Prepared for
Powerlink Queensland
ABN: 82 078 849 233

AECOM

# Appendix C

## Hydrology Technical Report

Oct-2021

Genex Kidston Connection Project - Ministerial Infrastructure Designation Assessment Report

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Powerlink Queensland
ABN: 82 078 849 233

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# Flood Hydrology and Hydraulics Technical Appendix

04-Oct-2021
Kidston Connection Project

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# Flood Hydrology and Hydraulics Technical Appendix

Client: Powerlink Queensland

ABN: 82 078 849 233

Prepared by

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04-Oct-2021

Job No.: 60577456

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# Table of Contents

# 1.0 Introduction

This technical appendix provides a summary of the potential flooding along the Proposed Feeder to inform the surface water assessment associated with the proposed Infrastructure Designation. The document also provides flood extents for the Mount Fox switching station.  Flood extents at the Mount Fox switching station is determined for the 0.5% Annual Exceedance Probability (AEP) flood event. At all other locations the 1% AEP flood extents are provided. Flood extents are provided for third-order streams or higher. Where possible this study leverages previous studies undertaken along the Proposed Feeder to estimate the 1% AEP flood.

# 2.0 Previous Studies

There is one relevant previous flood and drainage investigations to localities along the Proposed Feeder are as follows, being the *Queensland Flood Mapping Program: Flood Investigation Burdekin Basin 2015*.  The Queensland Flood Mapping Program was developed as part of the Queensland State Government's response to the Queensland Floods Commission of Enquiry. As part of these works, basin flood mapping of numerous river basins was conducted at a high level throughout Queensland (KBR, 2015). A high-level TUFLOW GPU model was developed for the 1% AEP and the Probable Maximum Flood (PMF) of the entire Burdekin Basin (KBR, 2015). The results of the Burdekin Basin flood modelling are leveraged throughout this study to discuss flood impacts and extents for the Project.

# 3.0 Available Data

## 3.1 Terrain

The following Digital Elevation Model (DEM) data for the assessment was sourced from Elevation Foundation Spatial Data (ELVIS):

- Shuttle Radar Topography Mission (SRTM) ~1 second arc with a resolution of 30m
- 1m LiDAR DEM of the Kidston Mine.

The above datasets were combined into a single elevation layer for all catchments within the study. The elevation data is used to determine catchment areas for all third order (or higher) streams along the Proposed Feeder.

## 3.2 Transmission Line

Shapefiles of the Proposed Feeder, transmission line structures, the location of the Mount Fox switching station was provided by Powerlink for this study.

## 3.3 Hydraulic and Hydrology Data

The Department of Natural Resource management (DNRM) Floodcheck mapping service was used to identify any existing and available data related to flooding in along the Proposed Feeder.

A GIS dataset identifying the stream order data for the watercourses in the study area was available from the Queensland Spatial Catalogue (QSpatial). This dataset was based on Geoscience Australia's 1:100,0000 drainage network of Queensland where streams are connected and directionalised according to the Strahler method (DNMRE, 2010). Stream order was only available for streams in the Burdekin Basin. Stream order in the Gilbert Basin was assessed as part of this study for areas where the Proposed Feeder crosses in the Gilbert Basin.

For the Gilbert Basin, stream gauge data in the study area was sourced from the Queensland Water Monitoring Portal for the purpose of estimating flood flows for higher order streams at the Proposed Feeder. Details of the gauges are provided in **Section 5.1.1.2**. A Flood Frequency Analysis (FFA) of the gauge data was used to derive the 1% AEP Peak flow for the gauged catchments. The Regional Flood

Frequency Estimation (RFFE) online utility was used for flow estimation within the ungauged catchments.

For the Burdekin Basin, 1% AEP flood extents taken from those created as part of the Queensland flood mapping program: Flood Investigation Burdekin Basin 2015 (KBR, 2015). Flood depth data was available from QSpatial as a raster dataset.

# 4.0 Mount Fox Switching Station

The Mount Fox switching station is located away from any major waterways and therefore the risks of flooding are minimal. The switching station is situated close to the catchment divide of a tributary of Michael Creek and a tributary of Douglas Creek within the Burdekin Basin. The previous flood modelling results of the 1% AEP and probable maximum flood (PMF) for the entire basin (KBR, 2015) were compared with ground levels and the switching station location. The Mount Fox switching station lies outside the flood extents provided for the PMF in Figure 1 and is estimated to be well above the flood level as illustrated in Figure 2. Therefore, the flood risk to the switching station is likely minimal.

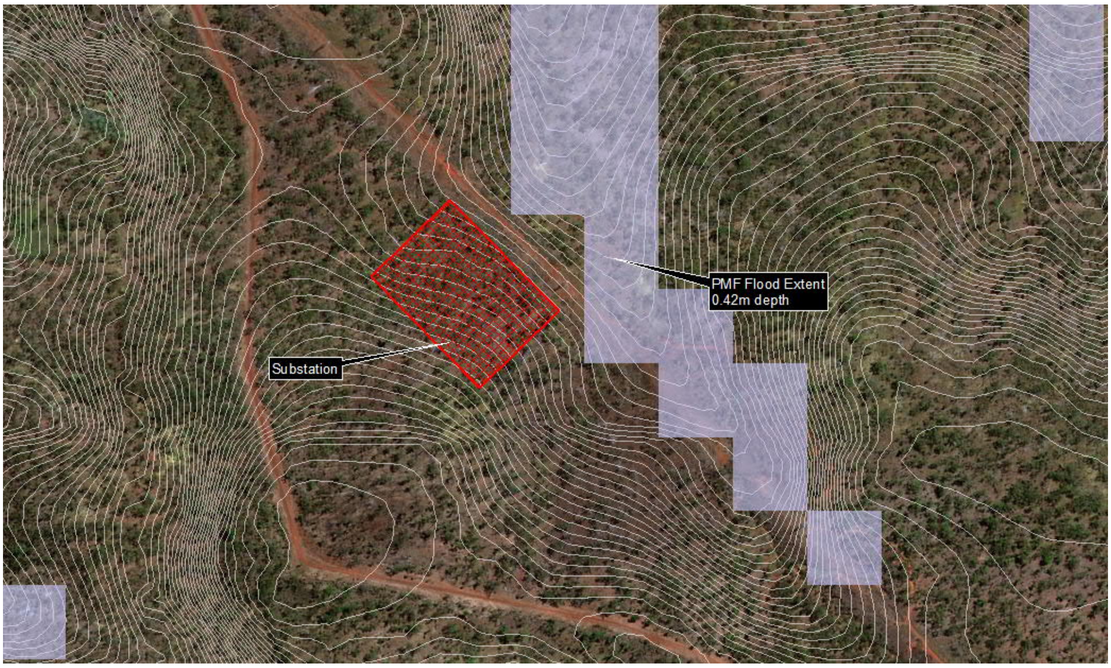


**Figure 1 Mount Fox switching station showing the flood extents for the PMF flood event**

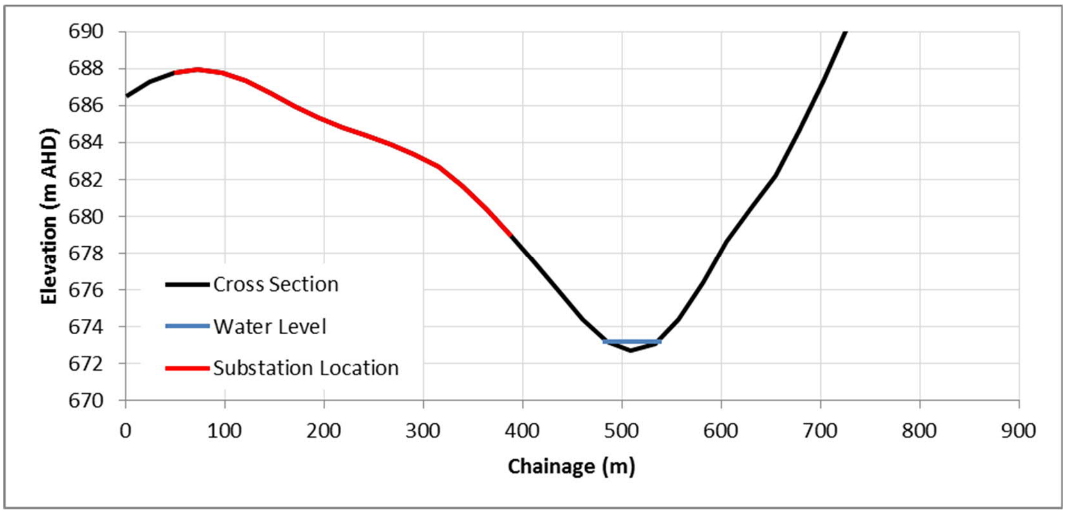


**Figure 2 Cross section through the Mount Fox switching station showing approximate flood elevations for the PMF flood event**

# 5.0 Transmission Line

The flood extents of the major watercourse crossings[1] were assessed at a high level to provide guidance of potential project impacts and inform infrastructure positioning.

## 5.1 Gilbert Basin

All flood estimates for the Gilbert Basin (except for the Copperfield River) have been derived using SRTM 30m grid data. This data has a low vertical accuracy (±10m). The flood levels quoted in this section are indicative only and should only be considered in relation to the SRTM derived ground levels.

### 5.1.1 Copperfield River

#### 5.1.1.1 Hydrology

The 1% AEP peak flow at the Proposed Feeder crossing was estimated by scaling the 1% AEP peak flow predicted by the FFA of the available gauge data upstream of the Proposed Feeder. This method was used rather than the RFFE as the RFFE is less accurate for catchments greater than 1000 $km^2$. The main hydraulic control for the Copperfield River upstream of the Proposed Feeder is the Copperfield Dam. The Copperfield Dam has a capacity of 24,000ML and was constructed on the Copperfield River in the early 1980s to service the Kidston mine site though a gravity feed pipeline (Genex, 2015 and DEWS, 2016). The dam has an uncontrolled spillway which is shown in Figure 3.

**Figure 3 Copperfield Dam spillway (Genex, 2015)**

#### 5.1.1.2 Flood frequency analysis

Table 1 lists the details of the available gauges upstream of the crossing of the Copperfield River and the Proposed Feeder crossing.

[1] For this study, a major watercourse crossing was assumed to have a stream order of three or higher

**Table 1 Available Gauges upstream of the Proposed Feeder crossing**

| Gauge ID | Location | Catchment Area (km$^2$) | Period of Operation | Years of Record |
|---|---|---|---|---|
| 917115A | Copperfield River at Spanner Waterhole | 1,199 | 14/12/1983 - present | 35 |
| 917110A | Copperfield River at Middle Creek Gap | 1,212 | 06/01/1969 – 01/06/1986 | 17 |
| 917116A | Copperfield River at Kidston Dam Headwater | 1,250 | 24/01/1985 – 06/05/2015 | 34 |
| 917118A | Copperfield River at Kidston Dam Tail Water | 1,252 | 28/11/1984 – 05/05/2015 | 34 |

Gauges 917116A and 917118A recorded peak flows are controlled by the Copperfield Dam. Gauges 917115A and 917110A are upstream of the Copperfield Dam and are not influenced by the Copperfield Dam. The FFA for gauge 917116A was used to check the flood attenuation impact of the dam. The rating curve for gauge 917116A is more accurate than the other gauges as the spillway cross-section (Figure 3) is well defined (DEWS, 2016) and does not change with time. Gauge 917118A was not included in the FFA.

The available years of record for the FFA was increased by combing data from Gauges 917115A and 917110A. These gauges are 2 km apart, have similar catchment areas and there are no tributaries feeding the Copperfield River between the gauges. The recorded peak flows for the larger of the two gauged catchments (Copperfield River at Middle Creek) was used for the overlapping period of the gauges. Figure 4 shows the results for FFA undertaken in TUFLOW Flike 2016.

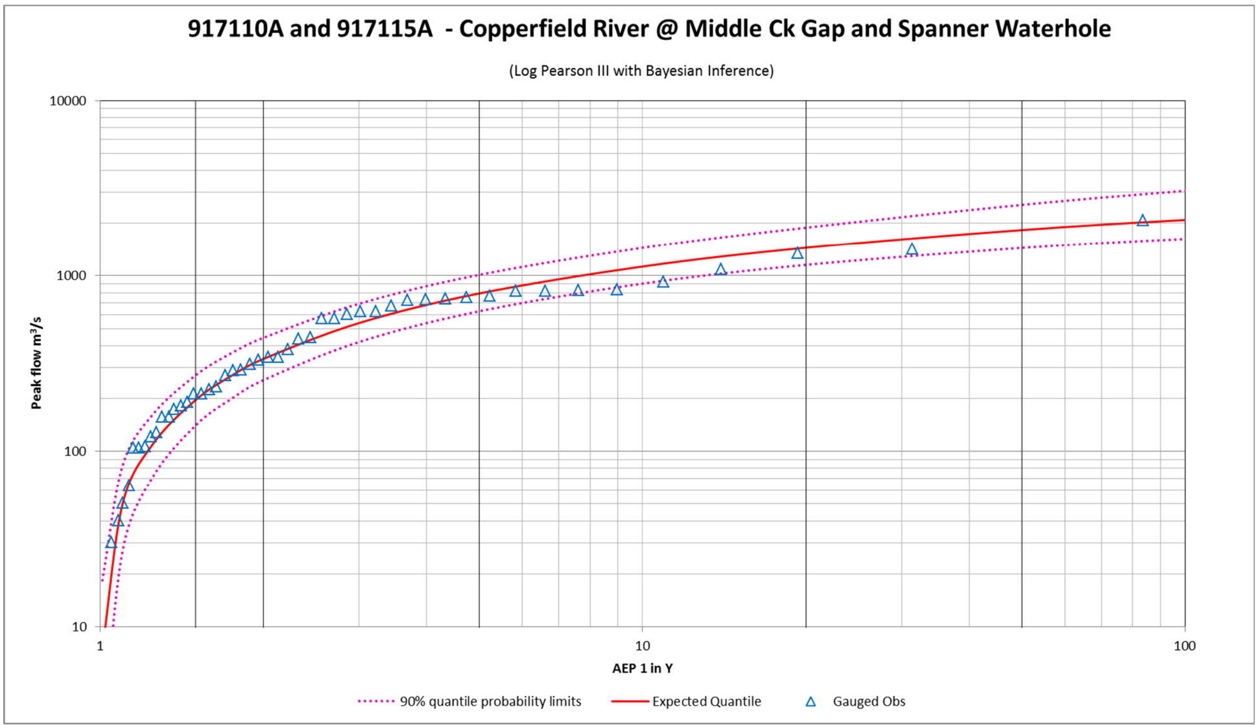


**Figure 4 FFA Plot for Gauges 917115A and 917110A**

The relatively narrow 90% confidence limits to the expected quantile shows that there is confidence in the expected 1% AEP peak flow of 2089 $m^3/s$.

