Kalgoorlie Regional Renewable Energy Project

Surface Water Assessment

Prepared for:

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EXECUTIVE SUMMARY

Northern Star operates gold mines within the Goldfields region of Western Australia, including the Kalgoorlie Production Centre, which consists of the KCGM Operations, Carosue Dam Operations, and Kalgoorlie Operations. Norther Star proposes to develop the Kalgoorlie Reginal Renewable Energy (KRRE) Project, a solar and wind farm near the KCGM Operations, to support power supply to these surrounding operations.

The Project consists of a development envelope of approximately 23km^2. Within the development envelope, disturbance corridors are proposed which cover a total of 33 wind turbine stations, each spaced several hundred metres apart, and a solar farm with a footprint area of about 2km^2. Each wind turbine location consists of the wind turbine foundation footprint, plus an adjacent cleared laydown area. An access track will be constructed between the network of wind turbine footprints, with cabling connecting the wind turbines and the solar farm also following the access track alignment.

A surface water assessment has been completed to support environmental submissions to regulators. The assessment identified the potential surface water risks for the project to the environment. The Project lies within the overall Reaside-Ponton catchment with runoff from the Project area draining to the north towards a salt lake system located adjacent to Kanowna. The main drainage feature in proximity to the Project is an unnamed drainage channel (called Main Drainage Channel for the purposes of this report). A 2D flood model of the Project area was completed to assist in identifying the hydrological risks. The 2D model indicated that the Project is outside any major flood areas and only minor flow paths exist within the development envelope.

The surface water risk assessment identified three potential environmental impacts which had inherent (without adopting management measures) risks to the hydrological environment rated at a medium level. All three risks could be readily reduced to a residual risk rating by adopting routine management measures. The three risks and their proposed management measures were identified as:

- R3: Access tracks blocking flow paths – this risk can be reduced to a rating of “Low” by ensuring the track is constructed at grade, or as a floodway, to ensure runoff isn’t blocked by the track. If the track is built up above the natural ground surface, culverts should be installed to ensure runoff can continue downstream past the road.
- R4: Erosion due to increased runoff from the solar panels – this can be reduced to a rating of “Low” if the base material used beneath the solar farm (or the in-situ ground surface) is non-erosive, taking into account the force of runoff from the solar panel faces. Alternatively, a collector bund could be installed along the downstream boundary of the solar farm to pass runoff through a sediment basin prior to release downstream.
- R5: Spillage of hydrocarbons and other chemicals during construction and maintenance activities – this can be reduced to a rating of “Low” by following typical hazardous substance handling procedures and using spill kits to clean up any spilled material immediately after spillage occurs.

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1. INTRODUCTION

1.1 Background

Northern Star operates gold mines within the Goldfields region of Western Australia, including the Kalgoorlie Production Centre, which consists of the KCGM Operations, Carosue Dam Operations and Kalgoorlie Operations. Northern Star is proposing to develop a solar and wind farm in proximity to the KCGM Operations to the east of Kalgoorlie to support power supply for its surrounding operations. A surface water assessment was commissioned to inform the environmental planning and approvals for the Kalgoorlie Regional Renewable Energy (KRRE Project). The scope of the assessment included identification of the baseline surface water characteristics within the project area and surrounds, identification of potential surface water risks associated with the proposal, and (where risks were identified) recommendations for potential mitigation and management measures. Project Layout

The Project layout is within a development envelope of approximately 23km^2, as shown in Figure 1.1. Within the development envelope, an indicative disturbance footprint corridor is proposed, which covers a total of 33 wind turbines, each spaced several hundred metres apart, and a solar farm with a footprint area of about 2km^2. Each wind turbine location consists of the wind turbine foundation footprint, plus an adjacent cleared laydown area. An access track will be constructed between the network of wind turbines, with cabling connecting the wind turbines and the solar farm also following the access track alignment.

Figure 1.1 Northern Star Solar and Wind Project Layout

2. HYDROLOGY OVERVIEW

2.1 Regional Hydrology

The Project is located within the Goldfields Region of Western Australia, approximately 10km northeast of Kalgoorlie (Figure 2.1). The site lies within the overall Reaside-Ponton catchment which is an extensive regional catchment. The Project is located close to the top of this catchment divide with runoff draining to the north towards a salt lake system located adjacent to Kanowna. Potentially, this lake system could overflow and report to the east to Lake Yindarlgooda, a large ephemeral Salt Lake.

