Appendix B Phillips Creek Diversion Functional Design Report

Phillips Creek Diversion Functional Design Report

Lake Vermont Resources

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Client	Lake Vermont Resources
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Executive Summary

As part of the Lake Vermont Northern Extension Project, Lake Vermont Resources (LVR) intends to mine the coal resource extending under Phillips Creek. Development of the mine pits in this area will require the diversion of a 2.5 km reach of Phillips Creek and the construction of approximately 7 km of levees (including the diversion plugs) to protect the mine workings from flooding.

Proponents seeking approval to divert a watercourse are encouraged to include a functional design report as a means of addressing diversion-related matters. This report has been prepared to address the requirements of the Department of Natural Resources and Mines' (DNRM) Guideline – Works that interfere with water in a watercourse: watercourse diversions (DNRM, March 2014).

A functional design has been prepared addressing the guideline objectives and design criteria:

OUTCOME 1 - The design incorporates natural features present in the local watercourses – it replicates the channel length, slope and cross-sectional shape. It incorporates meanders with radii, amplitude and magnitude similar to existing meanders in the adjacent reaches and the reach to be diverted. A revegetation plan will be established which will incorporate local native vegetation to achieve bank stability.

OUTCOME 2 – As the diversion is located on the edge of the floodplain, and it incorporates the above features, it maintains the existing hydrologic characteristics of surface water and groundwater systems.

OUTCOME 3 - The hydraulic characteristics of the design are comparable with those in the existing watercourse, and it is therefore suitable for the region in which the diversion is located.

OUTCOME 4 – As the hydraulic characteristics are largely unchanged, the sediment transport regime will allow the watercourse diversion to be self-sustaining and is unlikely to result in material or serious environmental harm on upstream and downstream reaches.

OUTCOME 5 - The watercourse diversion and associated structures maintain stability and functionality and are appropriate for all substrate conditions they encounter. The watercourse diversion and associated structures have been designed to maintain stability and functionality under the existing substrate conditions. The available information suggests the diverted channel is likely to encounter similar substrate conditions, but this will be confirmed in later design phases.

The intention is that the diversion will be stable and require minimal maintenance during mine operations. While erosion risks will require mitigation immediately post construction, it should ultimately achieve a state of dynamic equilibrium with the adjoining reaches such that ongoing management is not required post mining.

The functional design has been prepared with consideration of the following constraints and issues:

- The diversion ties in with the existing watercourse within the resource tenure boundary. The proposed diversion alignment has been selected to maintain a minimum offset from the top of the proposed diversion bank to the toe of the levee of 100 m, whilst being well within the ML boundary.
- The stability and performance of the diversion will be assisted by vegetation within the watercourse diversion and adjoining floodplain and will not include artificial structures for grade control.
- The proposed diversion channel has similar dimensions to the existing channel – and thus has similar design capacity. However, the combined effect of the proposed levee and diversion is to divert some additional flow to the northern floodplain of Phillips Creek, resulting in minor increases to the depth and duration of flooding.

- The existing channel includes a large meander which contributes significantly to the length of channel being diverted. A number of meanders are to be reintroduced at the upstream end of the diversion which results in a length of channel and bed slope identical to the existing channel. The meanders have similar amplitude, wavelength, sinuosity, and bend radius to bends found in the existing creek channel.
- The main channel has a similar geometry to the existing channel, but with flatter side slopes to improve the prospect of stabilisation through revegetation during construction. The channel base width is slightly less than the existing channel, and some initial undercutting of the base of the channel might therefore be expected until complete revegetation of the banks is achieved.

The hydraulic characteristics of the proposed channel have been compared to the existing conditions, and to guideline conditions.

Two models were prepared:

- A 1-dimensional steady state backwater model (HEC-RAS) of the diversion and adjacent reaches, to assess the in-stream conditions. (The 1 in 2 Annual Exceedance Probability (AEP) event was selected to represent in-stream flow); and
- A 2-dimensional hydrodynamic model of the affected reaches of Phillips Creek and Isaac River floodplains to assess the impact of the proposal on floodplain conditions in a 1 in 50 AEP flood.

The assessment found that the hydraulic characteristics of the proposed diversion are similar to those in the existing channel, and are consistent with the Department of Natural Resources and Mines Guidelines for channel-averaged Shear Stress, Stream Power and Velocity. The results are summarised in more detail below.