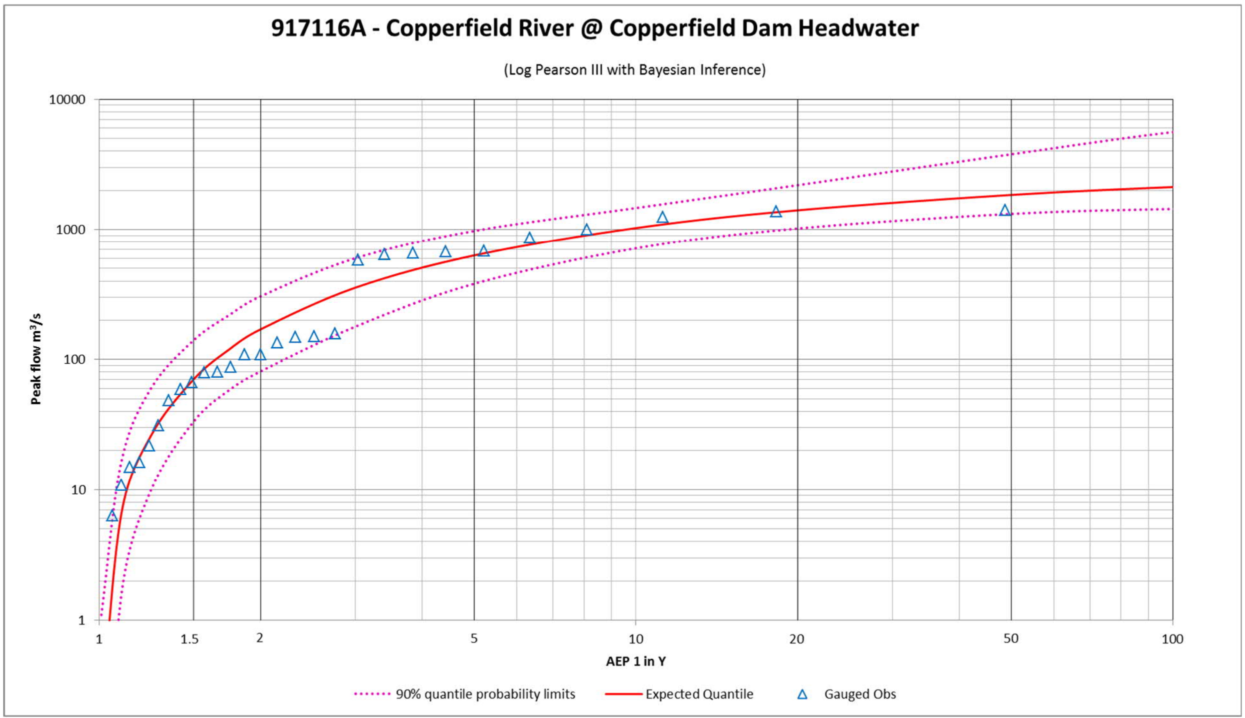


**Figure 5 FFA Plot for Gauges 917116A**

The expected peak flow of 2121 $m^3/s$ at gauge 917118A is consistent with the increase in catchment area between gauge 917115A and gauge 917116A if the Copperfield Dam is at full supply level. The expected peak flow of 2121 $m^3/s$ was used to estimate the peak flow at the Proposed Feeder crossing of the Copperfield River.

#### 5.1.1.3 Peak flow estimation

As there is no gauge at the crossing of the Proposed Feeder, the peak flow was estimated by scaling the expected 1% AEP discharge by catchment area. Details of the gauged catchment of 917116A and the catchment up to the crossing of the Proposed Feeder are listed in Table 2.

**Table 2 Details of gauged catchment 917115A and the catchment up to the Proposed Feeder crossing**

| Catchment | Catchment Area ($km^2$) | Shape Factor |
|---|---|---|
| 917116A – Copperfield River at Kidston Dam Headwater | 1,250 | 0.8 |
| Transmission Line at Copperfield River | 1,632 | 0.8 |

The catchment shape factor is defined as the shortest distance between the catchment centroid and catchment outlet divided by the square root of the catchment area. Narrower catchments have larger shape factors than wider catchments and tend to have lower peak discharges when other factors such as catchment slope, catchment area, soil infiltration and rainfall intensity are held constant. Figure 6 was created by Ladson (2016) using the RFFE online utility to demonstrate the shape factor's influence on the flood estimate from the RFFE.

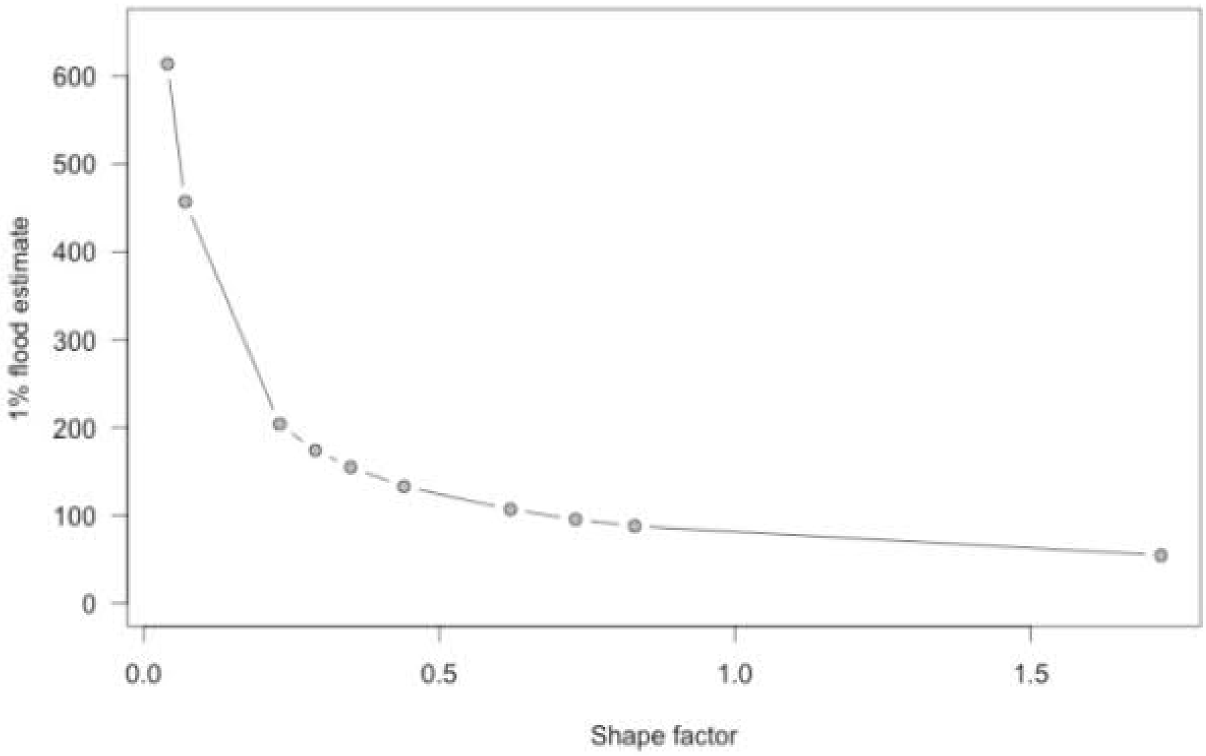


**Figure 6 1% AEP flood estimate as a function of catchment shape factor when keeping all other factors constant (Ladson, 2016)**

Figure 6 illustrates that the RFFE more accurately estimates floods for catchments with similar shape factors or shape factors over 0.5. The shape factors for the catchments in Table 2 are the same. This means that there is more confidence in the estimated peak discharge for the catchment up to the Proposed Feeder. Additionally, there are no major tributaries to the Copperfield River between the outlet of the gauged catchment and the catchment up to the Proposed Feeder. Table 3 lists the estimated peak flow for the catchment up to the Proposed Feeder crossing.

**Table 3 Estimated peak flow to the catchment up to the Proposed Feeder**

| Catchment | Estimate Peak Flow ($m^3/s$) |
|---|---|
| Transmission Line at Copperfield River | 2,843 (2,770) |

#### 5.1.1.4 Hydraulics

A steady state one-dimensional HEC-RAS model was developed to understand the hydraulic characteristics for the 1% AEP event of the Copperfield River at the Proposed Feeder crossing. Cross sections were developed approximately 50m to 100m upstream and downstream of the Proposed Feeder from the available LiDAR. Inspection of aerial imagery shows a moderately vegetated creek, extending to more heavily vegetated overbanks. For this reason, the Manning's 'n' for the creek was set at 0.05 for the main channel, and 0.07 for the overbanks.

The 1% AEP flood extents are show below in **Figure 7**. An elevation profile of the modelled 1% AEP event at the Proposed Feeder crossing is show below in **Figure 8.**

As seen above, flood flows for the 1% AEP event are confined to the immediate area around the main channel of the Copperfield River at the location of the Proposed Feeder.

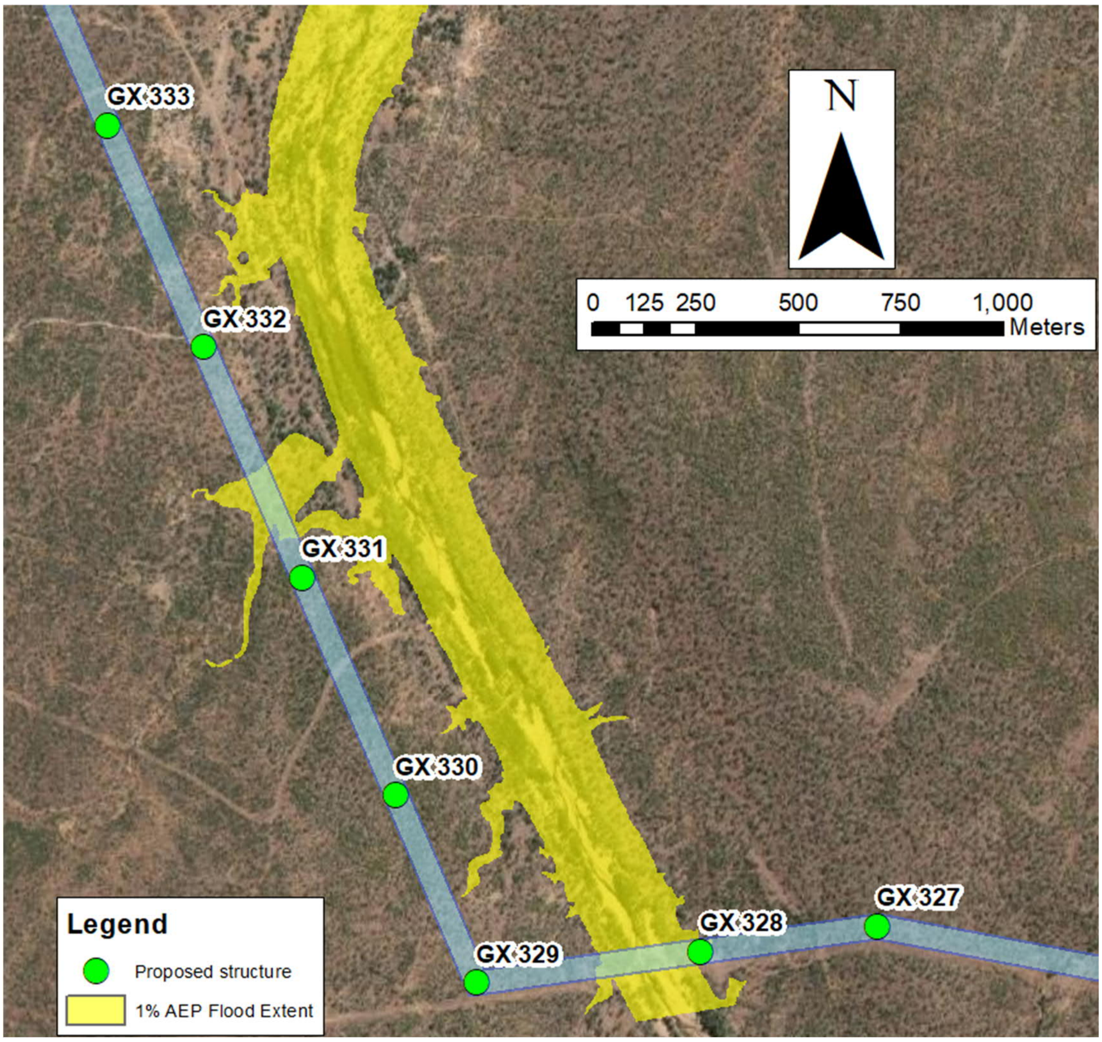


**Figure 7 1% AEP Flood Extents – Copperfield River**

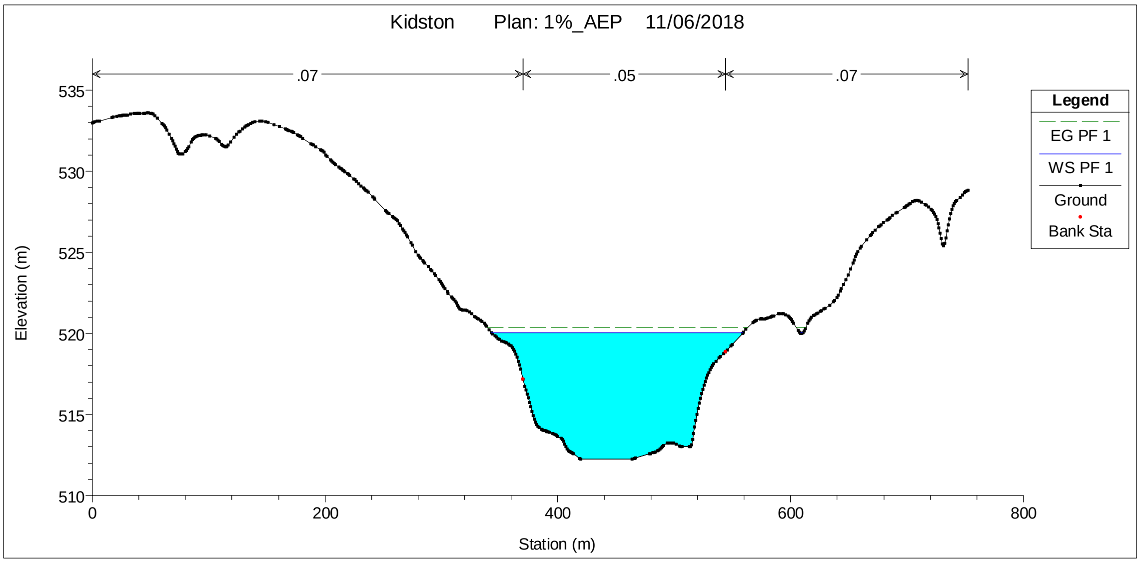


**Figure 8 1% AEP Flood Elevation Profile – Copperfield River**

### 5.1.2 East Creek

The 1% AEP peak flow was determined using the online RFFE utility and is presented in **Figure 9**.

