folder: General)]
 Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Harrigan St/Hope St/Savage St Intersection
 Site Category: Existing Design
 Stop (Two-Way)

| Vehicle Movement Performance | | | | | | | | | | | | | | | |
|-------------------------------|------|-----------|-------------------------|------|--------------------------|------|-----------|-------------|------------------|---------------------------------|-----|-----------|----------------|---------------------|-------------|
| Mov ID | Turn | Mov Class | Demand Flows [Total HV] | | Arrival Flows [Total HV] | | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue [Veh. Dist] | | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
| | | | veh/h | % | veh/h | % | | | | veh | m | | | | |
| South: Hope St (S) | | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.013 | 4.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.02 | 0.00 | 47.8 |
| 2 | T1 | All MCs | 104 | 10.0 | 104 | 10.0 | 0.063 | 0.1 | LOS A | 0.2 | 1.2 | 0.09 | 0.12 | 0.09 | 47.9 |
| 3 | R2 | All MCs | 22 | 10.0 | 22 | 10.0 | 0.063 | 5.8 | LOS A | 0.2 | 1.2 | 0.12 | 0.15 | 0.12 | 44.4 |
| Approach | | | 127 | 10.0 | 127 | 10.0 | 0.063 | 1.1 | NA | 0.2 | 1.2 | 0.10 | 0.13 | 0.10 | 47.1 |
| East: Hope St (E) | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 14 | 10.0 | 14 | 10.0 | 0.012 | 4.6 | LOS A | 0.0 | 0.3 | 0.07 | 0.47 | 0.07 | 41.9 |
| 5 | T1 | All MCs | 8 | 10.0 | 8 | 10.0 | 0.100 | 10.6 | LOS B | 0.4 | 3.0 | 0.44 | 0.91 | 0.44 | 38.9 |
| 6 | R2 | All MCs | 51 | 10.0 | 51 | 10.0 | 0.100 | 10.8 | LOS B | 0.4 | 3.0 | 0.44 | 0.91 | 0.44 | 29.6 |
| Approach | | | 73 | 10.0 | 73 | 10.0 | 0.100 | 9.5 | LOS A | 0.4 | 3.0 | 0.37 | 0.82 | 0.37 | 34.1 |
| North: Harrigan St (N) | | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 6 | 10.0 | 6 | 10.0 | 0.012 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.15 | 0.00 | 40.4 |
| 8 | T1 | All MCs | 104 | 10.0 | 104 | 10.0 | 0.051 | 0.0 | LOS A | 0.0 | 0.2 | 0.02 | 0.05 | 0.02 | 49.2 |
| 9 | R2 | All MCs | 4 | 10.0 | 4 | 10.0 | 0.051 | 5.1 | LOS A | 0.0 | 0.2 | 0.02 | 0.03 | 0.02 | 46.7 |
| Approach | | | 114 | 10.0 | 114 | 10.0 | 0.051 | 0.4 | NA | 0.0 | 0.2 | 0.02 | 0.05 | 0.02 | 48.7 |
| West: Savage St (W) | | | | | | | | | | | | | | | |
| 10 | L2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.008 | 8.2 | LOS A | 0.0 | 0.2 | 0.26 | 0.85 | 0.26 | 33.4 |
| 11 | T1 | All MCs | 3 | 10.0 | 3 | 10.0 | 0.008 | 10.3 | LOS B | 0.0 | 0.2 | 0.26 | 0.85 | 0.26 | 38.9 |
| 12 | R2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.008 | 10.4 | LOS B | 0.0 | 0.2 | 0.26 | 0.85 | 0.26 | 41.0 |
| Approach | | | 5 | 10.0 | 5 | 10.0 | 0.008 | 9.9 | LOS A | 0.0 | 0.2 | 0.26 | 0.85 | 0.26 | 38.3 |
| All Vehicles | | | 320 | 10.0 | 320 | 10.0 | 0.100 | 2.9 | NA | 0.4 | 3.0 | 0.13 | 0.27 | 0.13 | 44.1 |