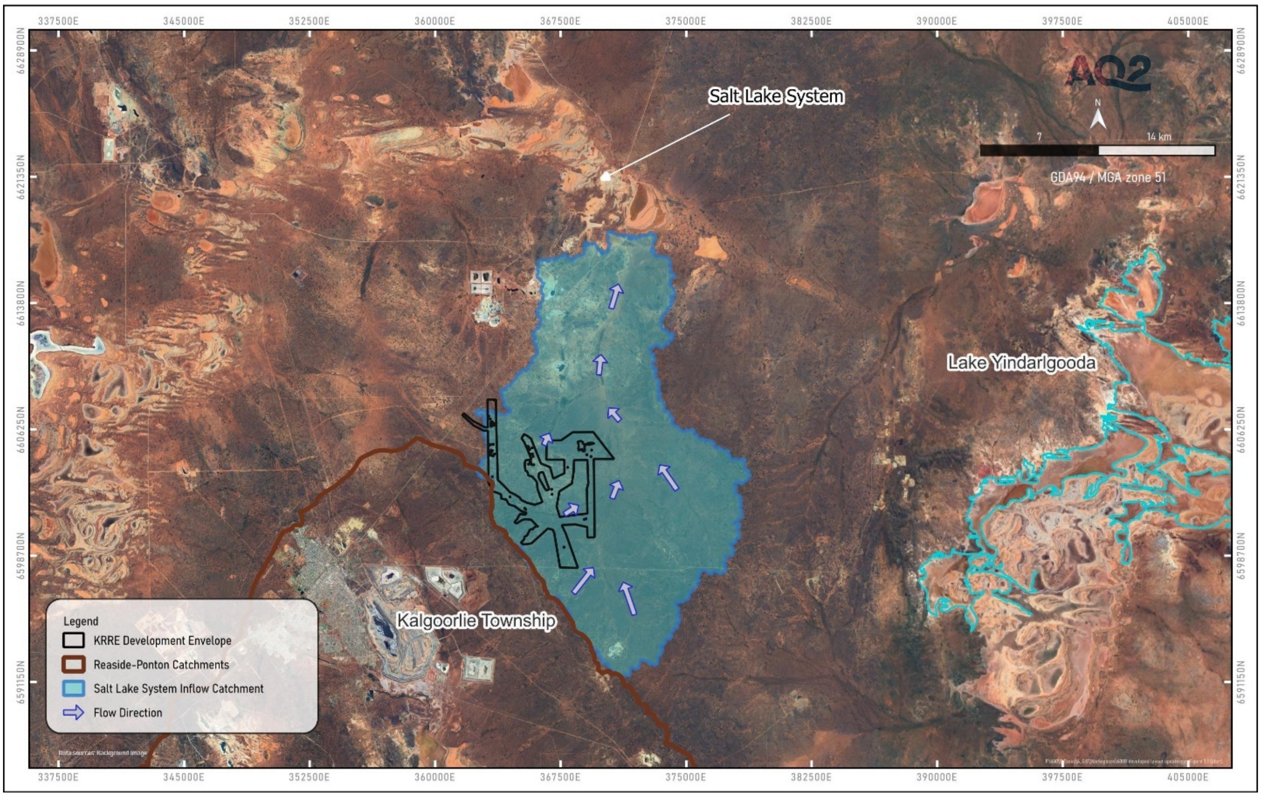

Figure 2.1 Regional Hydrology

2.2 Project Hydrology

The Project is located at the foot of an elevated range to the west, with the highest point in the range adjacent to the project being 410mRL, compared to the typical elevation of the Project being between 360mRL and 400mRL. East of the project, there is a drainage channel (called Main Drainage Channel for the purposes of this report) which would convey runoff from the Project area northwards (refer Figure 2.2). Terrain data and satellite imagery indicate that several smaller drainage paths traverse the proposed project location, draining west to east to the Main Drainage Channel. The catchment area of the Main Drainage Channel is shown in Figure 2.2.

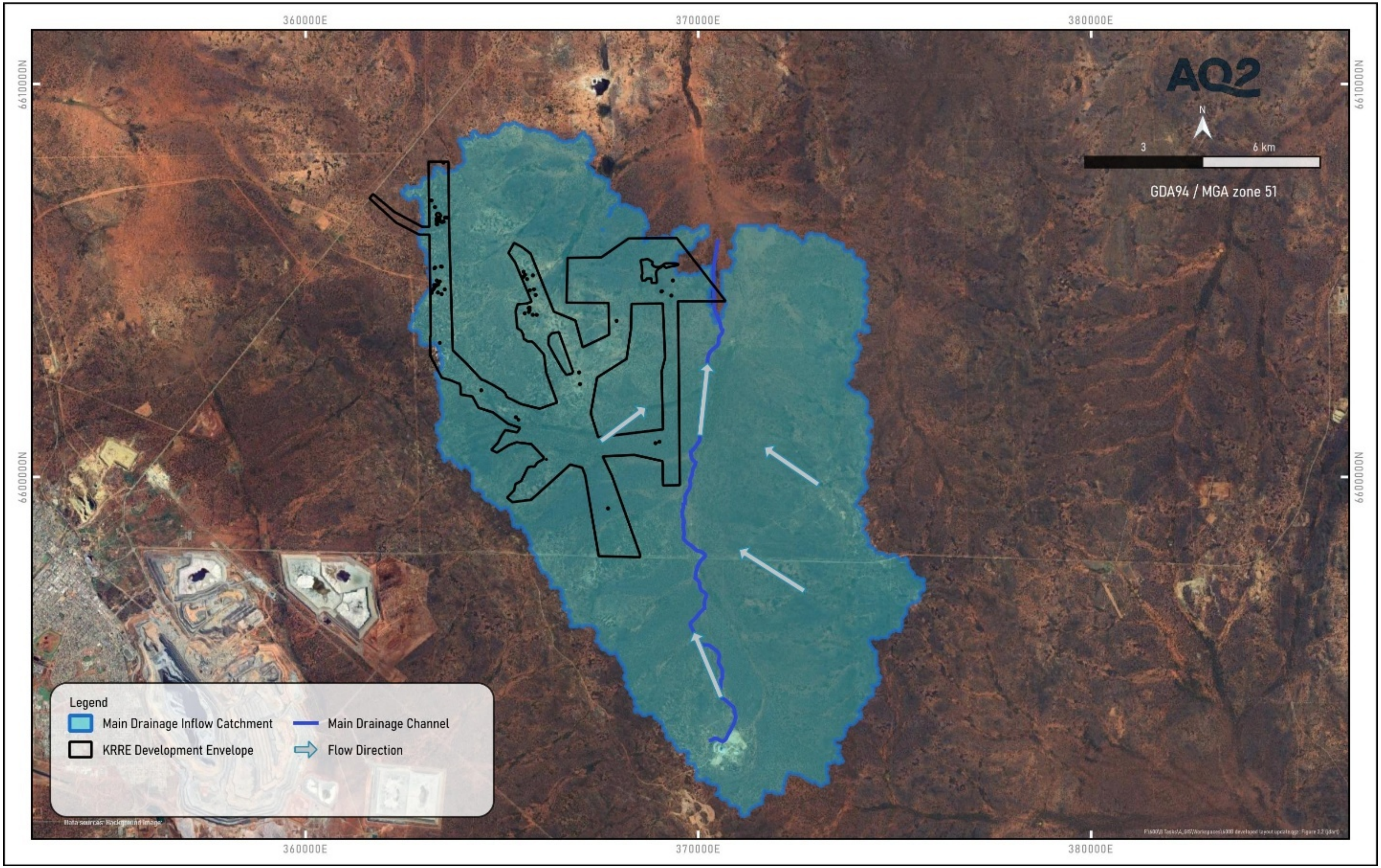

Figure 2.2 Project Hydrology

3. CLIMATE

The Project area is classified as having a Köppen climate classification of arid climate with dry, hot summers and cold winters (Bureau of Meteorology (2025). Annual rainfall can vary significantly in this area, ranging from a minimum of 100mm to a maximum of over 500mm in single year (530.8mm in 1992). The average annual rainfall at Kalgoorlie-Boulder Airport (BoM Site number 012038) is 266mm, and average evaporation exceeds average rainfall in most months of the year.

3.1 Design Rainfall (IFDs)

Australian Rainfall and Runoff (ARR) (Ball, et. Al 2019) recommends the use of Annual Exceedance Probability (AEP) defining flood probability, so has been adopted throughout this report. AEP is defined as the probability or likelihood of an event occurring or being exceeded within any given year, usually expressed as a percentage. This new terminology supersedes the Annual Recurrence Interval (ARI) terminology adopted in the earlier revision of ARR (Institution of Engineers, Australia 1987). The relationship between ARI and AEP is defined below:

$$AEP = 1- \exp\left(\frac{-1}{ARI}\right)$$

For example, a 1 in 100 ARI event would occur on average once every 100 years and has 1% chance of occurring in a particular year (i.e. 1% AEP), The assessment presented in this report was based on the 1% AEP design event.