1 in 2 AEP Shear Stress and Stream Power:

- Downstream of the diversion – there is no change from the existing conditions;
- Upstream of the diversion – there is a very small increase for a distance of 400m, but all values are well below guidelines, and well below values in the nearby existing channel.
- In the diversion itself – the resultant values are relatively uniform, resulting in a reduction in the lower reaches, and a small increase in much of the upstream half, but values are well below background and well within the envelope of naturally occurring values.

1 in 2 AEP Velocity:

- At most locations, the existing velocity is at or below the guideline of 1.5 m/s (typical range is 1.4 m/s to 1.5 m/s).
- Downstream of the diversion, there is no change from the existing conditions;
- Upstream of the diversion – there is a very small localised increase, but below guidelines.
- In the diversion itself – there is a small decrease, to under 1.4 m/s.

1 in 50 AEP Shear Stress:

- Downstream of the diversion – there is generally an increase from the existing values, but all values are under guideline values.
- Upstream of the diversion – there is generally a small increase, with some isolated sections slightly above guidelines in both existing and proposed cases.
- In the diversion itself - there is generally a decrease in values, with one isolated section at CH2150 (the apex of a tight radius bend) the exception (where existing values also exceed guideline values).

1 in 50 AEP Stream Power:

- Downstream of the diversion – there is generally an increase from the existing values - but all values are under guideline values.
- Upstream of the diversion – there is generally a small increase. However, except for chainage 0 m, all sections are below guidelines.
- In the diversion itself, there is generally a decrease in values to well below guideline levels – with one isolated section at CH2150 the exception, the apex of a tight radius bend, where values also exceed guideline values.

1 in 50 AEP Velocity:

- At most locations (with the exception of a 150 m reach upstream of the diversion), the existing velocity is less than the guideline value of 2.5 m/s (typical range is 1.7 m/s to 2.5 m/s).
- Downstream of the diversion, there is a small increase from the existing conditions. With the exception of a 100 m reach just downstream of the diversion, all reaches are below guideline values.
- Upstream of the diversion – there is a very small increase in velocity.
- In the diversion itself – the velocity is significantly reduced to well below guideline values.

Under close to bank-full conditions, there are also small reductions in shear stress, stream power and velocity predicted for the diversion channel itself. In the upstream reaches there will be increases in these parameters (due to the drawdown of the water surface profile through the diversion), but they will be similar to those occurring in the adjacent reaches.

In the 1 in 2 AEP, under post construction (unvegetated) conditions, all parameters will be elevated above existing conditions and guidelines upstream of the diversion and in its upper reaches. The short-term risk of erosion will need to be managed, and if necessary repairs made until vegetation is established.

During detailed design the following tasks will need to be undertaken to ensure the diversion meets the desired outcomes:

- Review the results of flood modelling to identify areas where shear stress, stream power and velocity are elevated and propose changes to the design profile and construction materials if necessary to ensure a stable profile.
- Refine the design of the transition zones to reduce the risk of erosion impacts at the upstream and downstream ends of the diversion.
- Undertake more detailed investigations into the substrate conditions to ensure the proposed channel design is appropriate for the conditions.
- Review the design cross-section and investigate the potential for providing a wider base and steeper base side slopes (more consistent with the existing channel) – to better mimic the shape of the existing channel and reduce the potential for initial undercutting of the banks.
- Investigate the need for a deeper channel to allow sediment to move through the diversion without net erosion in the downstream reaches. During construction, sand could be transferred from the bed of the diverted reach to the bed of the diversion – so there is an immediate source of sand to supply the downstream reaches.
- Develop a detailed revegetation strategy to ensure the banks can be stabilised as rapidly as possible.

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1 Introduction

1.1 BACKGROUND

Lake Vermont Resources (LVR) plans to extend its existing operations to the north, and is undertaking the feasibility studies and related environmental assessments for the Lake Vermont Northern Extension Project. The location of the project is shown in the locality plan in Figure 1.1.

As part of the proposed development, LVR intends to mine the coal resource extending under Phillips Creek. The proposed site layout is shown in Figure 1.2.

Development of the mine pits in this area will require the diversion of a 2.5 km reach of Phillips Creek and the construction of approximately 7 km of levees (including the diversion plugs) to protect the mine workings from flooding.