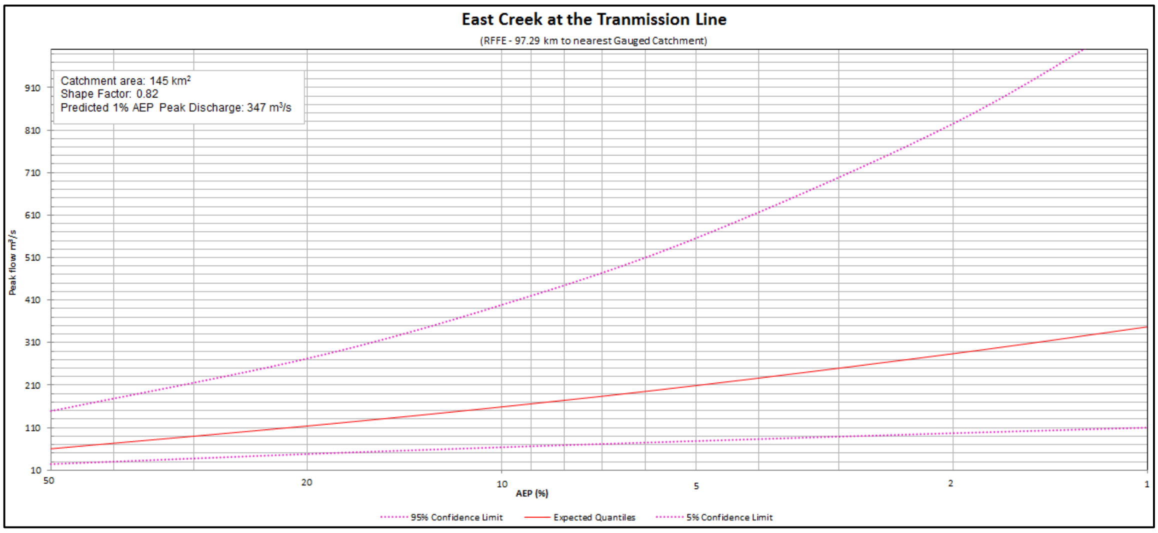


**Figure 9 RFFE plot for the East Creek Crossing**

A steady state one-dimensional HEC-RAS model was developed to understand the hydraulic characteristics of East Creek at the Proposed Feeder crossing, for the 1% AEP event. The available 30 SRTM DEM was used for the base topography. Cross sections were developed approximately 50m to 100m upstream and downstream of the Proposed Feeder. Inspection of aerial imagery shows a moderately vegetated creek, extending to more heavily vegetated overbanks. For this reason, the Mannings 'n' for the creek was set at 0.045 for the main channel, and 0.07 for the overbanks. The 1% AEP flood extents are show below in **Figure 10** with 100m chainages overlaid.

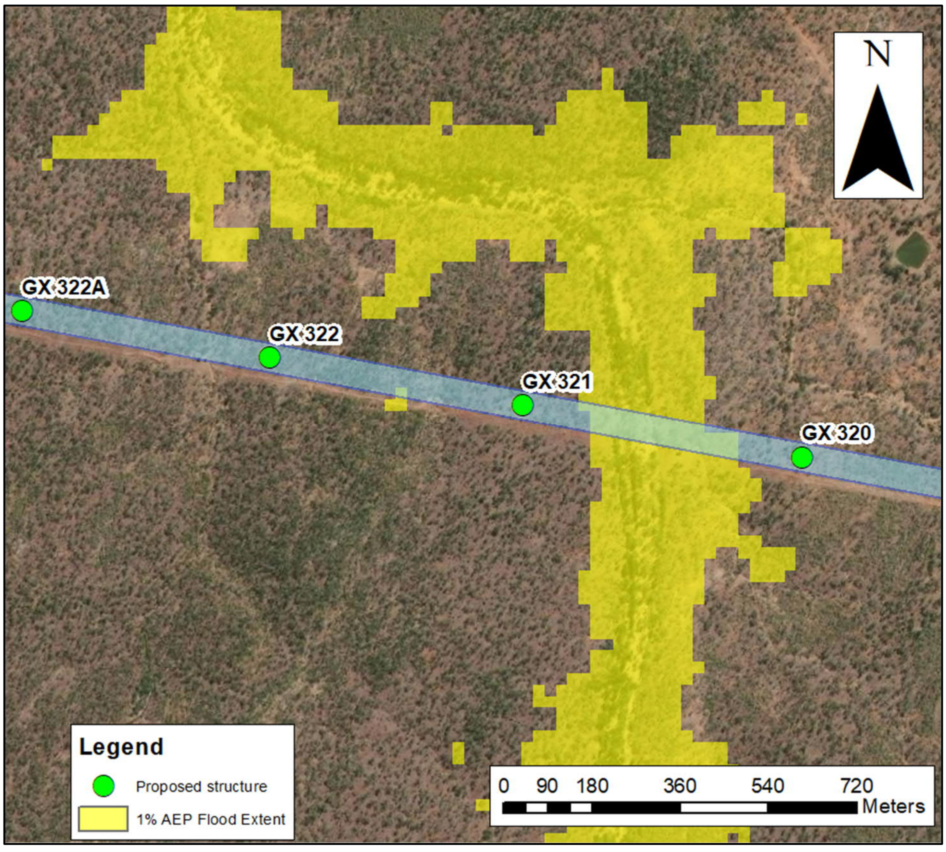


**Figure 10 1% AEP Flood Extents for the Proposed Feeder at East Creek**

### 5.1.3 Walkers Creek

The 1% AEP peak flow was determined using the online RFFE utility and is presented in **Figure 11**.

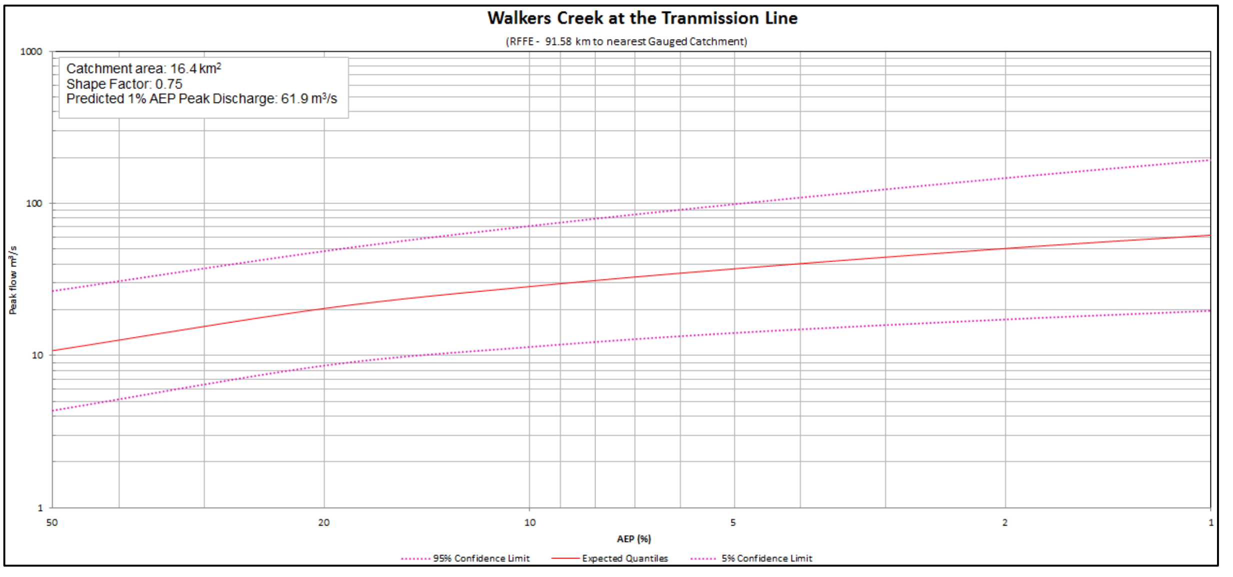


**Figure 11 RFFE plot for the Walkers Creek Crossing**

A steady state one-dimensional HEC-RAS model was developed to understand the hydraulic characteristics of East Creek at the Proposed Feeder crossing, for the 1% AEP event. The available 30 SRTM DEM was used for the base topography. Cross sections were developed approximately 50m to 100m upstream and downstream of the Proposed Feeder. Inspection of aerial imagery shows a moderately vegetated creek, extending to more heavily vegetated overbanks. For this reason, the Mannings ‘n’ for the creek was set at 0.045 for the main channel, and 0.07 for the overbanks. The 1% AEP flood extents are show below in Figure 11.

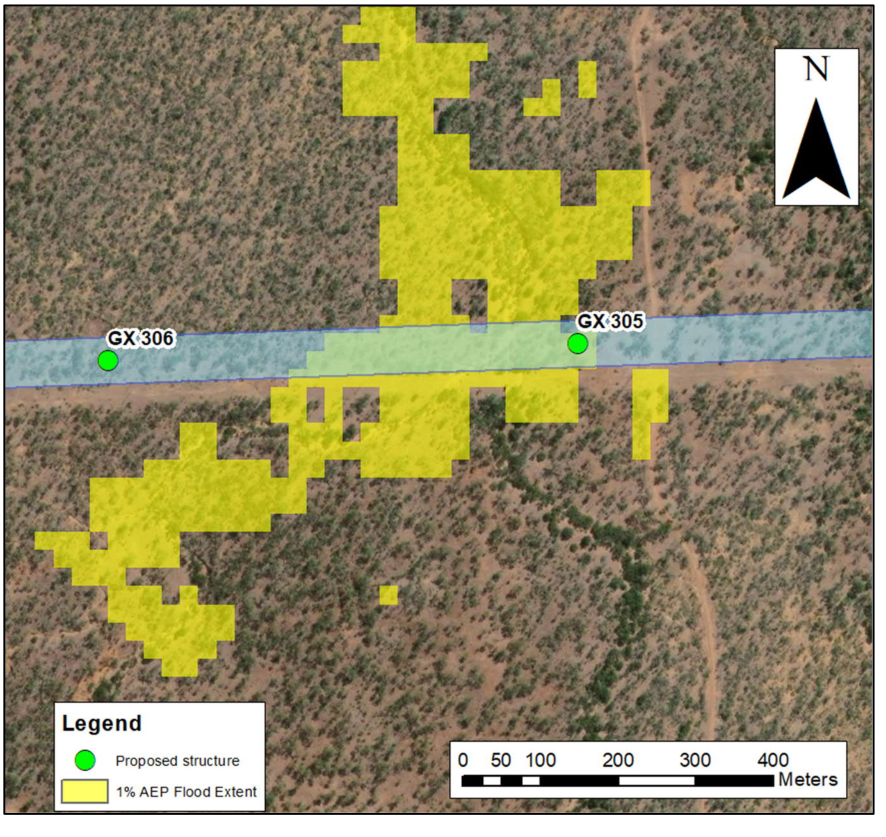

**Figure 12 1% AEP Flood Extents for the Proposed Feeder at Walkers Creek**

### 5.1.4 Einasleigh River and McKinnon's Creek

The 1% AEP peak flows were determined using the online RFFE utility and are presented in **Figure 13** and **Figure 14**. A stream flow gauge (917108A) was available downstream of McKinnon's Creek and the FFA is presented in Figure 15.