Table 3.1 Project IFD

Duration	50%	20%	10%	5%	2%	1%
5 min	4.65	7.22	9.17	11.2	14.3	16.9
10 min	6.81	10.6	13.5	16.7	21.3	25.2
15 min	8.24	12.9	16.4	20.2	25.7	30.5
20 min	9.31	14.5	18.5	22.8	29	34.3
30 min	10.9	16.9	21.5	26.5	33.7	39.8
45 min	12.6	19.5	24.8	30.4	38.6	45.5
1 hour	13.9	21.4	27.2	33.3	42.3	49.8
2 hour	17.2	26.6	33.7	41.2	52.4	61.8
3 hour	19.5	30.1	38.2	46.8	59.6	70.4
4.5 hour	21.9	34.1	43.4	53.4	68.2	80.8
6 hour	23.9	37.2	47.6	58.8	75.3	89.4
9 hour	26.8	42.2	54.3	67.5	86.9	104
12 hour	29.1	46.1	59.6	74.6	96.3	115
18 hour	32.6	52	67.8	85.6	111	133
24 hour	35.1	56.5	74	93.9	122	147
30 hour	37.1	60	79	101	131	158
36 hour	38.7	62.9	83	106	138	166
48 hour	41.3	67.3	89.1	114	149	180

Duration	50%	20%	10%	5%	2%	1%
72 hour	44.6	73	96.9	124	163	197
96 hour	46.7	76.4	101	130	171	206
120 hour	48.2	78.6	104	133	175	212
144 hour	49.2	79.9	105	135	177	215
168 hour	49.9	80.8	106	135	179	217

4. FLOODING ASSESSMENT

To assist with the evaluation of the hydrology of the project area and identification of the potential impacts of the proposed KRRE Project, a two-dimensional (2D) flood model was constructed.

The extent of the 2D flood model matched the provided detailed terrain data and covered the extent of the KRRE Project development envelope. The model accounted for rainfall over the model domain plus inflows to the model domains from external catchments.

4.1 Hydrological Assessment

A rain-on-grid 2D model assessment was completed covering the Main Drainage Channel and the development envelope. The 2D model domain compared with the catchment divides is shown in Figure 4.1. The model domain extends past the western boundary of the surface water catchment but doesn't cover the full catchment area for the Main Drainage Channel. Runoff rates from the Main Drainage Channel catchment external to the model domain (Catchment A) have been estimated separately and added as an inflow to the model boundary. Catchment A represents an area of 90km^2.

To simulate flows through the model domain, the following hydraulic assessments were completed:

- For the purposes of simplifying the model, runoff from Catchment A has all been added to the model at the Main Drainage Channel on the southern model boundary.
- The runoff from Catchment A has been estimated using the Flavell Regional Flood Frequency Procedure (Flavell, 2012), with an estimated peak 1% AEP runoff rate of 190m^3/s, while accounting for potential climate change impacts as per the Australian Rainfall and Runoff Guidelines (ARR 2024). This rate was applied to the model (conservatively) as a continuous inflow rate throughout the model simulation.
- A rain-on-grid routine was run over the model domain to simulate local runoff reporting to the Main Drainage Channel. A 6-hour nested frequency storm using 1% AEP rainfall depths was used to simulate the rainfall event. To account for climate change, the Long- Term (2080 period) Medium RCP4.5 was used, as the basis for selection of the climate change multiplier for (ARR2024) for location. With a rainfall depth increased with the rainfall depths increased by 24% to account for climate change, Australian Rainfall and Runoff Guidelines (ARR 2024). A rainfall loss of 67.8% (increased by 13%).
- Catchment A and the rain-on-grid routine are applied simultaneously.

4.2 Surface Water 2D Model Build

A 2D flood model was developed using HEC-RAS V6.7 modelling software. A summary of the model build is as follows:

- A 50 x 50m calculation grid was used across the whole 2D model extent.
- The terrain data used in the model was provided by Northern Star (19 March 2025). A section of the Main Drainage Channel was not covered by the LiDAR data (Figure 4.2). To allow the flows through the Main Drainage Channel to be simulated, SRTM data was sourced and stitched in with the LiDAR data. The SRTM data did not have sufficient resolution to define the low flow channel of the Main Drainage Channel within the model domain. To approximate the expected runoff behaviour through the Main Drainage Channel, the SRTM data was modified to include a nominal channel to allow Main Drainage Channel flow to be conveyed through the SRTM data section of the model. As such, the predicted flood regime characteristics within the SRTM area are not considered to be reliable but have been included in the model only to allow Main Drainage Channel flows to continue through the model domain.

- Manning's n roughness coefficient of 0.06 was adopted across the whole model domain.
- Inflow from the upstream catchment (Catchment A) was applied as a constant inflow to the model boundary as shown in Figure 4.3.
- A rain-on-grid method was used to simulate runoff for the 1% AEP nested frequency storm across the 2D model domain.
- Variable timestep was used, which is calculated internally by the model using a maximum Courant Number of 1.

4.3 2D Flood Model Results

1% AEP baseline flood predictions from the 2D model are presented in Figure 4.4 (flood depth) and Figure 4.5 (flood velocity).

The 1% AEP flood model predictions indicate the following:

- The flow regime across the Project is characterised by concentrated sheet flow within poorly defined drainage corridors.
- A large portion of the wind turbine network (the western branch of the network) is located close to the catchment drainage divide and is unlikely to encounter any significant drainage issues.
- The access track and cable network associated with the wind turbines cross some of the tributaries to the Main Drainage Channel. These tributaries are typically shallow (<300mm) concentrated sheetflow areas.
- The majority of the proposed wind turbine footings are located outside of areas with predicted flood depths exceeding 100mm.
- The solar farm footprint is located within an area with a low flood risk. The catchment for the shallow sheetflow drainage path shown within the solar farm footprint is within the solar farm boundary.
- The flow velocities within the area of proposed development are relatively low (typically < 1m/s). outside of the area of flooding

The extent and depth of flooding, and the velocity of floodwaters, will be decreased in runoff events associated with smaller, more frequent rainfall events.