1.2 SCOPE OF THIS DOCUMENT

LVR engaged WRM Water & Environment Pty Ltd to undertake preliminary design of the diversion and to undertake impact assessment studies.

The regulatory role for approval of watercourse diversions has recently been transferred from the Water Act to the Environmental Protection Act. Under the new provisions, watercourse diversions will be approved and conditioned under a resource activity's Environmental Authority.

The Department of Natural Resources and Mines (DNRM) has developed the Guideline "Works that interfere with water in a watercourse: watercourse diversions" (DNRM, March 2014), to provide technical advice to proponents seeking approval to divert a watercourse. Proponents are encouraged to include a functional design report as a means of addressing diversion-related matters.

This report has been prepared to address the guideline requirements for a functional design report, namely, to document conceptually how a watercourse diversion can satisfy the outcomes identified in the guideline, including:

- Geomorphic and vegetation assessment of the existing watercourse;
- Hydrologic conditions of the existing watercourse;
- The proposed watercourse diversion route;
- Hydraulic conditions of the existing watercourse and proposed watercourse diversion;
- A statement of how the watercourse diversion meets the outcomes.

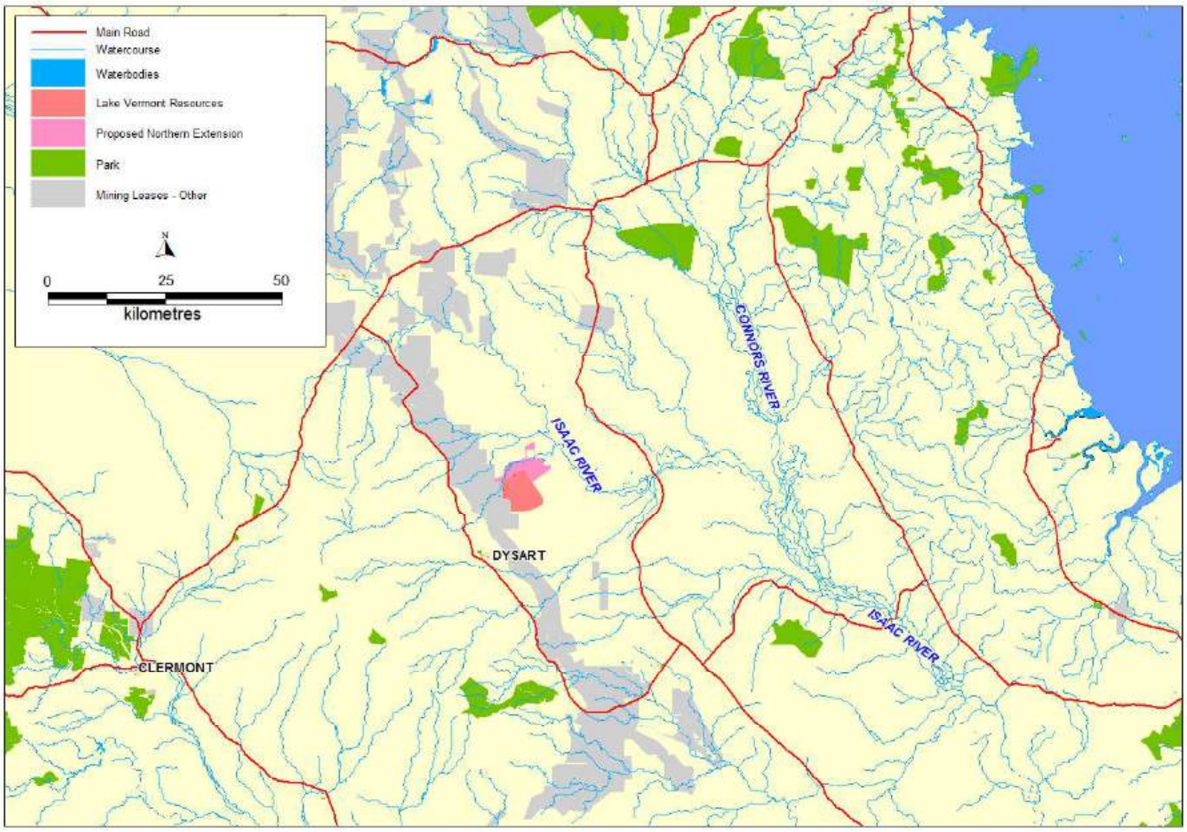

Figure 1.1 - Locality plan - Lake Vermont Northern Extension Project

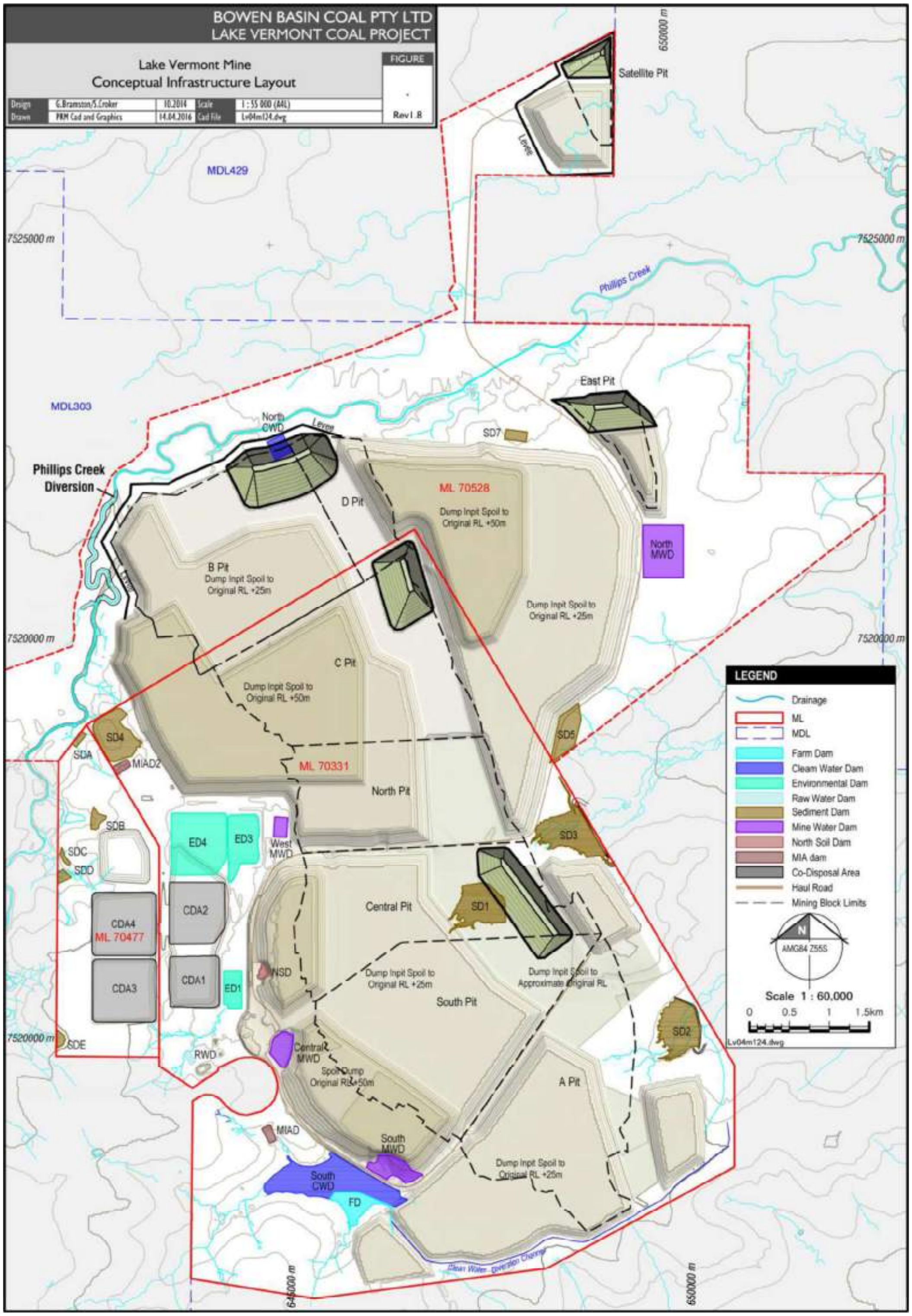

Figure 1.2 – Site layout – Lake Vermont Northern Extension Project

2 Design Approach

The Guideline (DNRM, March 2014) provides guidance to proponents seeking approval to divert a watercourse as part of a new or amended environmental application. It includes guidance on watercourse diversion design and operation including maintenance, monitoring and revegetation. The guideline sets out key design principles and requirements for the functional designs of permanent diversions. Design of the proposed Phillips Creek diversion is generally in accordance with these requirements. Details of how they have been addressed are provided in Section 5.