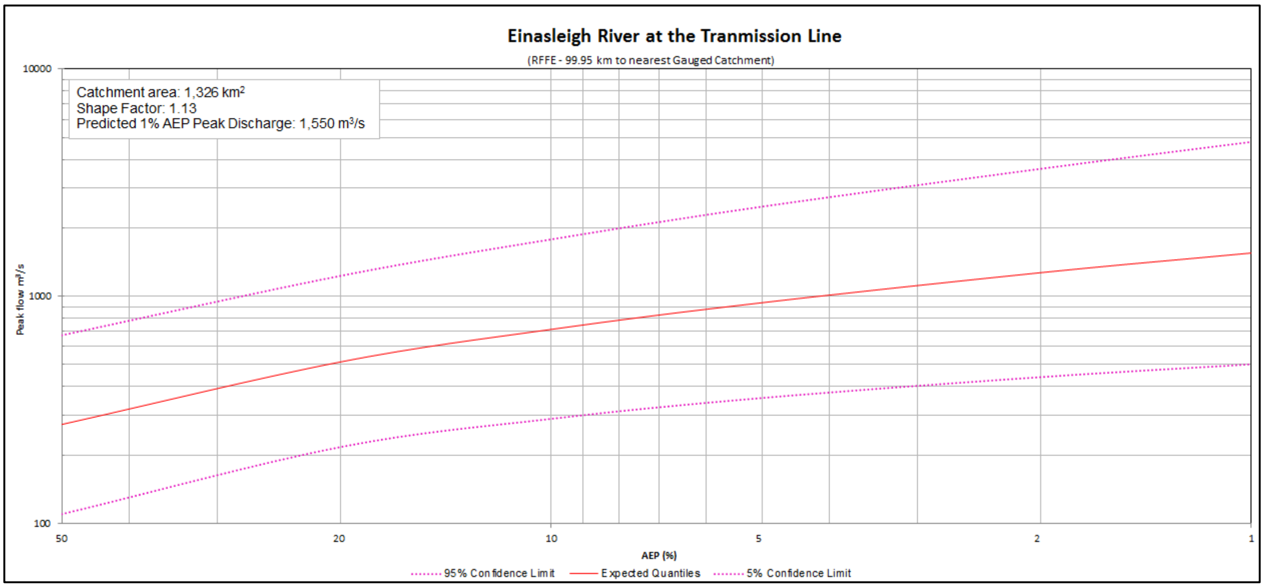


**Figure 13 RFFE plot for the Einasleigh River Crossing**

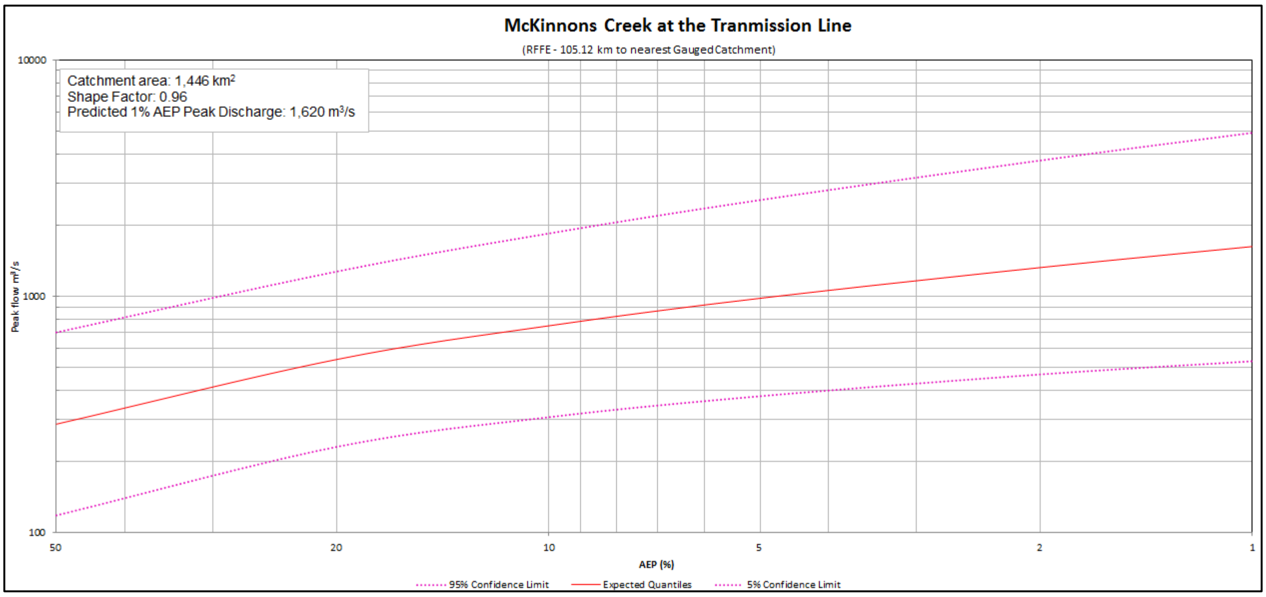


**Figure 14 RFFE plot for the McKinnon's Creek Crossing**

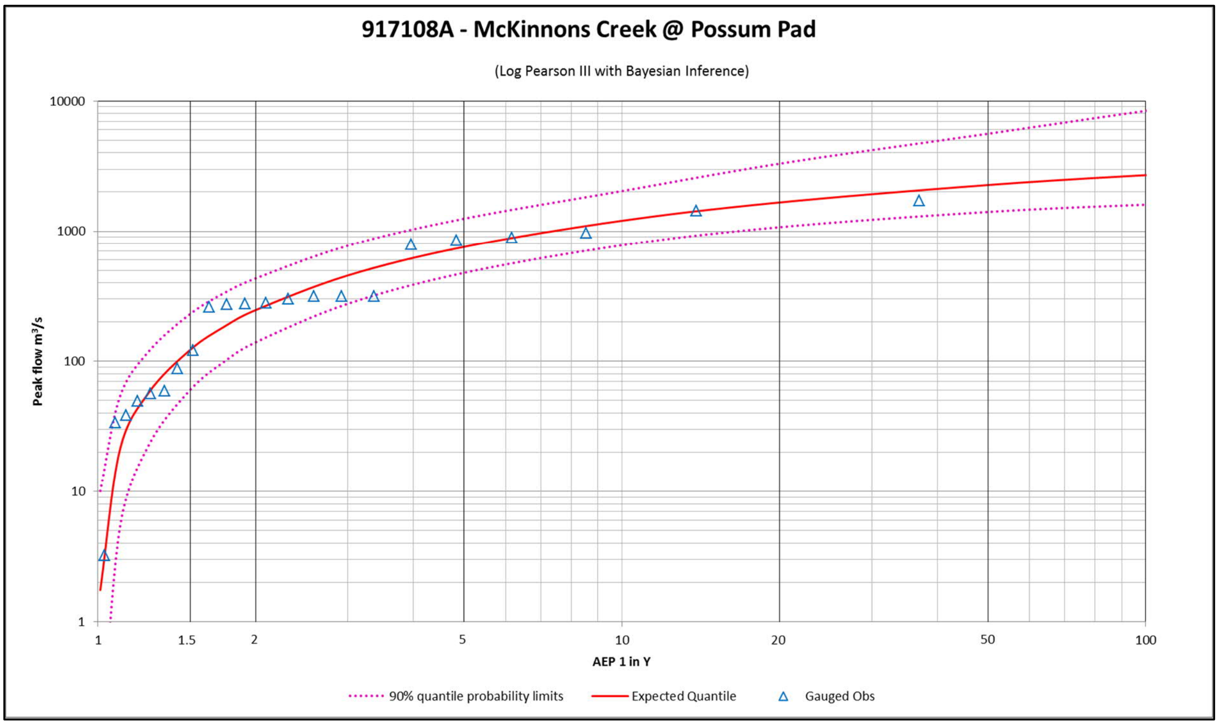


**Figure 15 FFA Plot for Gauges 917108A**

The predicted discharges in **Figure 13** and **Figure 14** have a lower level of accuracy as the catchment areas in are greater than the recommended maximum catchment area of 1,000 $km^2$ recommended for the RFFE.

**Figure 15** shows that there is 22 years of data and the largest recorded stream flow has an AEP of greater than 2%. The shape factor of the catchment to gauge 917108A is 2.24 while the shape factor to the crossing of the Proposed Feeder at McKinnons is 0.96. There is a greater degree of uncertainty of the estimated 1% peak flow at the crossing of McKinnons Creek if the expected 1% AEP peak discharge in **Figure 15** was scaled by catchment area. Therefore, the RFFE in **Figure 14** for the McKinnons creek catchment up to the Proposed Feeder crossing was used.

A TUFLOW two-dimensional hydraulic model was developed along the Proposed Feeder from chainage 37.2 km to 43.9 km and includes the crossings with Einasleigh River to McKinnon's Creek. The available 30 m SRTM was used as the base topography and the model roughness was determined from the aerial imagery.

The predicted peak discharge for each waterway was applied as a constant inflow to the model with steady state flow conditions. The predicted peak discharge was applied separately for each waterway. The 1% AEP flood inundation extents in **Figure 16** is the maximum of both of these results.

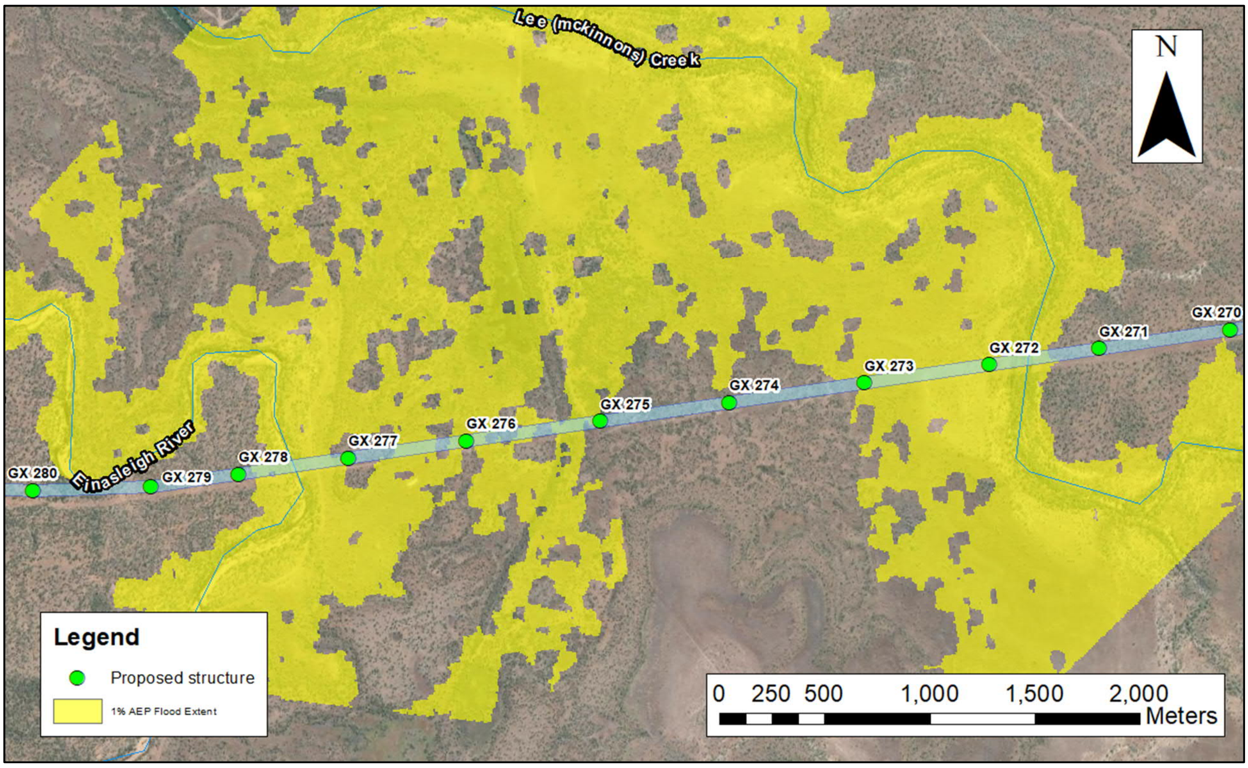


**Figure 16 1% AEP Flood Extents for the Proposed Feeder at the Einasleigh River and McKinnons Creek**

## 5.2 Burdekin Basin

### 5.2.1 Overview

The available Queensland flood mapping program - flood investigation Burdekin Basin 2015 mapping was used to identify the 1% AEP flood extents along the Proposed Feeder. For the assessment, crossings with a stream order of 3 or more were identified using the available stream order GIS mapping layer.

### 5.2.2 Results

Table 4 provides a summary of flood overlay mapping at the Proposed Feeder for higher order streams (3rd order or above). Flood extents for these crossings within the Burdekin Basin are illustrated within the mapping the Appendix A

**Table 4 Summary of structures within the 1% AEP waterway flood extents**

| Waterway Name | Structures within 1% AEP Flood extents |
|---|---|
| Unnamed Creek | GX 14 |
| Unnamed Creek | GX 60 |
| Unnamed Creek | GX 67 |
| Camel Creek | GX 81 & GX82 |
| Unnamed Creek | GX 83 |
| Unnamed Creek | GX 86 |
| Unnamed Creek | GX 92 |
| Unnamed Creek | GX 97 |
| Perry Creek | GX 104 |
| Unnamed Creek | GX 105 & GX 106 |

| Waterway Name | Structures within 1% AEP Flood extents |
|---|---|
| Unnamed Creek | GX 107 |
| Unnamed Creek | GX 116 |
| Unnamed Creek | GX 122 |
| Unnamed Creek | GX 129 |
| Unnamed Creek | GX 130 |
| Hopewell Ck | GX 135 & GX 135a |
| Unnamed Creek | GX 137, GX 138 & 138a |
| Burdekin River | GX 142, GX 143, GX 144, GX 145, GX 146, GX 150, GX 151, GX 152 & GX 153 |
| Unnamed Creek | GX 184 |
| Paddys Creek | GX 190, GX 191 & GX 192 |
| Unnamed Creek | GX 204A |
| Unnamed Creek | GX 221 |

### 5.2.3 Flood Frequency Analysis

A FFA was also undertaken on a combined record from two DNRM monitoring stations on the Burdekin River 33km downstream from the Project. The purpose of the FFA was to highlight the major historical floods affecting the region in the Upper Burdekin catchment. The records from the two Burdekin River at Blue Range gauging stations (ID 120107A and 120107B) were combined to provide a record from 1952 until present. The ten largest floods during this time are provided in Table 5.

**Table 5 Flood Frequency Analysis of historical floods from the Burdekin River at Blue Range**

| Rank | Peak Discharge (m3/s) | Year | Recurrence Interval | AEP |
|---|---|---|---|---|
| 1 | 9660 | 1991 | 45 | 2.2% |
| 2 | 8453 | 1956 | 41 | 2.4% |
| 3 | 8447 | 2009 | 35 | 2.8% |
| 4 | 6206 | 1953 | 18 | 5.5% |
| 5 | 5948 | 2021 | 16 | 6.3% |
| 6 | 5772 | 1981 | 14 | 7.1% |
| 7 | 5488 | 1974 | 12 | 8.3% |
| 5 | 5290 | 1997 | 10 | 10.% |
| 9 | 5159 | 1979 | 9 | 11.1% |
| 10 | 4742 | 1998 | 8 | 12.5% |

# 6.0 Conclusions

Based on available data, the potential flooding along the Proposed Feeder and the Mount Fox switching station was assessed. The assessment indicated that the Mount Fox are not predicted to be inundated during the 0.5% AEP rainfall event and indicated that several transmission towers along the Proposed Feeder might be inundated during a 1% AEP rainfall event. More detailed hydraulic modelling is required to validate findings of the assessments.

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# Appendix A

## Burdekin Basin Flood Extents


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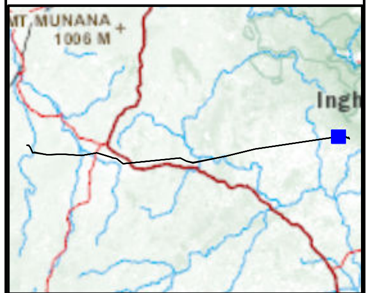
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 15 30 60
metres
1:2,200 (when printed at A4)

LEGEND
Proposed Structure
Preferred Transmission Line
Preferred Transmission Line Corridor
Watercourse
Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Unnamed Creeks**

| | |
|---|---|
| PROJECT ID | 60577456 |
| CREATED BY | floodmodellingtsv |
| LAST MODIFIED | 28-Sep-2021 |
| VERSION | 2 |

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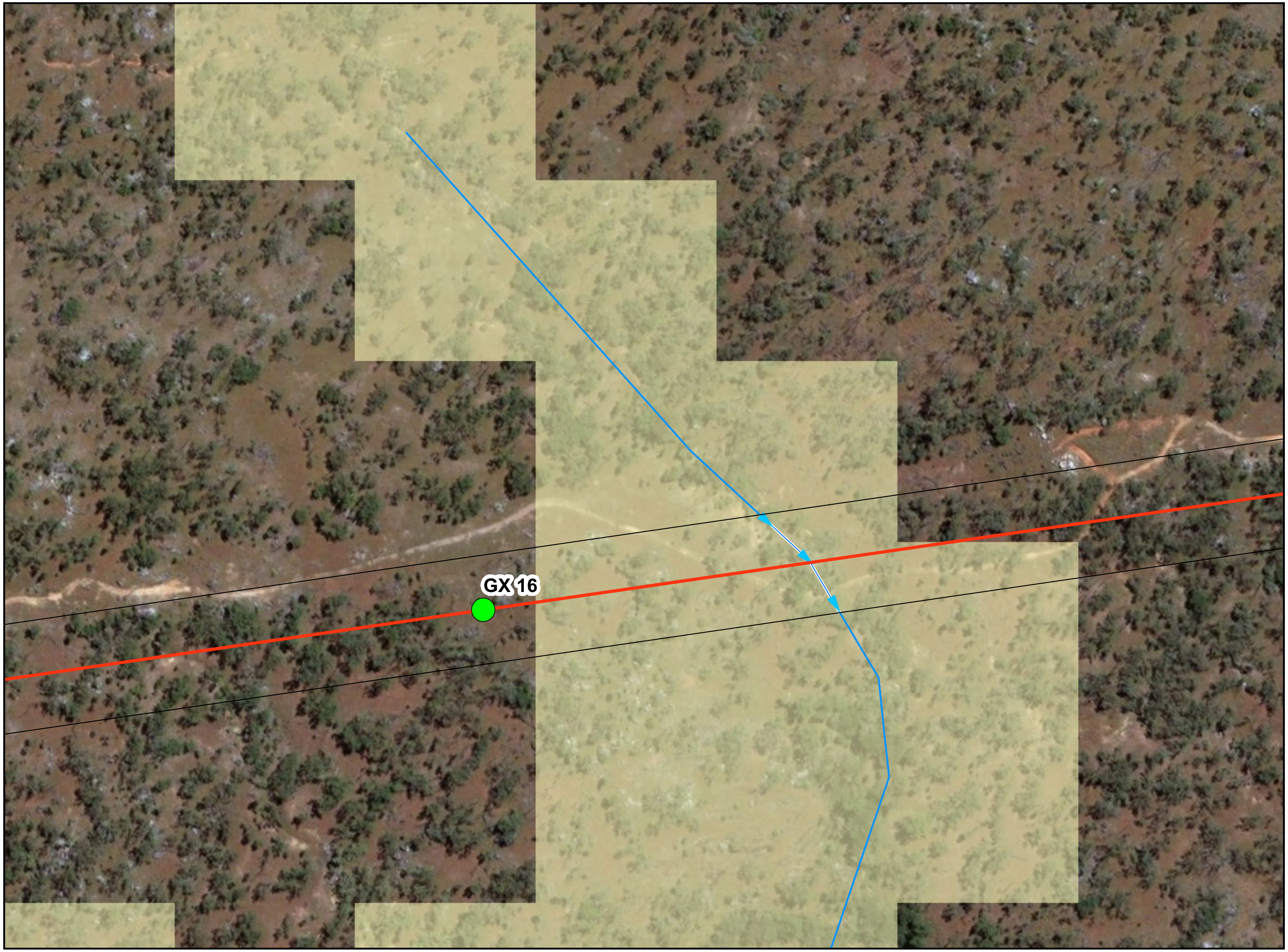