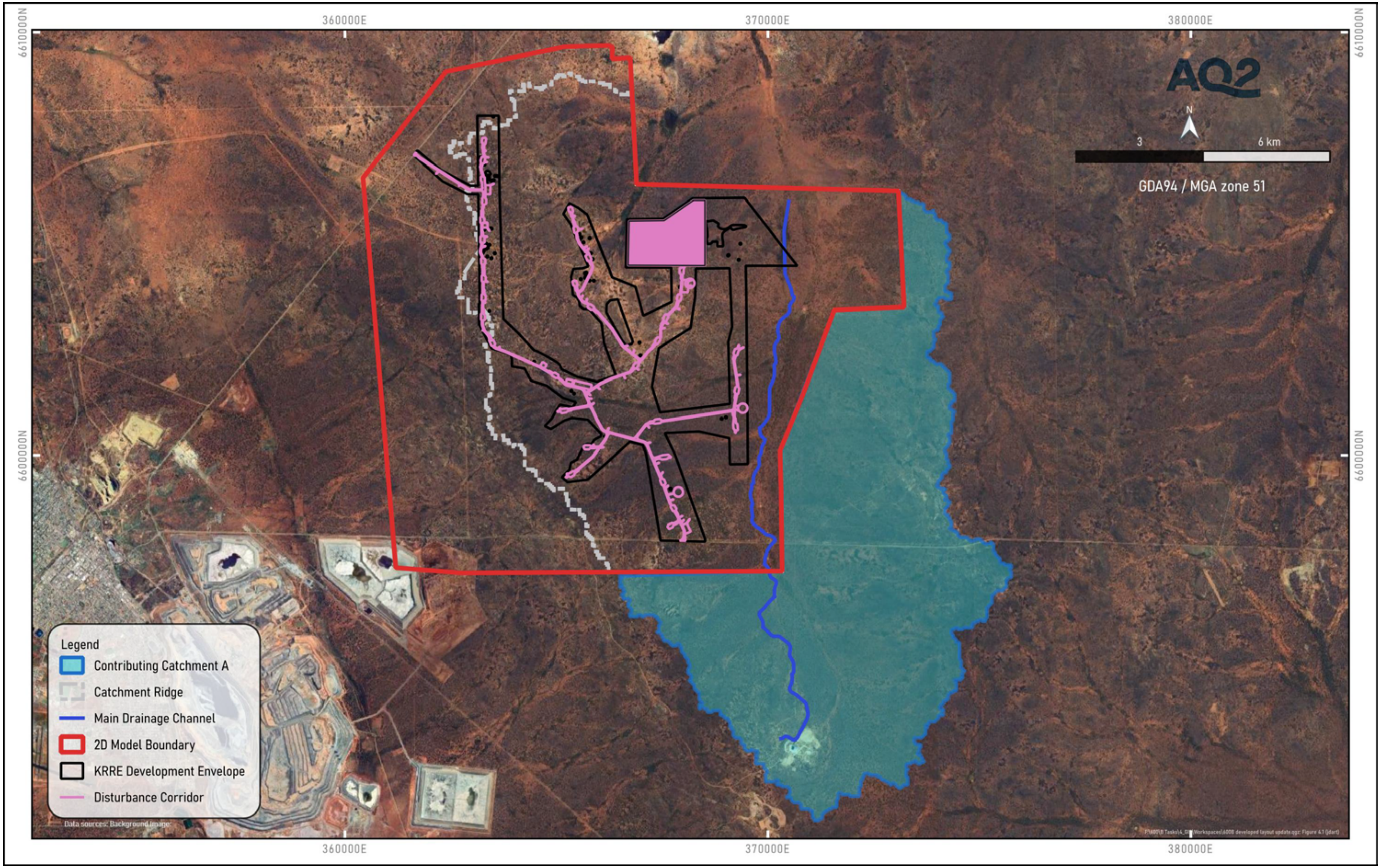

Figure 4.1 Model Contributing Upstream Catchment

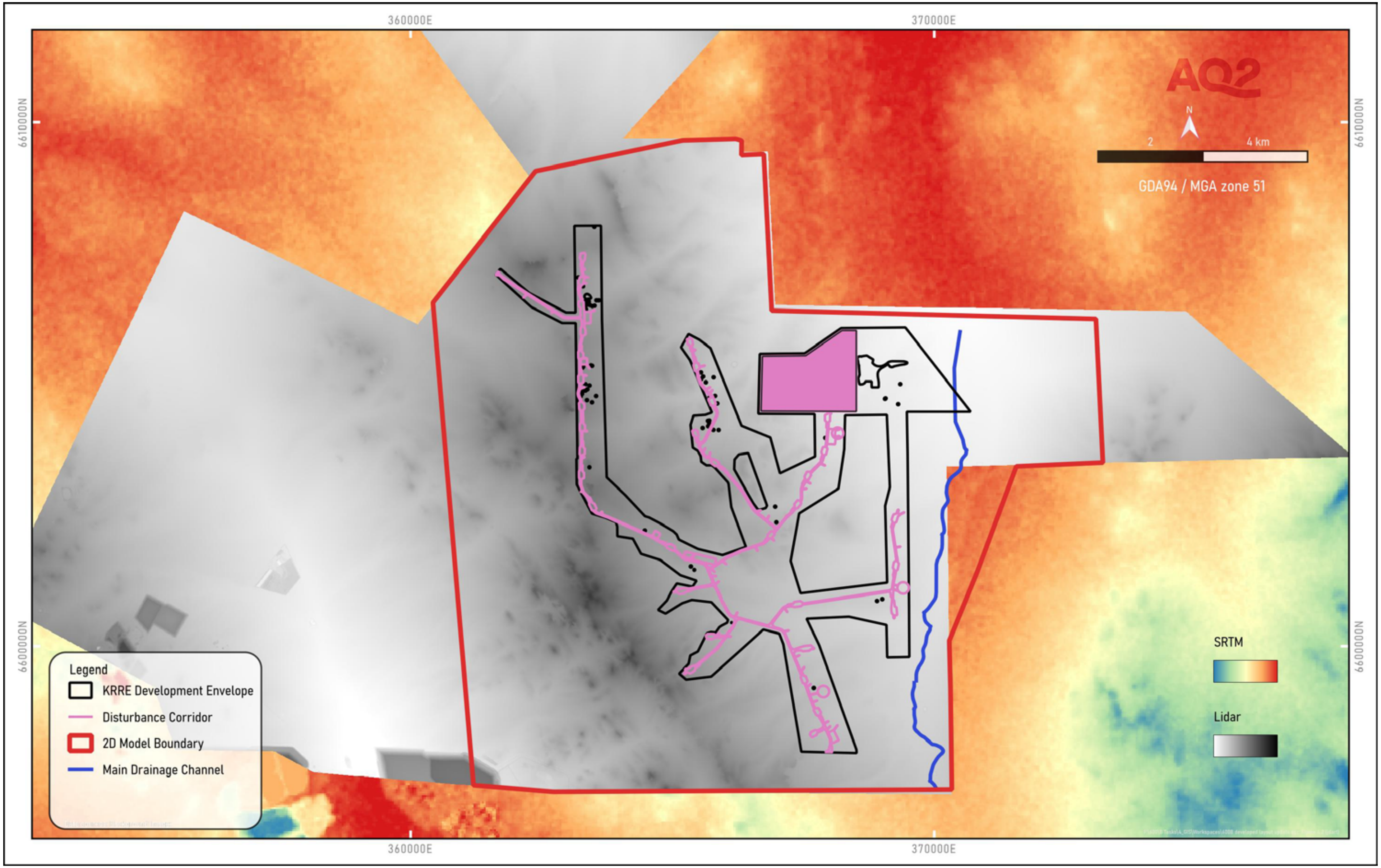

Figure 4.2 Lidar and SRTM Realignment Location

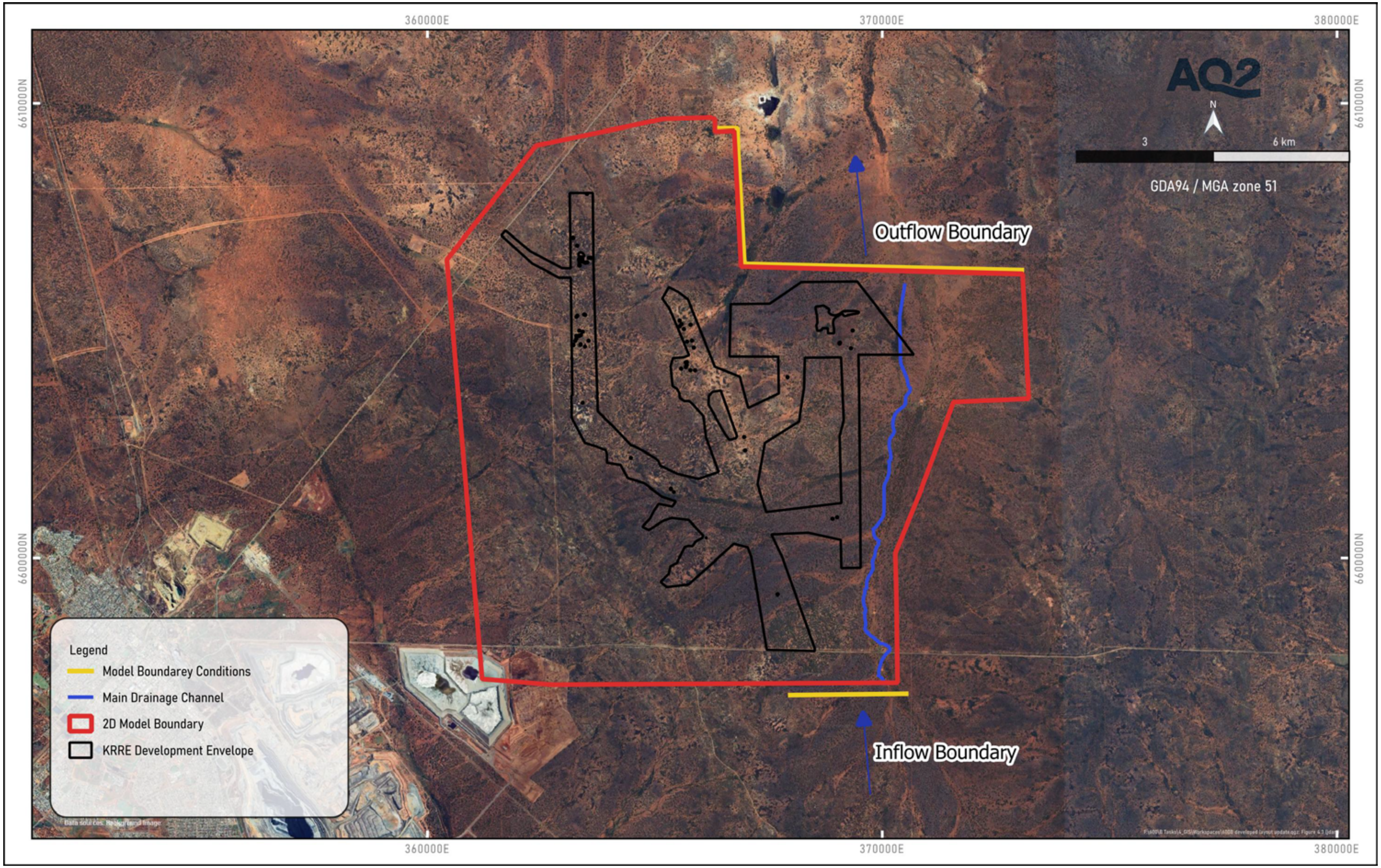

Figure 4.3 2D Model Setup

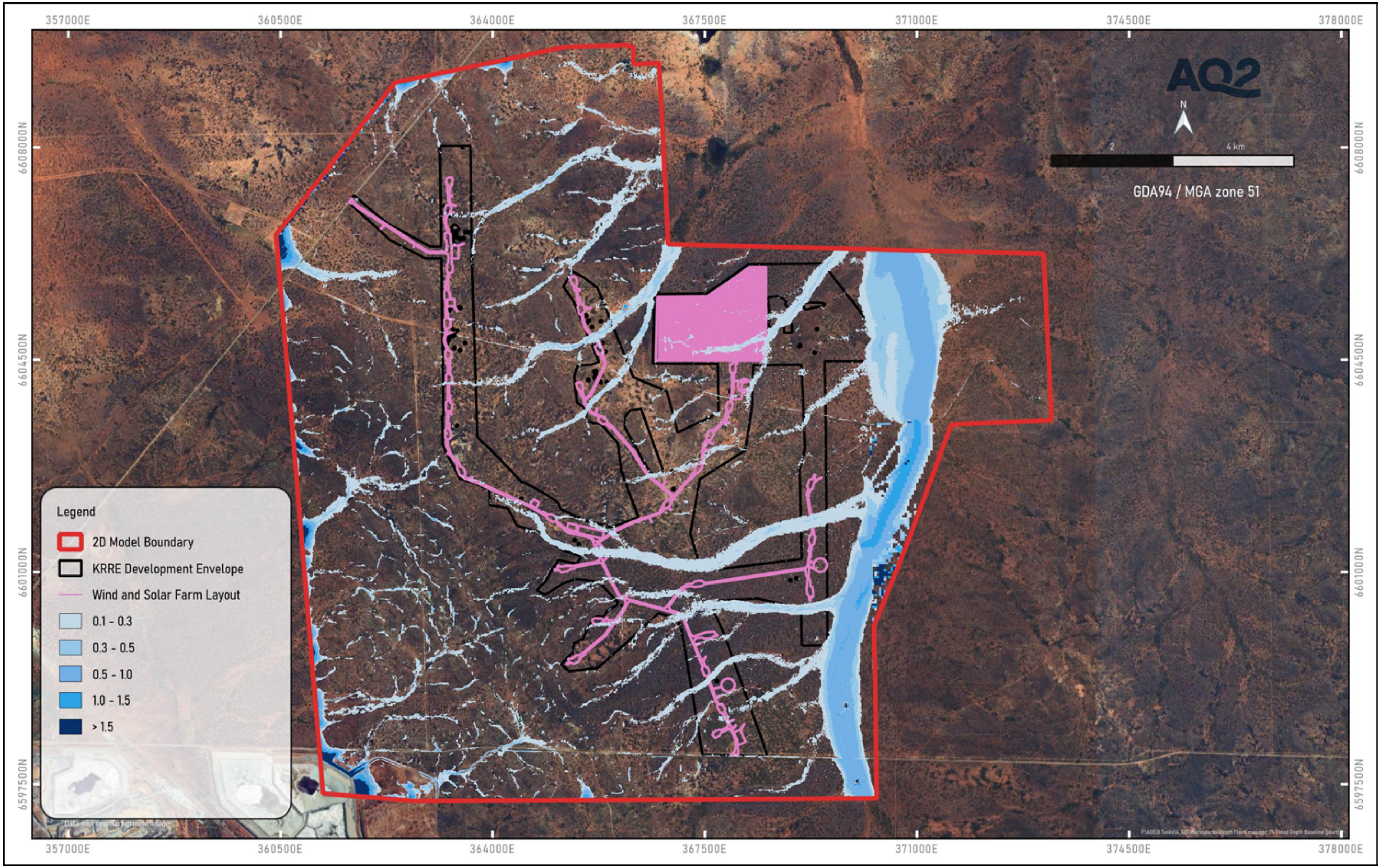

Figure 4.4 1%AEP Baseline Flood Depth

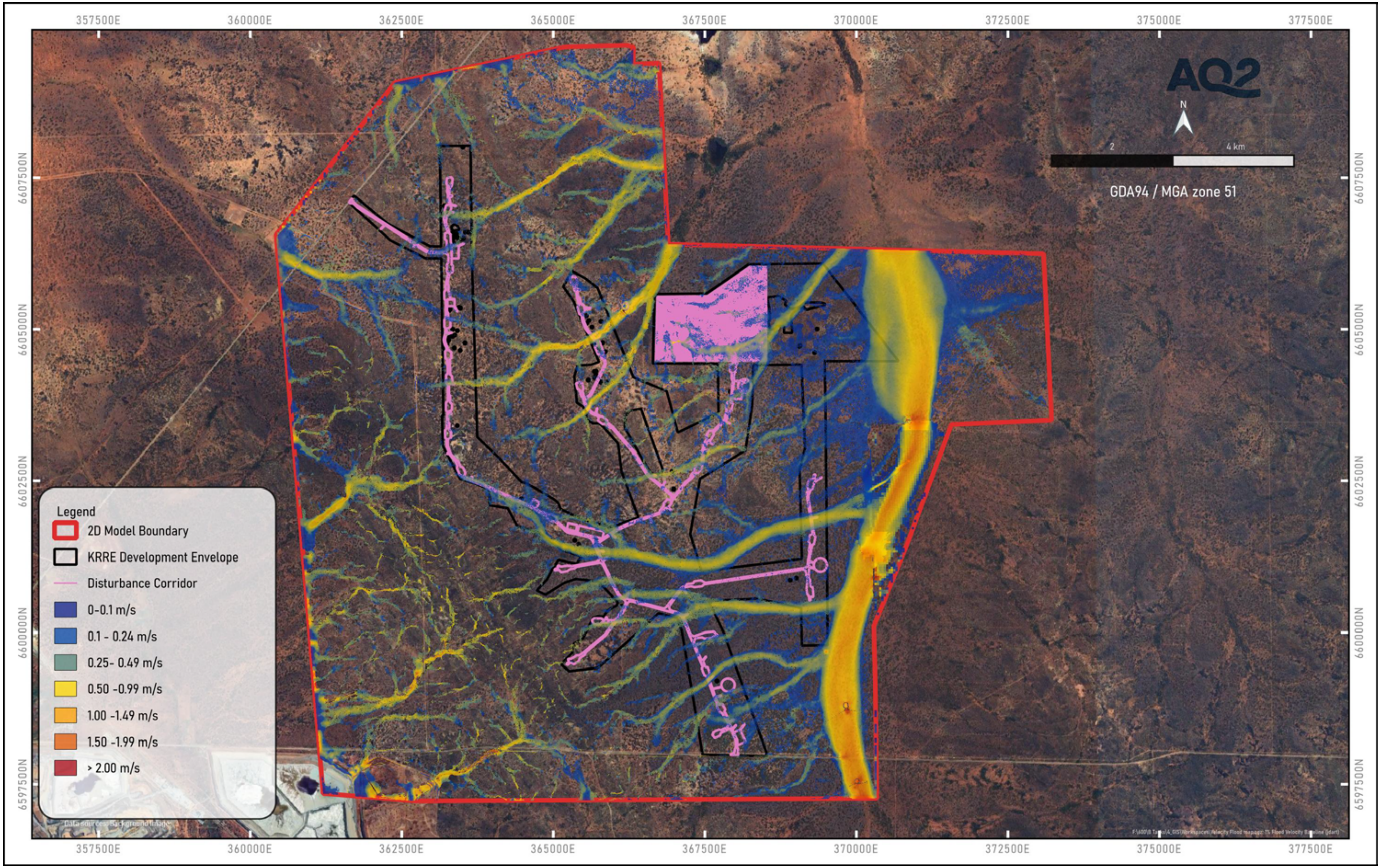

Figure 4.5 1%AEP Baseline Flood Velocity

5. HYDROLOGICAL IMPACT AND RISK ASSESSMENT

5.1 Identification of Potential Impacts

The potential impacts of the KRRE to the hydrological environment, and of the hydrological environment to the KRRE Project have been identified, prior to consideration of mitigation measures. These represent the potential inherent risks associated with the KRRE Project. The potential inherent impacts:

- Modification of the existing hydrological regime, by increasing or decreasing water availability and flood levels within the environment.
- Increased risk of erosion and subsequent sedimentation in downstream areas.
- Degradation of water quality through the discharge of chemicals.
- Impact to constructed infrastructure of flooding.