3) 2034 AM Peak

MOVEMENT SUMMARY
 Site: 101 [2034 AM Peak (Background + Dev) (Site Folder: General)]
 Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Harrigan St/Hope St/Savage St Intersection
 Site Category: Existing Design
 Stop (Two-Way)

| Vehicle Movement Performance | | | | | | | | | | | | | | | |
|-------------------------------|------|-----------|-------------------------|------|--------------------------|------|-----------|-------------|------------------|---------------------------------|-----|-----------|----------------|---------------------|-------------|
| Mov ID | Turn | Mov Class | Demand Flows [Total HV] | | Arrival Flows [Total HV] | | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue [Veh. Dist] | | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
| | | | veh/h | % | veh/h | % | | | | veh | m | | | | |
| South: Hope St (S) | | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.018 | 4.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.02 | 0.00 | 47.9 |
| 2 | T1 | All MCs | 111 | 10.0 | 111 | 10.0 | 0.090 | 0.1 | LOS A | 0.4 | 2.8 | 0.15 | 0.20 | 0.15 | 46.5 |
| 3 | R2 | All MCs | 56 | 10.0 | 56 | 10.0 | 0.090 | 5.8 | LOS A | 0.4 | 2.8 | 0.21 | 0.28 | 0.21 | 42.8 |
| Approach | | | 168 | 10.0 | 168 | 10.0 | 0.090 | 2.0 | NA | 0.4 | 2.8 | 0.17 | 0.23 | 0.17 | 45.1 |
| East: Hope St (E) | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 7 | 10.0 | 7 | 10.0 | 0.005 | 4.6 | LOS A | 0.0 | 0.1 | 0.04 | 0.47 | 0.04 | 42.0 |
| 5 | T1 | All MCs | 3 | 10.0 | 3 | 10.0 | 0.053 | 11.1 | LOS B | 0.2 | 1.5 | 0.48 | 0.90 | 0.48 | 38.4 |
| 6 | R2 | All MCs | 24 | 10.0 | 24 | 10.0 | 0.053 | 11.5 | LOS B | 0.2 | 1.5 | 0.48 | 0.90 | 0.48 | 29.0 |
| Approach | | | 34 | 10.0 | 34 | 10.0 | 0.053 | 10.1 | LOS B | 0.2 | 1.5 | 0.39 | 0.82 | 0.39 | 33.5 |
| North: Harrigan St (N) | | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 16 | 10.0 | 16 | 10.0 | 0.014 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.35 | 0.00 | 37.3 |
| 8 | T1 | All MCs | 111 | 10.0 | 111 | 10.0 | 0.057 | 0.0 | LOS A | 0.0 | 0.1 | 0.01 | 0.03 | 0.01 | 49.5 |
| 9 | R2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.057 | 4.7 | LOS A | 0.0 | 0.1 | 0.01 | 0.01 | 0.01 | 46.9 |
| Approach | | | 128 | 10.0 | 128 | 10.0 | 0.057 | 0.6 | NA | 0.0 | 0.1 | 0.01 | 0.07 | 0.01 | 48.1 |
| West: Savage St (W) | | | | | | | | | | | | | | | |
| 10 | L2 | All MCs | 4 | 10.0 | 4 | 10.0 | 0.020 | 8.2 | LOS A | 0.1 | 0.6 | 0.28 | 0.85 | 0.28 | 33.2 |
| 11 | T1 | All MCs | 9 | 10.0 | 9 | 10.0 | 0.020 | 11.1 | LOS B | 0.1 | 0.6 | 0.28 | 0.85 | 0.28 | 38.6 |
| 12 | R2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.020 | 11.1 | LOS B | 0.1 | 0.6 | 0.28 | 0.85 | 0.28 | 40.8 |
| Approach | | | 14 | 10.0 | 14 | 10.0 | 0.020 | 10.2 | LOS B | 0.1 | 0.6 | 0.28 | 0.85 | 0.28 | 37.3 |
| All Vehicles | | | 344 | 10.0 | 344 | 10.0 | 0.090 | 2.6 | NA | 0.4 | 2.8 | 0.14 | 0.25 | 0.14 | 44.3 |

24 November 2023

Updated Traffic Calculations and Intersection Assessment- 81 Savage Street, Cooktown