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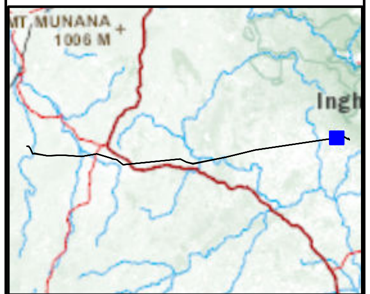
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 25 50 100
metres
1:3,000 (when printed at A4)

**LEGEND**

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Unnamed Creek**

| | |
|---|---|
| PROJECT ID | 60577456 |
| CREATED BY | floodmodellingtsv |
| LAST MODIFIED | 28-Sep-2021 |
| VERSION | 2 |

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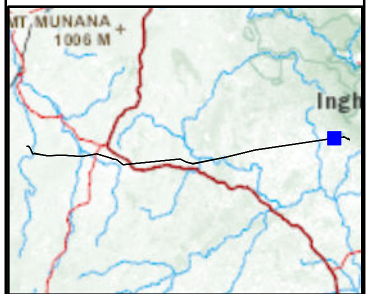


Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

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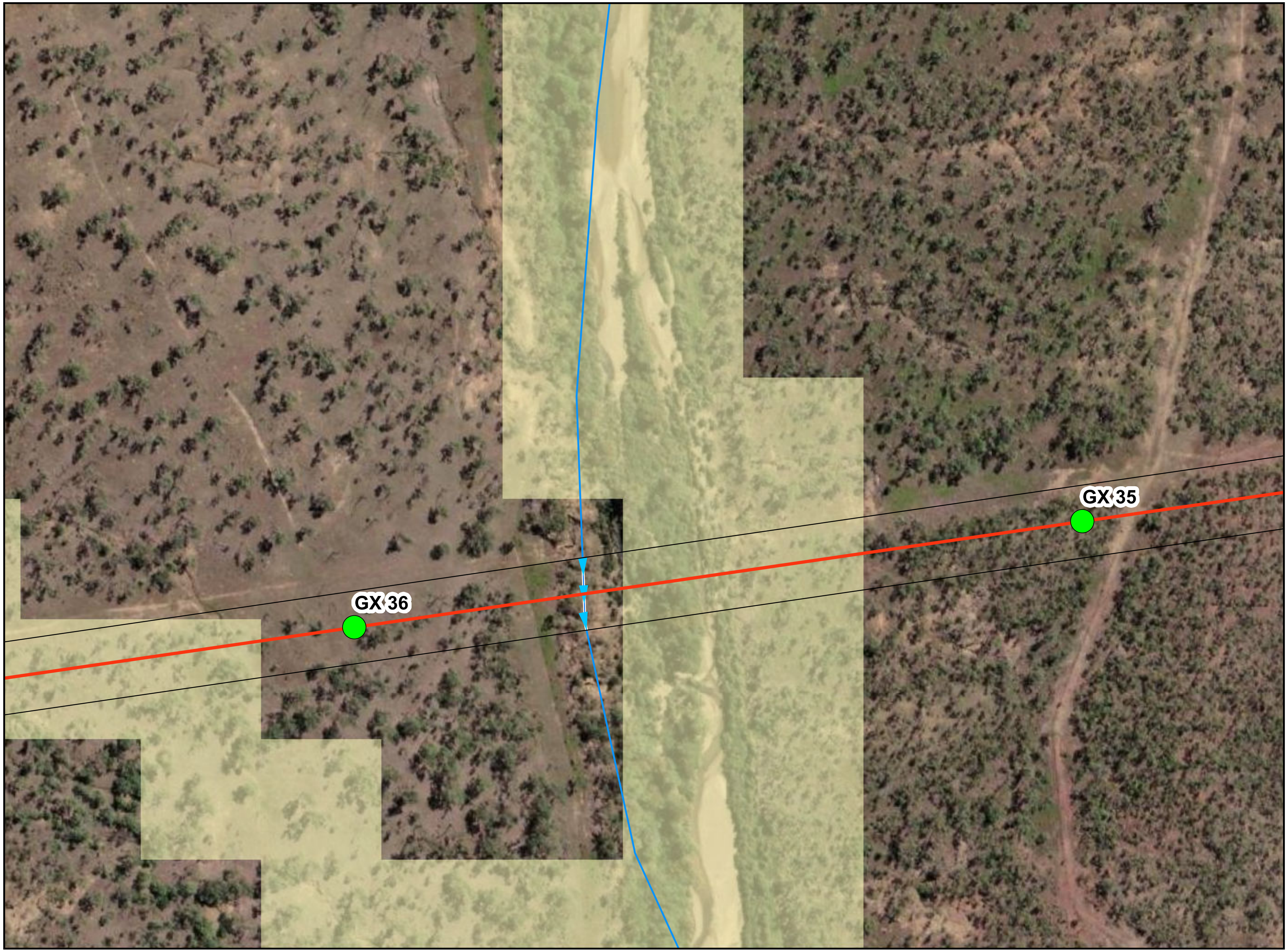
| | |
|---|---|
| PROJECT ID | 60577456 |
| CREATED BY | floodmodellingtsv |
| LAST MODIFIED | 28-Sep-2021 |
| VERSION | 2 |

A3

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N

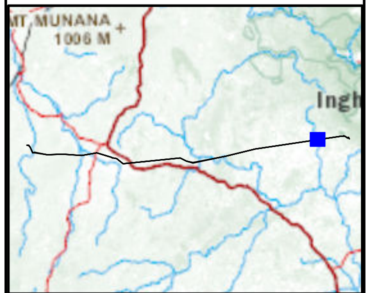
DATUM GDA 1994, PROJECTION MGA ZONE 55

0 37.5 75 150
metres

1:4,500 (when printed at A4)

LEGEND

Proposed Structure
Preferred Transmission Line
Preferred Transmission Line Corridor
Watercourse
Flood Extents




Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Douglas Creek

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PROJECT ID 60577456
CREATED BY floodmodellingtsv
LAST MODIFIED 28-Sep-2021
VERSION 2

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A4 size


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N

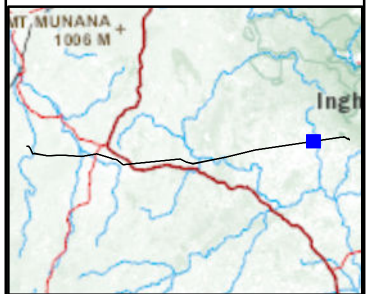
DATUM GDA 1994, PROJECTION MGA ZONE 55

0 15 30 60
metres

1:2,200 (when printed at A4)

**LEGEND**

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Unnamed Creek**

| | |
|---|---|
| PROJECT ID | 60577456 |
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A4 size


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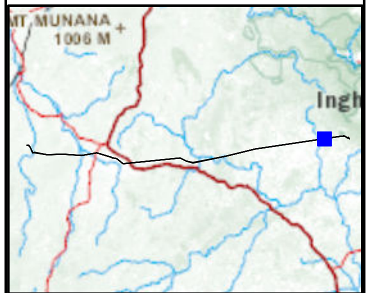
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 25 50 100
metres
1:3,100 (when printed at A4)

LEGEND
Proposed Structure
Preferred Transmission Line
Preferred Transmission Line Corridor
Watercourse
Flood Extents




Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

| | |
|---|---|
| PROJECT ID | 60577456 |
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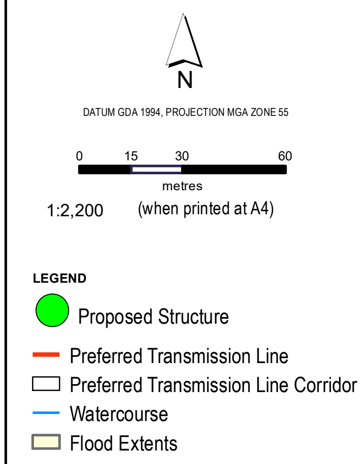
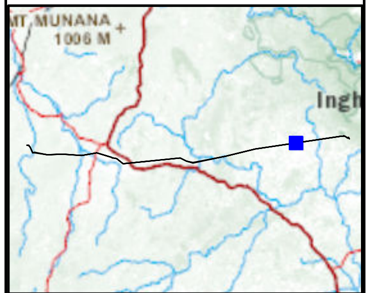
A4 size


Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

| | |
|---|---|
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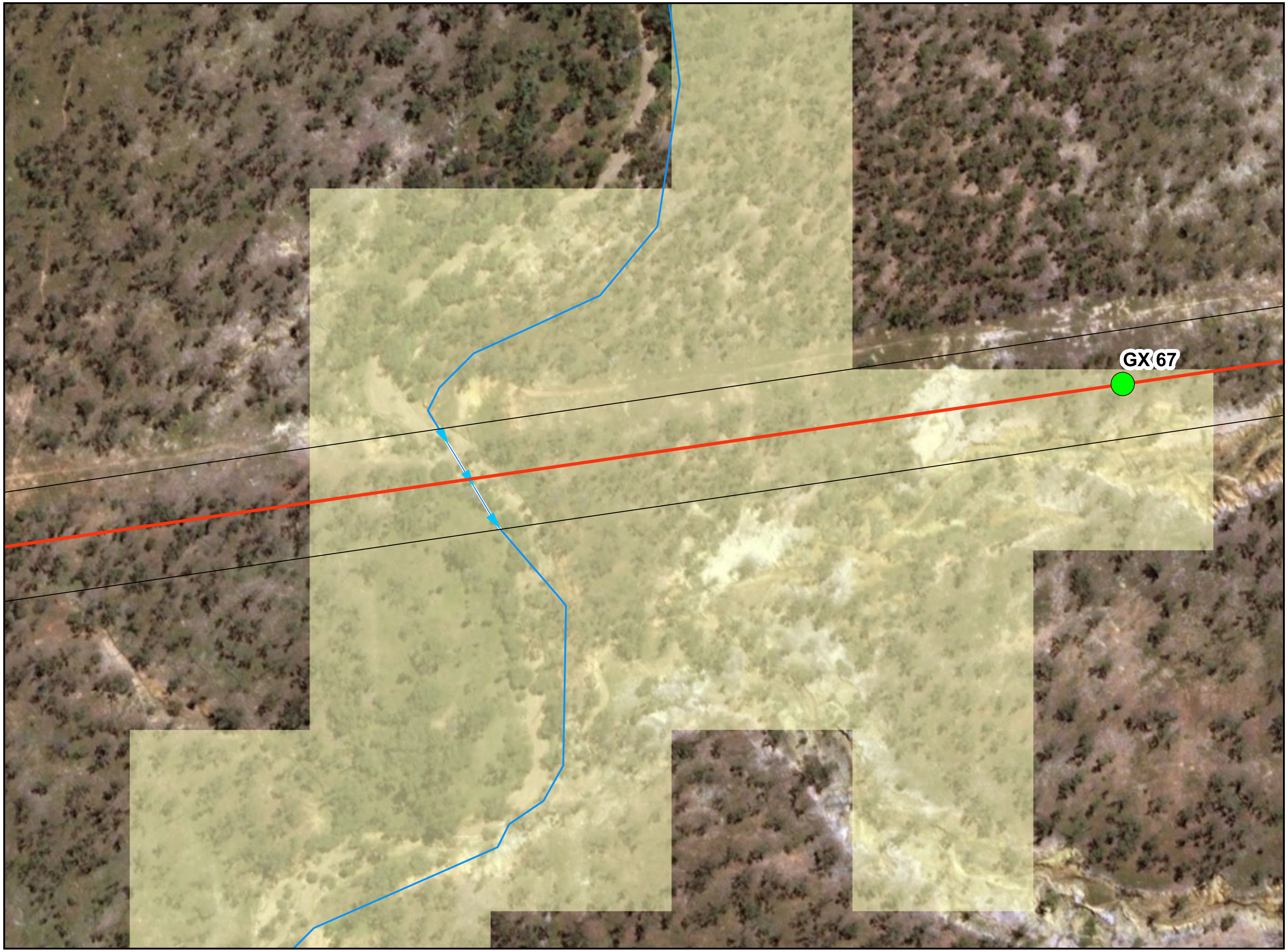


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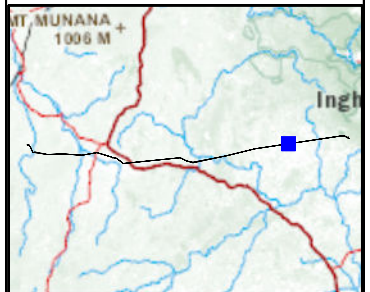
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 25 50 100
metres
1:3,000 (when printed at A4)