The potential impacts for each of these categories are discussed further below, together with a risk assessment of these potential inherent impacts.

5.1.1 Modification to the Hydrological Regime

The Project is unlikely to result in significant changes to the existing hydrological regime, given that the majority of the proposed disturbance footprint is located outside of areas that are susceptible to flooding. The following potential impacts have been considered:

- Solar farm area is likely to generate higher volume of runoff than the existing land surface, given the installation of impervious solar panels. Although the additional water is unlikely to have any direct impacts to the environment, there is an indirect risk of increased erosion within the solar farm footprint and immediately downstream of the solar farm (refer to the following section).
- The access tracks cross the shallow sheetflow drainage areas and may result in a reduction of flow downstream of the tracks and ponding upstream of the tracks.

5.1.2 Increased Erosion Risk

As discussed above, the installation of the solar farm may result in an increased risk of local erosion from runoff from the solar panels themselves, and downstream of the Project from increased total runoff from the solar farm footprint.

5.1.3 Impacts to Water Quality (Chemical)

There is potential for contamination of surface water runoff in the event of hydrocarbon or chemical leaks during construction of the wind and solar farm, or during maintenance of the wind turbines. The volume of chemicals stored on site is expected to be relatively low and therefore the risk of this impacting the environment is also low.

5.1.4 Hydrological Impacts on the Project

Mapping of flood modelling predictions for the 1% AEP flood event has indicated that there is limited risk of significant flooding occurring within the solar farm footprint or at the proposed footings for the wind turbines. The management of any minor flooding in these locations is being addressed by the designers of the wind and solar farm.

5.2 Risk Assessment

The previous section identified the potential impacts of the Project on the hydrological regime. The following section assesses the inherent risk of the Project to hydrological and environmental receptors in the surrounding area, and the residual risk following application of any proposed mitigation measures (where risks are significant).

The hydrological risk assessment has been completed by adopting the NSR semi-quantitative risk matrix template (shown in Appendix A). Application of the matrix involves rating each impact with respect to:

- The plausible consequence of the impact resulting from the proposed infrastructure or activity.
- The likelihood of the adverse impact occurring.

NSR has provided descriptors for each of the consequence and likelihood aspects of the risk assessment, which have been adapted for this assessment.

The likelihood of an impact occurring is focused on the frequency or probability of different scale rain events (i.e. Annual Exceedance Probability or AEP) during the expected life of the Project. The Likelihood rating ranges from Rare to Almost Certain.

The components of the Risk Matrix include “Likelihood Descriptors”, “Consequence Descriptors” and the Risk Matrix table that cross-references the likelihood and consequence categories to determine the overall risk level.

5.2.1 Inherent Unmitigated Hydrological Risks

The DMPE (formerly DEMIRS) guideline document “Guideline for preparing Mining Development and Closure Proposals” (DEMIRS 2025) states that environmental assessments address the objectives of the DEMIRS environmental objectives. The evaluation of Inherent Risks (i.e., prior to the application of mitigation or management measures) associated with the Project have therefore been considered in relation to the different key environmental objectives (DEMIRS 2024). An excerpt of Table 1 from the publication is shown below, with the ‘Inland Waters’ factor being the most relevant for this assessment.

Table 1

Factor	Objective
Flora, vegetation and fauna	To protect flora and vegetation, subterranean fauna, and terrestrial fauna so that biological diversity and ecological integrity are maintained.
Inland waters	To maintain the hydrological regimes, quality and quantity of groundwater and surface water so that environmental values are protected.
Terrestrial environmental quality	To maintain the quality of land and soils so that environmental values are protected.
Rehabilitation and Mine Closure	Mining activities are rehabilitated and closed in a manner to make them physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/non-contaminating, and capable of sustaining an agreed post-mining land use, with consideration for cultural values and without unacceptable liability to the State.

Source: DEMIRS 2024

A Risk Matrix (Appendix A) was developed and includes a combined Risk Rating for each of the identified potential impacts for the development, which accounts for both the consequence and likelihood of the impact event.

5.2.2 Risks and Proposed Management

The risk matrix shown in Appendix A shows that most inherent risks are rated as 'Low,' with some identified as 'Medium.' After applying the recommended mitigation measures, all residual risks are reduced to Low. The proposed mitigation measures to reduce the identified Medium inherent risks to Low are as follows:

- R3: Access tracks blocking flow paths – this risk can be reduced to a rating of "Low" by ensuring the track is constructed at grade, or as a floodway, to ensure runoff isn't blocked by the track. If the track is built up above the natural ground surface, culverts should be installed to ensure runoff can continue downstream past the road.
- R4: Erosion due to runoff from the solar panels – this can be reduced to a rating of "Low" if the base material used beneath the solar farm (or the in-situ ground surface) is non-erosive, taking into account the force of runoff from the solar panel faces. Alternatively, a collector bund could be installed along the downstream boundary of the solar farm to pass runoff through a sediment basin prior to release downstream.
- R5: Spillage of hydrocarbons and other chemicals during construction and maintenance activities – this can be reduced to a rating of "Low" by following typical hazardous substance handling procedures and using spill kits to clean up any spilled material immediately after spillage occurs.

6. CONCLUSION

The KRRE Project layout appears to avoid encroachment into the 1% AEP flood plain of the Main Drainage Line, and there are limited hydrological risks from the Project to the hydrological environment, and from the hydrological environment to the Project. 2D flood modelling was completed to estimate the flood extents from the local catchments and the upstream catchment of the Main Drainage Line.

Although the risks are typically rated as Low, a couple of Medium risks were identified. These risks could be easily managed by the following mitigation measures:

- Constructing an access track at the same level as the ground surface to allow surface water flow downstream. Alternatively, if access tracks are built up, installation of culverts can allow surface water to flow. The drainage lines, which may be impacted by the access tracks, are minor, concentrated shallow sheetflow areas.
- Ensuring that the pad on which the solar farm is constructed is non-erosive from runoff from the solar panel surfaces. Alternatively, a sediment collection bund could be installed downstream of the solar farm to divert runoff through a sediment basin prior to discharge to the downstream environment.
- Managing hydrocarbons and other chemicals to ensure contamination of the downstream environment doesn't occur.

7. REFERENCES

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APPENDIX A
RISK MATRIX

7 Environmental Risk Management

7.1 Methodology

Northern Star has a risk assessment process to identify significant risks and ensure that appropriate management strategies are implemented to reduce potential impacts to people, the environment or community. The risk assessment identifies the hazards associated with planned activities, the likelihood of it occurring and the potential consequence (**Tables 15 - 18**).