2.1 KEY DESIGN PRINCIPLES

OUTCOME 1 - The watercourse diversion incorporates natural features (including geomorphic and vegetation) present in the regional landscape and associated local watercourses.

OUTCOME 2 - The watercourse diversion maintains the existing hydrologic characteristics of surface water and groundwater systems.

OUTCOME 3 - The hydraulic characteristics of the watercourse diversion are comparable with other local watercourses and suitable for the region in which the diversion is located.

OUTCOME 4 - A sediment transport regime that allows the watercourse diversion to be self-sustaining and not result in material or serious environmental harm on upstream and downstream reaches.

OUTCOME 5 - The watercourse diversion and associated structures maintain stability and functionality and are appropriate for all substrate conditions they encounter.

2.2 DESIGN REQUIREMENTS

The following criteria have been considered when developing the proposed diversion design:

1. The watercourse diversion should tie-in with the existing or receiving watercourse within the resource tenure boundary.
2. The stability and performance of a watercourse diversion is assisted by vegetation within the watercourse diversion and adjoining floodplain and does not include artificial structures for grade control that require ongoing maintenance.
3. The channel capacity must be at least equivalent to the natural stream channel capacity existing in that vicinity.
4. The length of the channel should be equivalent to the length of the watercourse it replaces.
5. Bed grade/slope should be equivalent to the existing watercourse.
6. Batter slopes should be designed to maintain stability through different substrate.

The Guideline (DNRM, March 2014) has been developed using the results of the Australian Coal Association Research Program (ACARP) stream diversion project (Fisher Stewart, 2002). The Fisher Stewart study investigated the hydraulic characteristics of a number of natural streams in the area of the Project. The performance and design faults of existing stream diversions within the Bowen Basin were also assessed as part of the Fisher Stewart study.

Table 2.1 shows the ACARP design criteria recommended for Bowen Basin stream diversions as given in the Guideline. Stream power, stream velocity and shear stress are the main hydraulic characteristics of interest:

- Stream power is a function of discharge, hydraulic gradient and flow width. It represents the energy that is available to do work in and on the channel. High stream powers are indicative of elevated erosion potential.
- The velocity criteria have been selected to minimise the potential for damage to the channel through erosion associated with high flow velocities. Where calculated velocities exceed the adopted velocity criteria, additional bank protection (increased vegetation density or rock protection) will be required. Note there is no direct relationship between velocity and the force exerted on soil particles at the boundary and thus stream power and shear stress are used as more reliable indicators of erosion potential.
- The shear stress provides a measure of the tractive force acting on sediment particles at the boundary of the stream, and is used to determine the threshold of motion for bed material. It provides an indication of the potential for erosion of cohesive sediments or movement of non-cohesive sediments at the channel boundary.

Table 2.1 – ACARP Design Criteria for Bowen Basin Stream Diversions

	Stream Power (W/m^2)	Velocity (m/s)	Bed Shear (N/m^2)
2 year ARI event without vegetation	<35	<1.0	<40
2 year ARI event with vegetation	<60	<1.5	<40
50 Year ARI event with vegetation	<220	<2.5	<80

Note that in the latest version of the guideline, the bed shear guideline value is $50N/m^2$

The ACARP design criteria are based on an incised channel with confinement of flows up to and including the 20 year ARI design event.

3 Existing Geomorphic and Vegetation Conditions

3.1 GEOMORPHIC CHARACTER

The reach of Phillips Creek between the nearby Saraji Mine and its confluence with the Isaac River is shown in Figure 3.1. It is an alluvial system with low to moderate sinuosity and a single channel with high capacity. The channel meanders across a 75 m to 340 m wide belt on the southern edge of the floodplain.

The length of the channel from Saraji Mine to the Isaac River reach is approximately 32.5 km, of which some 9.7 km is located upstream of the Lake Vermont ML. The reach within the Lake Vermont Northern Extension ML is approximately 12.7 km long, and crosses the ML boundary approximately 10 km upstream of the Isaac River confluence. The downstream 8 km of this reach crosses the Isaac River floodplain, and is more sinuous than the upstream reaches.