LEGEND
- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

| | |
|---|---|
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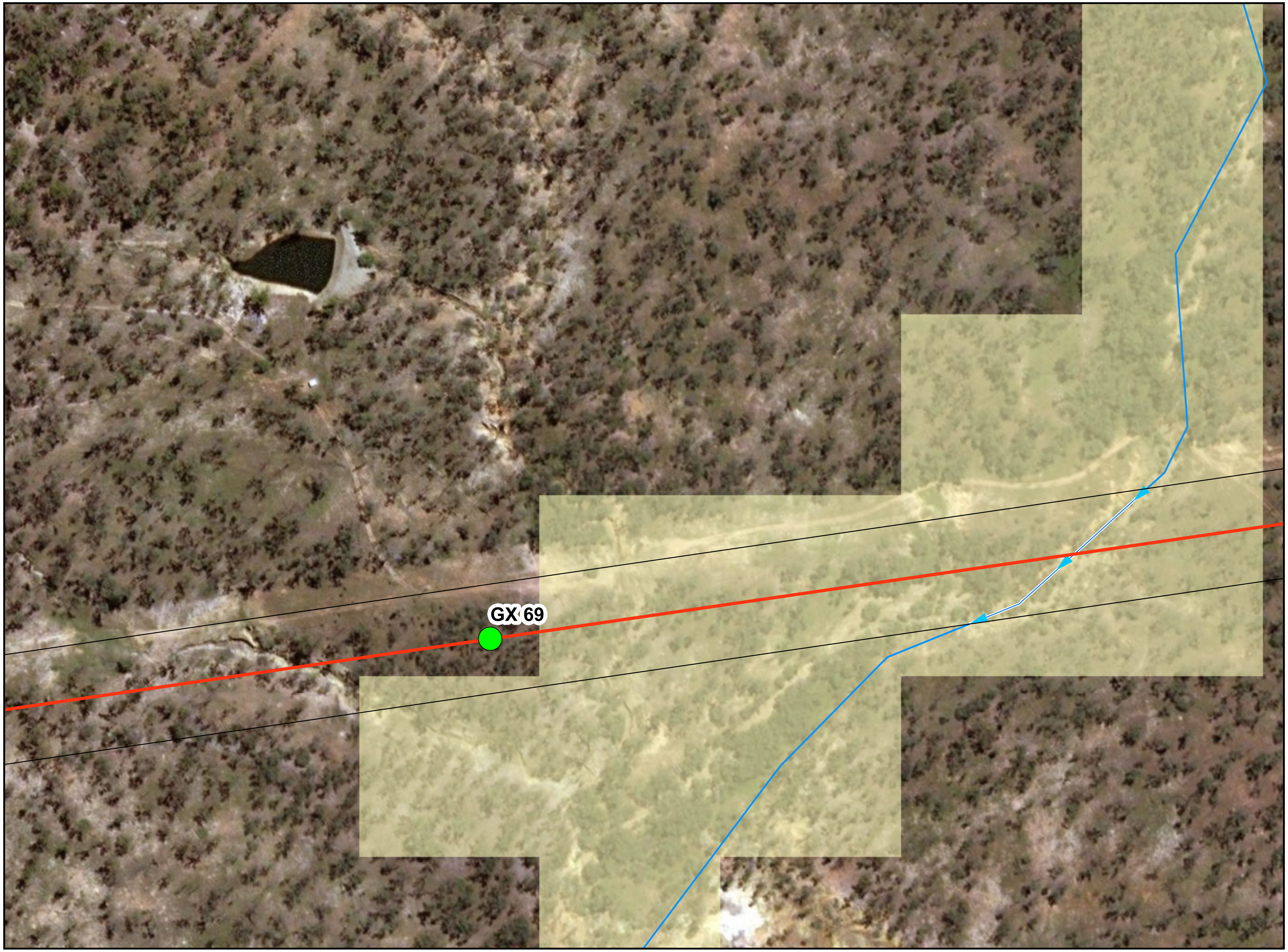


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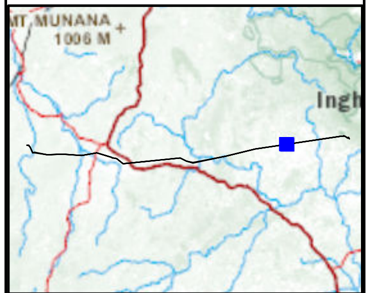
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 25 50 100
metres
1:3,000 (when printed at A4)

LEGEND

Proposed Structure
Preferred Transmission Line
Preferred Transmission Line Corridor
Watercourse
Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Unnamed Creek**

| | |
|---|---|
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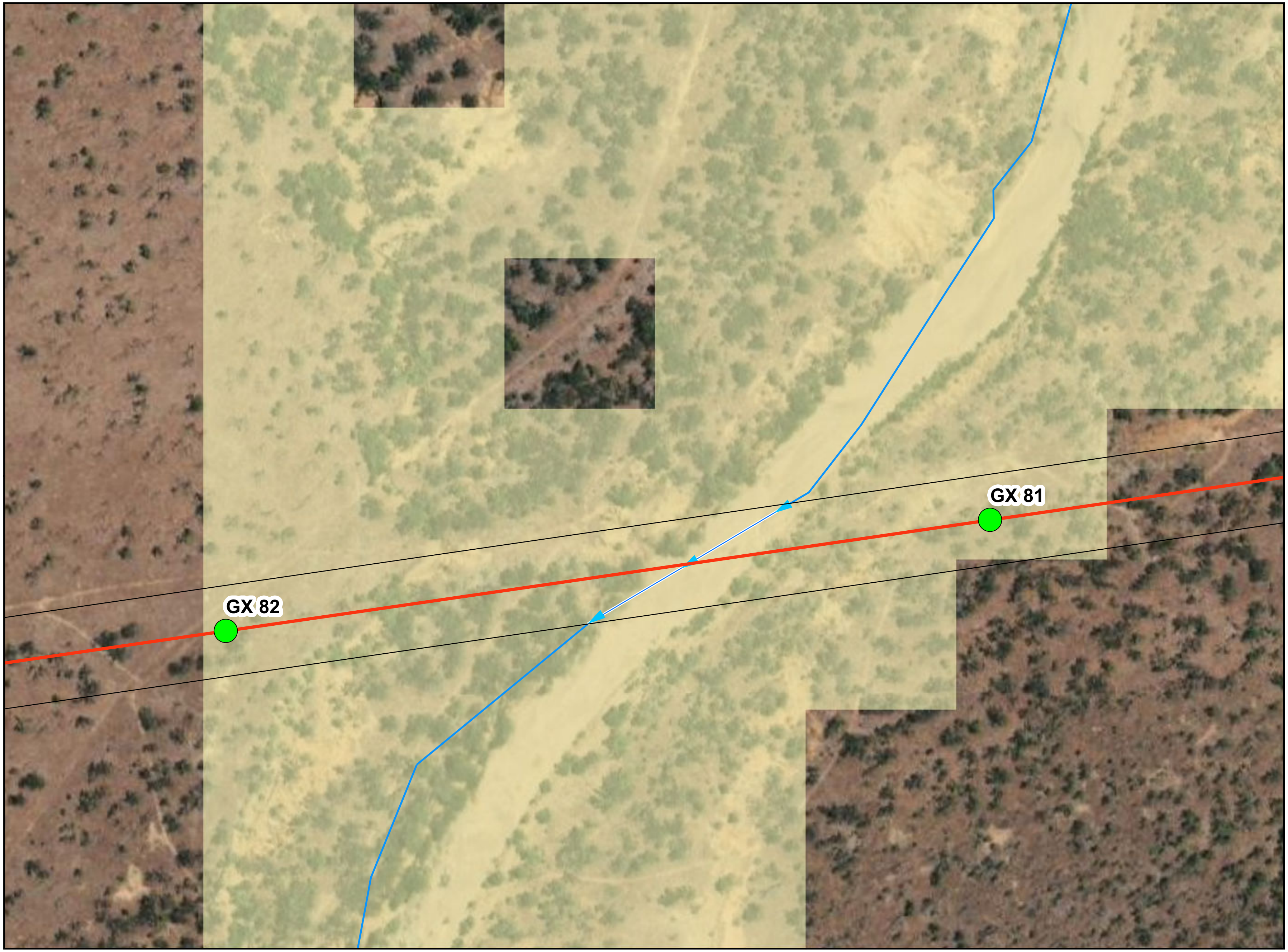
A4 size





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N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 30 60 120
metres

1:3,600 (when printed at A4)

LEGEND

Proposed Structure
Preferred Transmission Line
Preferred Transmission Line Corridor
Watercourse
Flood Extents

Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Camel Creek

| | |
|---|---|
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A4 size

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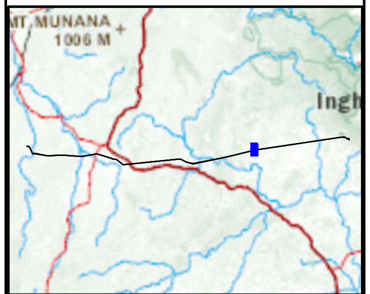
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 12.5 25 50
metres
1:1,500 (when printed at A4)

**LEGEND**

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Unnamed Creek**

| | |
|---|---|
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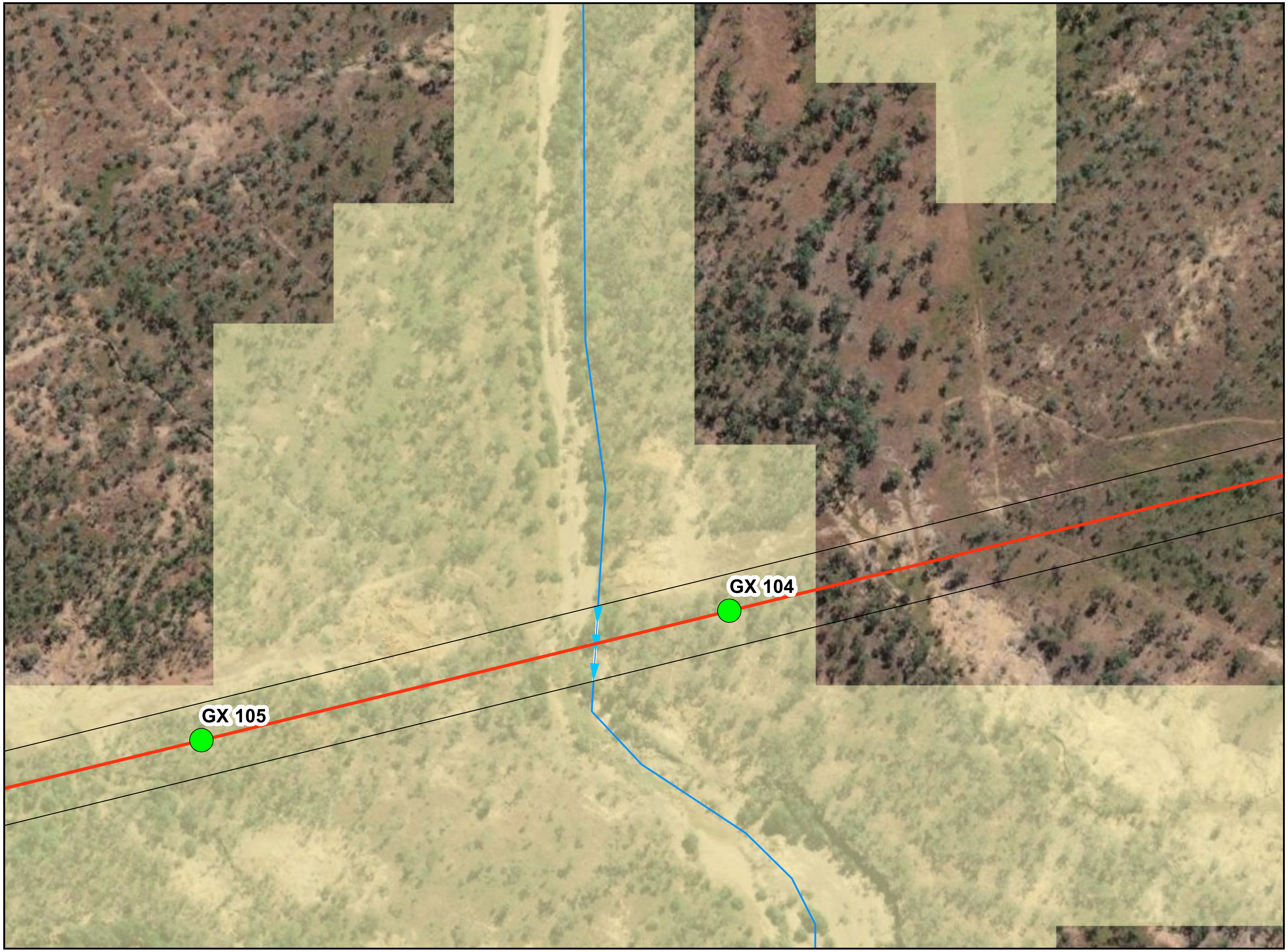


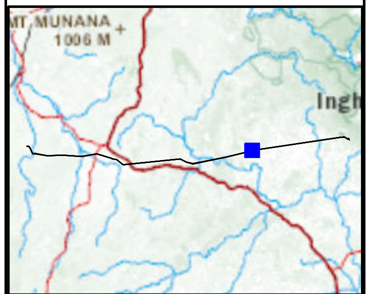


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N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 37.5 75 150
metres
1:4,500 (when printed at A4)

LEGEND

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents

Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Perry Creek

| | |
|---|---|
| PROJECT ID | 60577456 |
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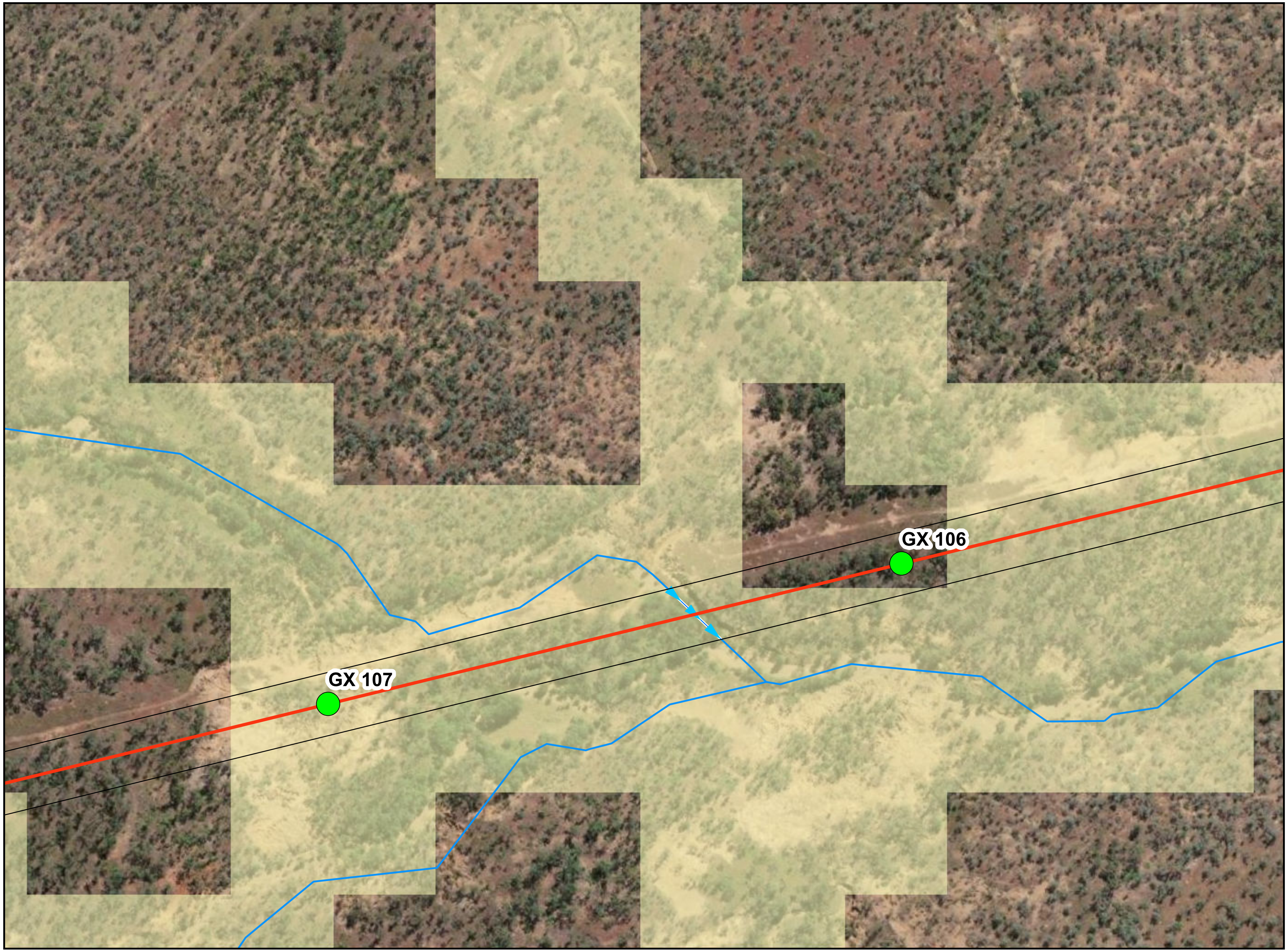