4) 2034 PM Peak

MOVEMENT SUMMARY
 Site: 101 [2034 PM Peak (Background + Dev) (Site Folder: General)]
 Output produced by SIDRA INTERSECTION Version: 9.1.2.202
 Harrigan St/Hope St/Savage St Intersection
 Site Category: Existing Design
 Stop (Two-Way)

| Mov ID | Turn | Mov Class | Demand Flows [Total HV] | | Arrival Flows [Total HV] | | Dep. Satn v/c | Aver. Delay sec | Level of Service | 95% Back Of Queue [Veh. Dist] | | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed km/h |
|-------------------------------|------|-----------|-------------------------|------|--------------------------|------|---------------|-----------------|------------------|---------------------------------|-----|-----------|----------------|---------------------|------------------|
| | | | veh/h | % | veh/h | % | | | | veh | m | | | | |
| South: Hope St (S) | | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.014 | 4.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 0.00 | 47.8 |
| 2 | T1 | All MCs | 111 | 10.0 | 111 | 10.0 | 0.068 | 0.1 | LOS A | 0.2 | 1.4 | 0.10 | 0.13 | 0.10 | 47.8 |
| 3 | R2 | All MCs | 24 | 10.0 | 24 | 10.0 | 0.068 | 5.8 | LOS A | 0.2 | 1.4 | 0.12 | 0.16 | 0.12 | 44.3 |
| Approach | | | 136 | 10.0 | 136 | 10.0 | 0.068 | 1.1 | NA | 0.2 | 1.4 | 0.10 | 0.13 | 0.10 | 47.0 |
| East: Hope St (E) | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 16 | 10.0 | 16 | 10.0 | 0.013 | 4.7 | LOS A | 0.0 | 0.3 | 0.07 | 0.47 | 0.07 | 41.8 |
| 5 | T1 | All MCs | 9 | 10.0 | 9 | 10.0 | 0.114 | 10.8 | LOS B | 0.4 | 3.4 | 0.46 | 0.92 | 0.46 | 38.7 |
| 6 | R2 | All MCs | 56 | 10.0 | 56 | 10.0 | 0.114 | 11.1 | LOS B | 0.4 | 3.4 | 0.46 | 0.92 | 0.46 | 29.4 |
| Approach | | | 80 | 10.0 | 80 | 10.0 | 0.114 | 9.8 | LOS A | 0.4 | 3.4 | 0.38 | 0.83 | 0.38 | 33.9 |
| North: Harrigan St (N) | | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 7 | 10.0 | 7 | 10.0 | 0.013 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 0.00 | 40.3 |
| 8 | T1 | All MCs | 111 | 10.0 | 111 | 10.0 | 0.054 | 0.0 | LOS A | 0.0 | 0.2 | 0.02 | 0.05 | 0.02 | 49.2 |
| 9 | R2 | All MCs | 4 | 10.0 | 4 | 10.0 | 0.054 | 5.3 | LOS A | 0.0 | 0.2 | 0.03 | 0.03 | 0.03 | 46.6 |
| Approach | | | 122 | 10.0 | 122 | 10.0 | 0.054 | 0.4 | NA | 0.0 | 0.2 | 0.02 | 0.05 | 0.02 | 48.7 |
| West: Savage St (W) | | | | | | | | | | | | | | | |
| 10 | L2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.008 | 8.2 | LOS A | 0.0 | 0.2 | 0.28 | 0.84 | 0.28 | 33.3 |
| 11 | T1 | All MCs | 3 | 10.0 | 3 | 10.0 | 0.008 | 10.5 | LOS B | 0.0 | 0.2 | 0.28 | 0.84 | 0.28 | 38.7 |
| 12 | R2 | All MCs | 1 | 10.0 | 1 | 10.0 | 0.008 | 10.7 | LOS B | 0.0 | 0.2 | 0.28 | 0.84 | 0.28 | 40.9 |
| Approach | | | 6 | 10.0 | 6 | 10.0 | 0.008 | 10.1 | LOS B | 0.0 | 0.2 | 0.28 | 0.84 | 0.28 | 38.2 |
| All Vehicles | | | 344 | 10.0 | 344 | 10.0 | 0.114 | 3.0 | NA | 0.4 | 3.4 | 0.14 | 0.28 | 0.14 | 43.9 |

In summary the SIDRA analysis indicates that:

- All turning movements at each approach operate at LOS A/B throughout the 10 year design horizon;
- The delay and queue length at all approaches is minimal (i.e. maximum of 11.5 sec delay and maximum queue length < 1 car length); and
- The maximum DOS is approximately 0.12 (i.e. 2034 PM Peak) with 88% surplus capacity.

Should you require any additional information, please do not hesitate to me on 0402 568 698 or the email address below.

Yours sincerely

Craig Caplick

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