- Risk assessments are utilised to:
- Identify activities that could result in safety, environmental or community impacts;
- Quantify the level of inherent risk (pre-treatment) of the activity i.e. no control measures applied;
- Develop appropriate control measures to reduce the residual risk (post-treatment);
- Document these processes so they form part of the EMS; and
- Routinely monitor and review the effectiveness of these processes and control measures aiming for continuous improvement.

The aim of the process is to reduce the residual risk to 'As Low as Reasonably Practicable' (ALARP). The best way to control a risk is to eliminate the hazard altogether, however this is not always practicable. Northern Star use the 'Hierarchy of Control' which is widely accepted as a systematic approach to risk management. It provides a structure to select the most effective control measures to eliminate or reduce the risk of identified hazards.

Table 15. Likelihood Categories

	Description	Criteria (read as either/ or)
LIKELIHOOD	Almost Certain **(A)**	The event is expected to occur in most circumstances; Once per week
	Likely **(B)**	The event will probably occur in most circumstances; Once per month
	Possible **(C)**	The event could possibly occur at some time; Once per year
	Unlikely **(D)**	The event could possibly occur at some time but is unlikely; Once every 5-10 years
	Rare **(E)**	The event may occur in exceptional circumstances; >10 years

Table 16. Consequence Categories

	Insignificant (5)	Minor (4)	Moderate (3)	Major (2)	Catastrophic (1)
Biodiversity	- Negligible localised ecosystem component impact, contained.	- Minor ecosystem component impact within site boundary, contained.	- Moderate ecosystem component impact, extends beyond site boundary, uncontained. - Able to be remediated in short-term.	- Severe ecosystem component impact requiring long-term remediation. - Severe impact to a priority species.	- Severe permanent ecosystem component impact. - Total loss of a priority species.
Water	- Negligible localised surface/ groundwater impact, contained.	- Minor surface/ groundwater impact within site boundary, contained.	- Moderate surface/ groundwater impact, extends beyond site boundary, uncontained. - Able to be remediated in short-term.	- Severe surface/ groundwater impact requiring long-term remediation.	- Severe permanent surface/ groundwater impact.
Land and Soil Degradation	- Negligible localised environmental impact, contained.	- Minor environmental impact within site boundary, contained.	- Moderate environmental impact, extends beyond site boundary, uncontained. - Able to be remediated in short-term.	- Severe environmental impact requiring long-term remediation.	- Severe permanent environmental impact.
Rehabilitation and Mine Closure	- Site is safe. - Stability or pollution issues are localised and contained. - Post-mining land use is not impacted.	- Site is safe. - Stability or pollution issues are localised and contained. - Short-term management required by post-mining land user.	- Site is safe. - Stability or pollution issues require ongoing/ long-term management by post-mining land user.	- Site cannot be considered safe, stable or non-polluting without significant intervention. - Post-mining land use cannot proceed.	- Site is permanently unsafe, unstable and/ or polluting. - Post-mining land use cannot be achieved.

Table 17. Risk Ranking Matrix

			CONSEQUENCE				
			Insignificant	Minor	Moderate	Major	Catastrophic
			5	4	3	2	1
LIKELIHOOD	**Almost Certain -** Expected occurrences - once per week	A	5A Medium	4A Medium	3A High	2A High	1A High
	Likely - Probable occurrences - once per month	B	5B Medium	4B Medium	3B High	2B High	1B High
	Possible - Possible occurrences - once per year	C	5C Low	4C Medium	3C Medium	2C Medium	1C High
	Unlikely - Unlikely to occur - once every 5-10 years	D	5D Low	4D Low	3D Low	2D Medium	1D Medium
	Rare - May occur in exceptional circumstances - >10 years	E	5E Low	4E Low	3E Low	2E Medium	1E Medium

Type	ID	Risk Pathway/Unwanted Event	Description of Impact	Consequence	Likelihood	Inherent Risk Rating	Risk Treatment/Mitigation Measure	Consequence	Likelihood	Residual Risk Rating
Modification to Hydrological Regime	R1	The installation of solar panels may result in an increase in an increase volume of runoff due to the impervious surfaces.	Additional runoff may result in a higher flow depths and flow volumes in downstream areas. Increased flow velocities may result in increased erosion (refer Risk R4). Given the flat area which the solar farm is proposed to be installed on, the highly variable rainfall regime and poorly defined drainages, the increased impervious area is unlikely to cause any significant change to the hydrological regime.	Insignificant	Possible	5C	None	Insignificant	Possible	5C
	R2	Flooding of the wind turbine infrastructure	The footings of some of the wind turbines' footprints may encroach within the extent of inundation of the shallow sheet-flow drainage areas predicted by the model. Given the shallow nature of the sheet flow and flatness of the topography, this is unlikely to have any impact to the hydrological regime of the area.	Insignificant	Possible	5C	Management of surface water around the wind turbine footings will be accounted for in the design of the wind turbines. Where required, minor v-drains may be installed to transfer nuisance runoff around the footings.	Insignificant	Unlikely	5D
	R3	Access tracks blocking flow paths.	Potential for ponding on the upstream side of roads and water starvation on the downstream side of roads. The access tracks only cross shallow (less than 30cm deep in 1% AEP event) sheetflow flow paths relatively high up in the catchment.	Minor	Possible	4C	Design of the access track shall ensure that runoff is allowed to pass to the downstream environment. Access shall either by constructed at grade, as floodways or with culverts installed.	Insignificant	Possible	5C

Type	ID	Risk Pathway/Unwanted Event	Description of Impact	Consequence	Likelihood	Inherent Risk Rating	Risk Treatment/Mitigation Measure	Consequence	Likelihood	Residual Risk Rating
Erosion and Sedimentation	R4	The installation of solar panels may result in an increased rate of runoff due to the impervious surfaces.	Potential increased erosion risk, particlularly locally at the base of solar panels.	Moderate	Possible	3C	Potential control measures which could be considered include: a) Ensuring the ground around the solar panels is competent, non-erosive considering runoff sheeting from the solar panels b) Installing a runoff collector bund along the downstream side of the solar farm area to collect runoff and divert through a sediment basin prior to release to the downstream environment.	Insignificant	Unlikely	5D
Water Quality	R5	Spillage of hydrocarbons and chemicals	Pollution of the downstream environment leading to environment damage.	Minor	Possible	4C	Operators to use standard storage, handling and transport procedures for chemicals while working on site. Spill kits to be used in the event of spills occuring during construction or maintenance activities.	Insignificant	Unlikely	5D