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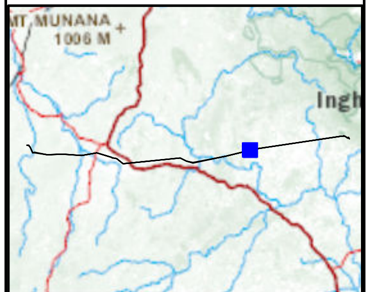
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 45 90 180
metres
1:5,300 (when printed at A4)

**LEGEND**

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Unnamed Creek**

PROJECT ID 60577456
CREATED BY floodmodellingtsv
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VERSION 2

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A4 size

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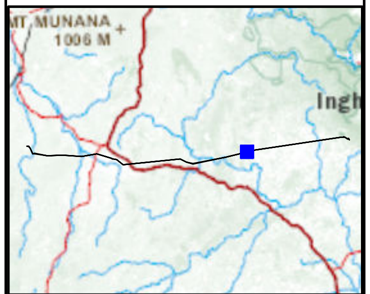
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 12.5 25 50
metres
1:1,500 (when printed at A4)

LEGEND

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Unnamed Creek**

| | |
|---|---|
| PROJECT ID | 60577456 |
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A4 size


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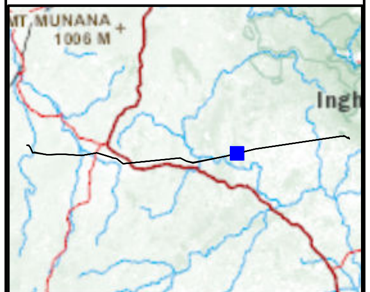
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 15 30 60
metres
1:1,900 (when printed at A4)

LEGEND
Proposed Structure
Preferred Transmission Line
Preferred Transmission Line Corridor
Watercourse
Flood Extents




Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

| | |
|---|---|
| PROJECT ID | 60577456 |
| CREATED BY | floodmodellingtsv |
| LAST MODIFIED | 28-Sep-2021 |
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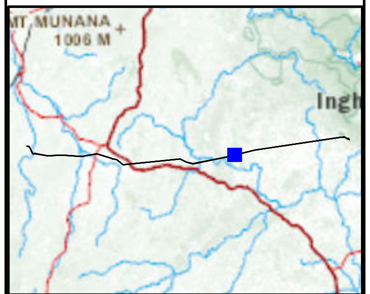


Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

| | |
|---|---|
| PROJECT ID | 60577456 |
| CREATED BY | floodmodellingtsv |
| LAST MODIFIED | 28-Sep-2021 |
| VERSION | 2 |

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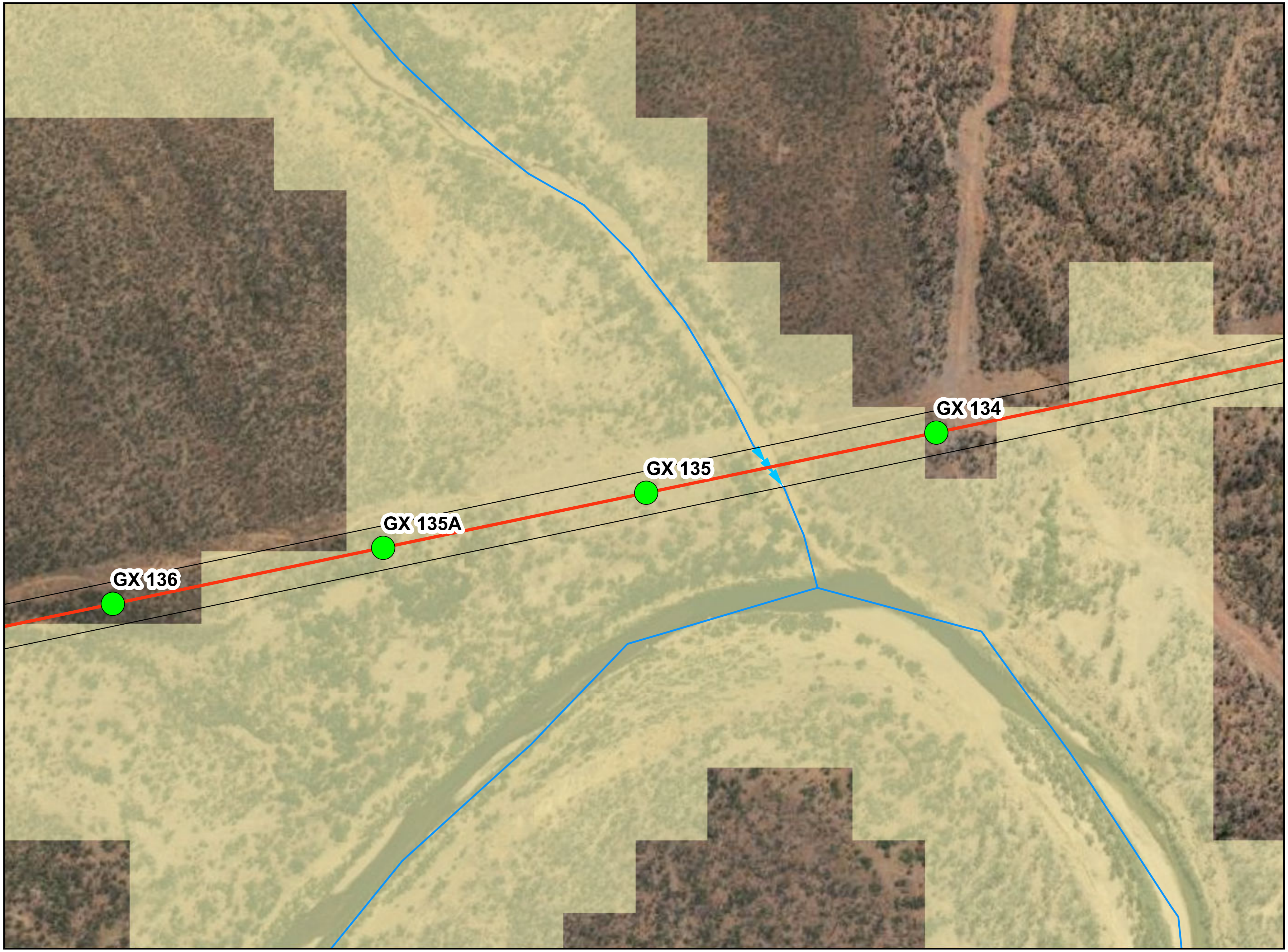
A4 size

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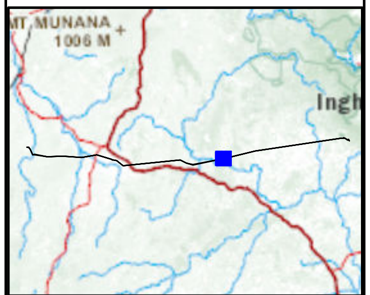
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 65 130 260
metres
1:7,500 (when printed at A4)

LEGEND

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Hopewell Ck/Burdekin River**

PROJECT ID 60577456
CREATED BY floodmodellingtsv
LAST MODIFIED 28-Sep-2021
VERSION 2

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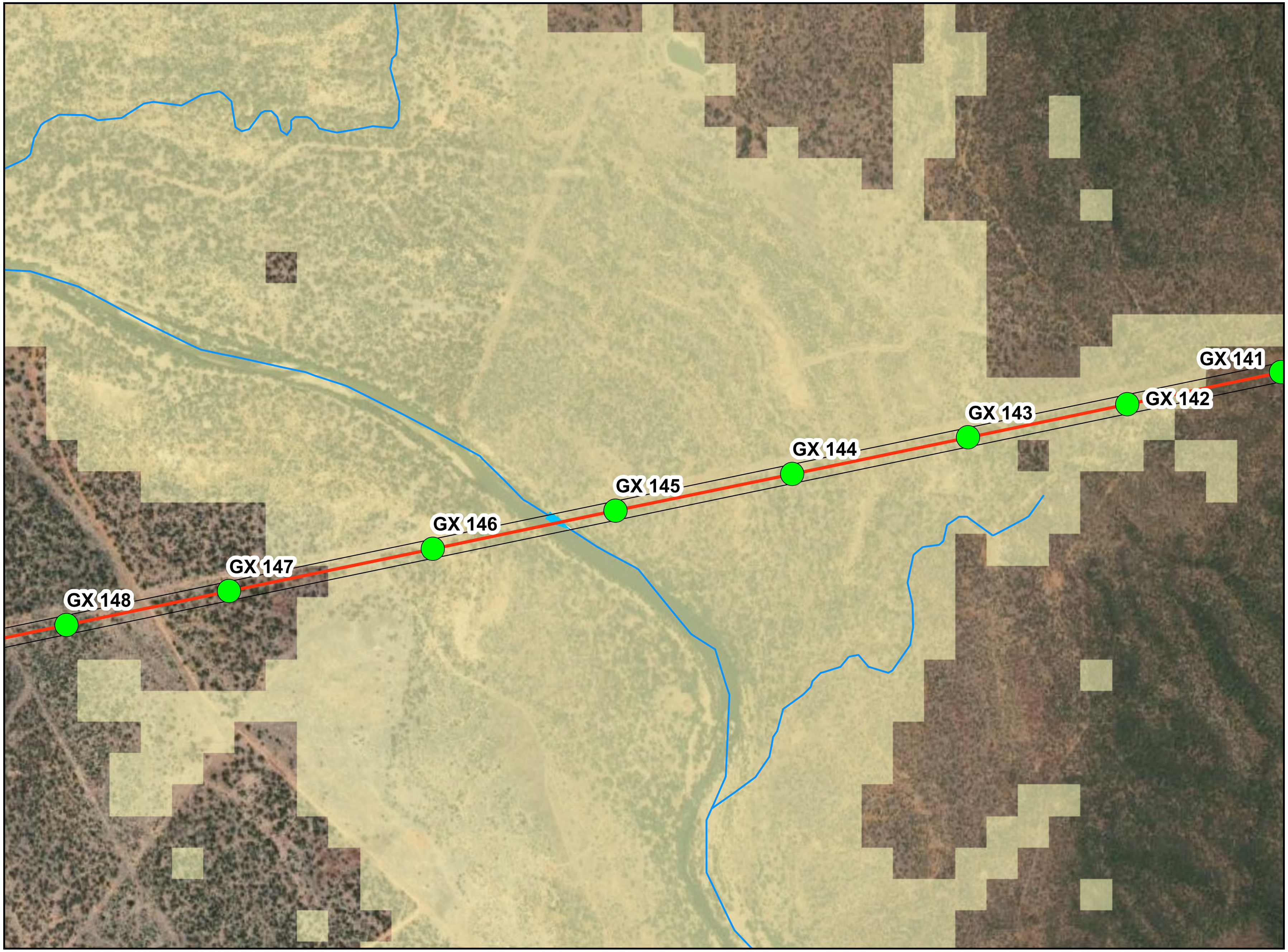
A4 size

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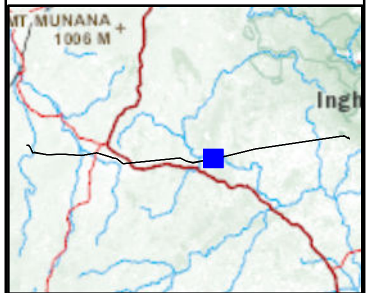
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 150 300 600
metres
1:17,300 (when printed at A4)

LEGEND

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Burdekin River**

| | |
|---|---|
| PROJECT ID | 60577456 |
| CREATED BY | floodmodellingtsv |
| LAST MODIFIED | 28-Sep-2021 |
| VERSION | 2 |

**A18**

A4 size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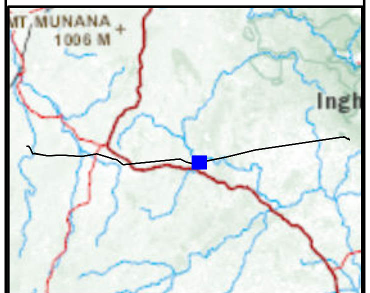
DATUM GDA 1994, PROJECTION MGA ZONE 55

0 25 50 100
metres
1:3,000 (when printed at A4)

**LEGEND**

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Gray Creek**

| | |
|---|---|
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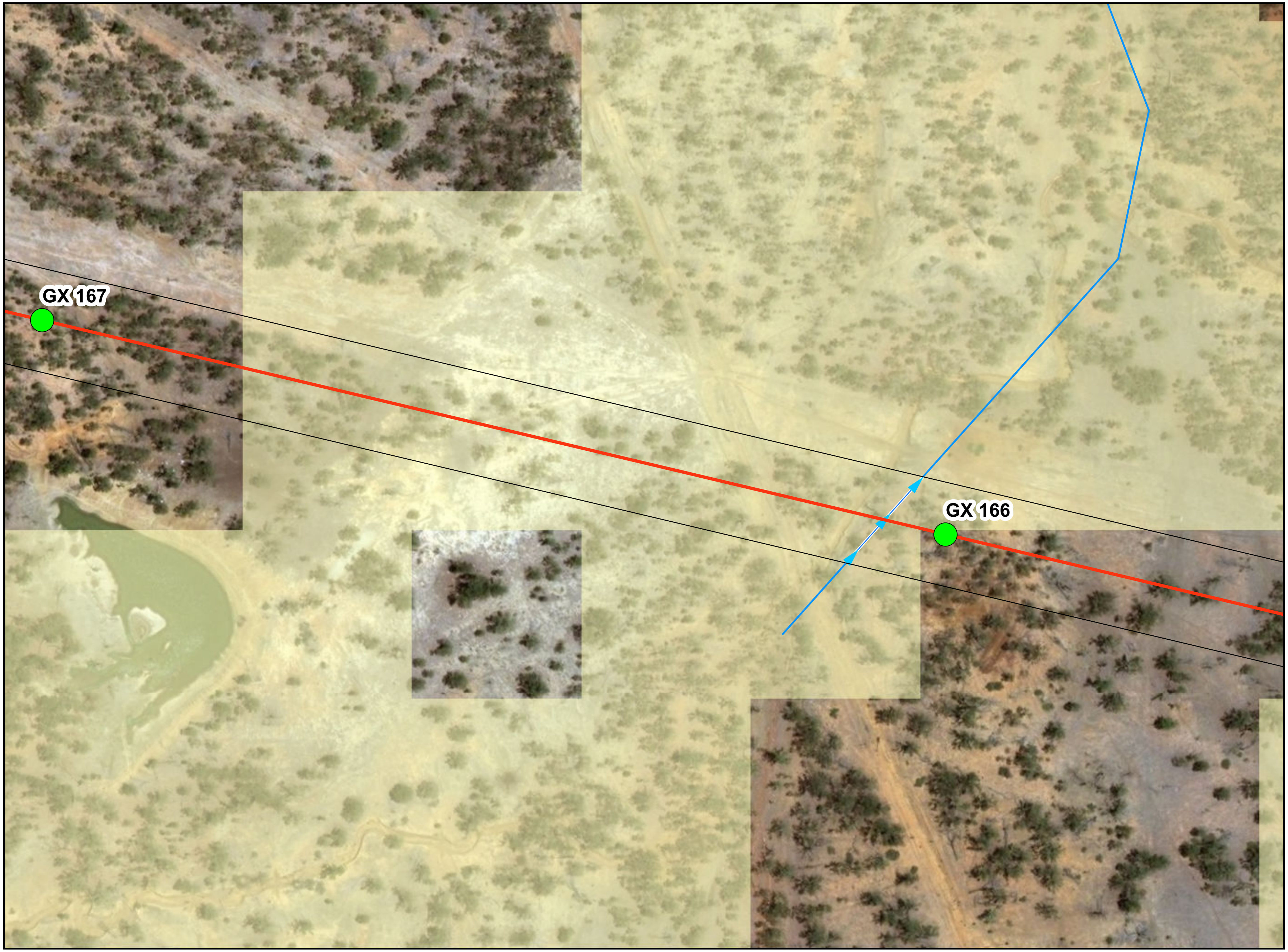


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N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 25 50 100
metres
1:3,200 (when printed at A4)

LEGEND
Proposed Structure
Preferred Transmission Line
Preferred Transmission Line Corridor
Watercourse
Flood Extents


Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

| | |
|---|---|
| PROJECT ID | 60577456 |
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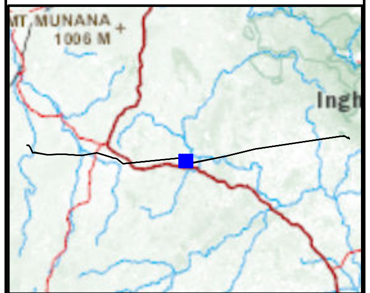
DATUM GDA 1994, PROJECTION MGA ZONE 55

0 25 50 100
metres
1:3,000 (when printed at A4)

LEGEND
- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

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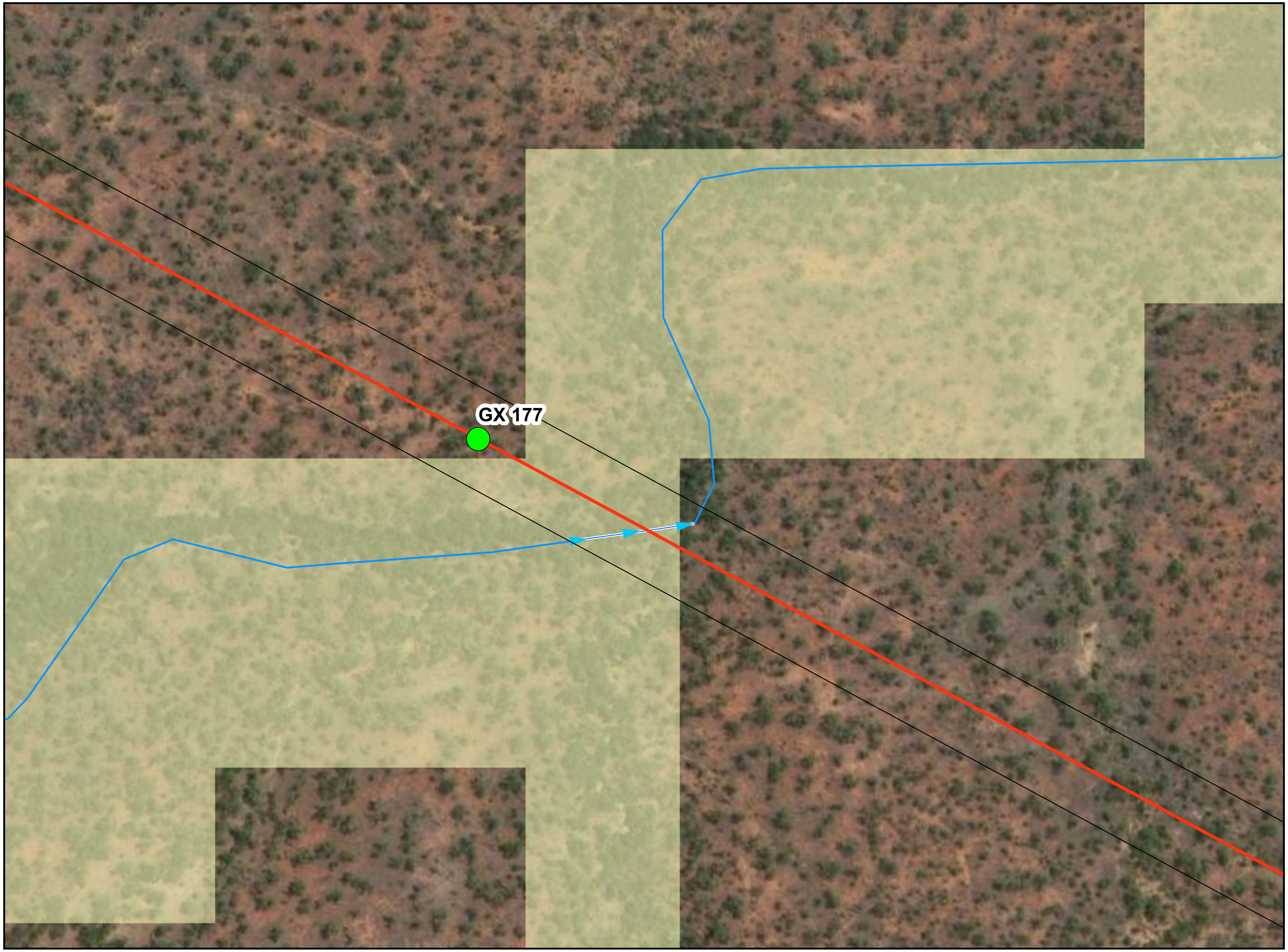


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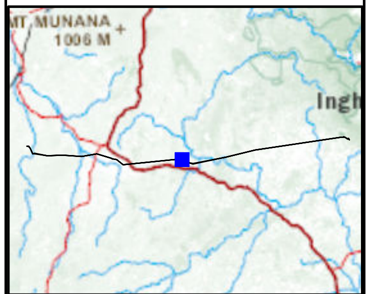
N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 30 60 120
metres
1:3,500 (when printed at A4)

LEGEND
Proposed Structure
Preferred Transmission Line
Preferred Transmission Line Corridor
Watercourse
Flood Extents




Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

| | |
|---|---|
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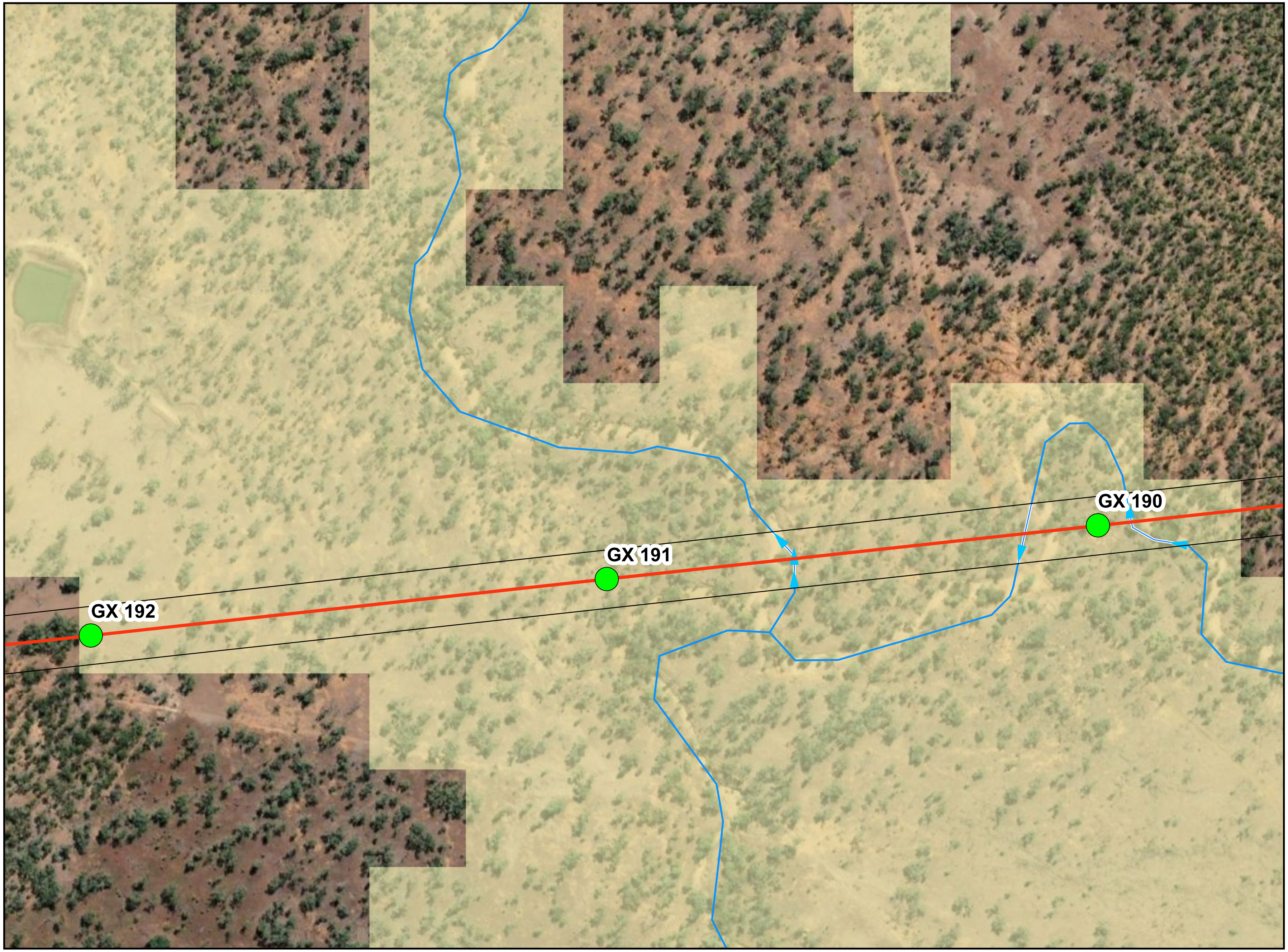


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N

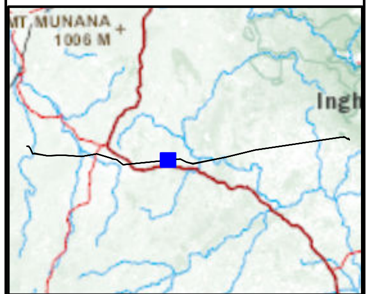
DATUM GDA 1994, PROJECTION MGA ZONE 55

0 45 90 180
metres

1:5,600 (when printed at A4)

**LEGEND**

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents




**Connection Project**
**Environmental Assessment Report**

**Hydrology Appendix**
**1% AEP Flood Extents**

**Paddy's Creek**

| | |
|---|---|
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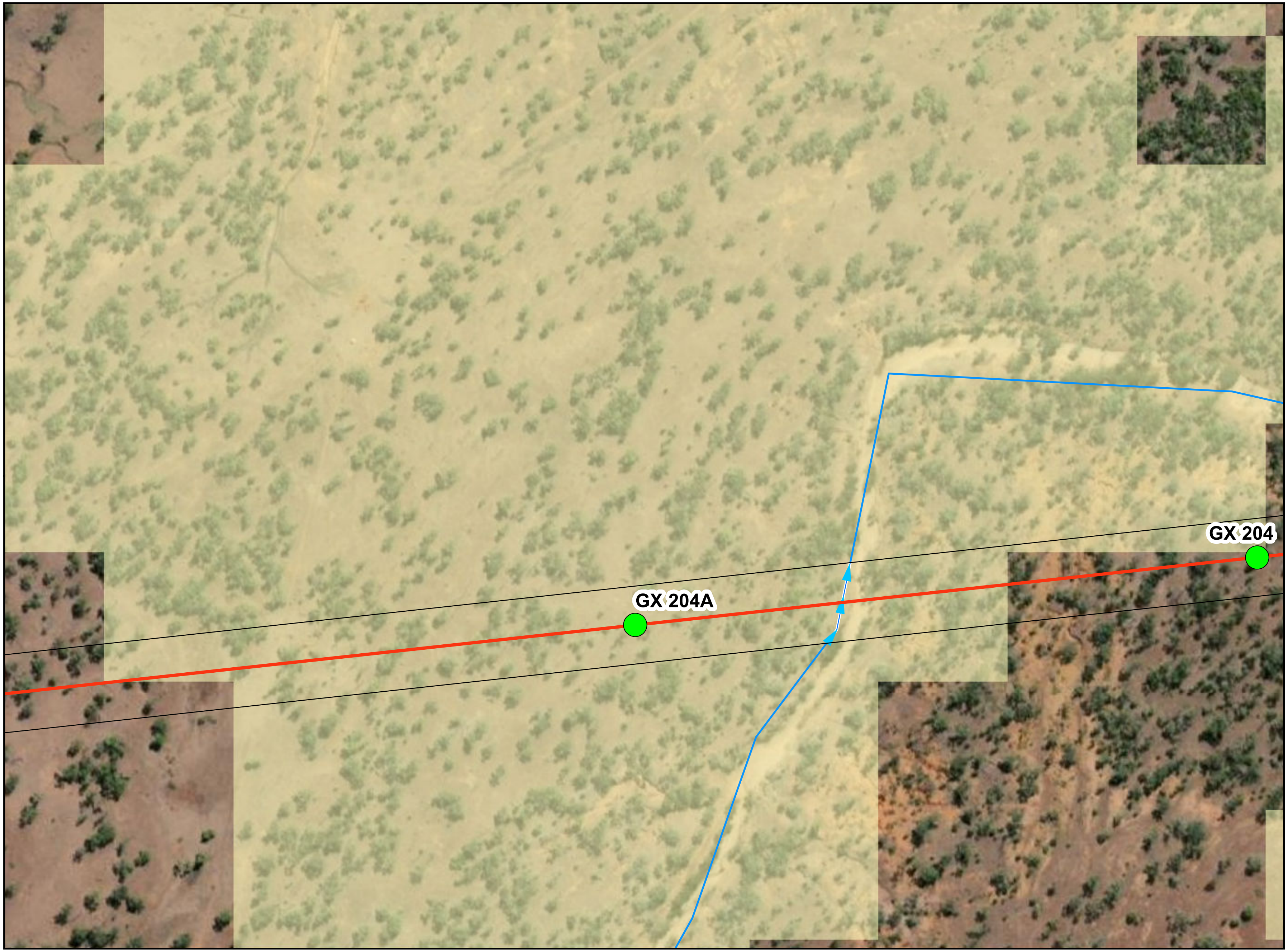



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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 35 70 140
metres
1:4,200 (when printed at A4)

LEGEND

- Proposed Structure
- Preferred Transmission Line
- Preferred Transmission Line Corridor
- Watercourse
- Flood Extents

Connection Project
Environmental Assessment Report

Hydrology Appendix
1% AEP Flood Extents

Unnamed Creek

| | |
|---|---|
| PROJECT ID | 60577456 |
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