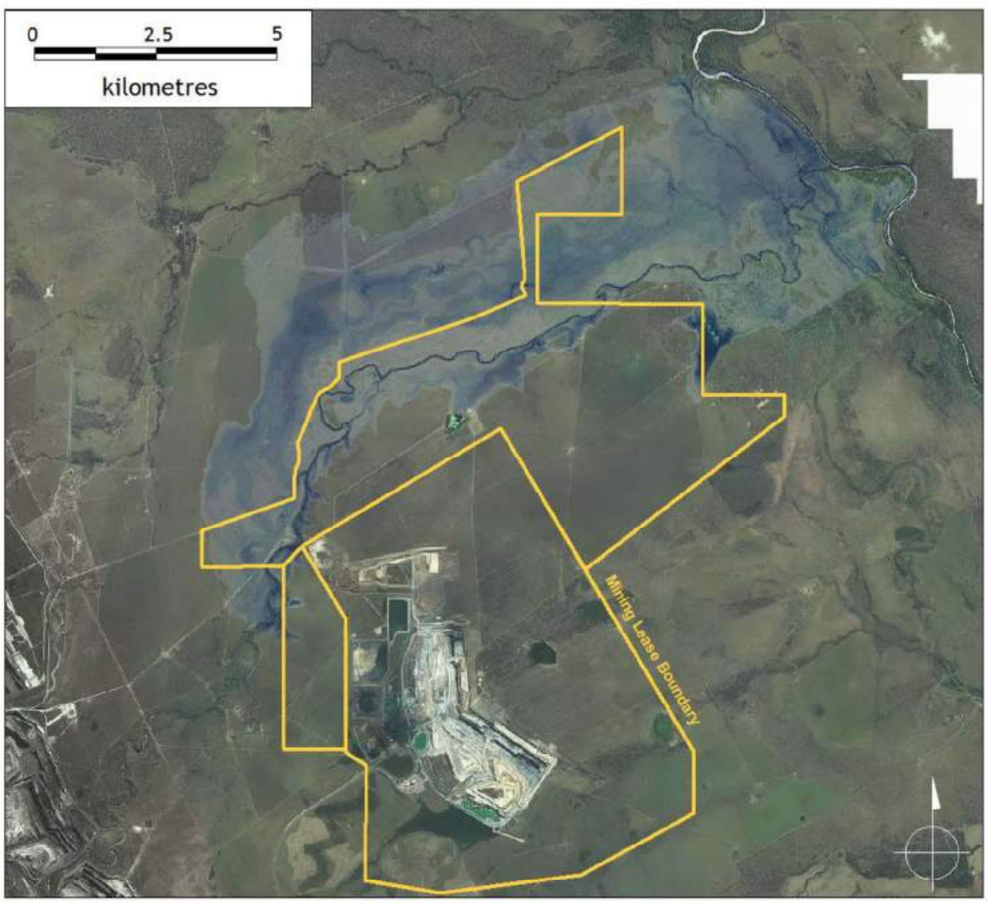

Figure 3.1 – Phillips Creek and its floodplain between Saraji Mine and the Isaac River

3.2 MEANDER PLAN-FORM CHARACTERISTICS

Meanders in the nearby reaches of Phillips Creek crossing the ML are irregular. Meander amplitude is greatest in the proposed diverted reach (up to approximately 340 m), but there are long straight reaches upstream and downstream (up to 1.5 km long) with meander amplitude less than 75 m. Meander wavelength ranges up to approximately 800 m, but small meanders have a typical wavelength of approximately 200 m across the ML area.

Over the full reach of Phillips Creek crossing the ML, sinuosity (channel length divided by valley length) is approximately 1.3, but the straighter downstream reaches have sinuosity less than 1.1. In the reach to be diverted, the sinuosity index is higher (1.7).

Meander radii in the vicinity of the ML range from less than 50 m to over 500 m, with a median of approximately 160 m. The proposed diverted reach includes a large meander comprising a long, wide-radius bend (>500 m) approaching a tight 60 m radius bend, followed by a series of short bends at approximately 150 m radius.

Figure 3.2 – Tight bends at diversion reach and downstream of ML boundary

3.3 FLOODPLAIN GEOMETRY

The floodplain widens downstream, from 2.1 km wide in the vicinity of the proposed diversion to over 4 km in the downstream reaches approaching the Isaac River floodplain.

The channel is perched above the surrounding floodplain as illustrated in Figure 3.3 and Figure 3.4. The locations of the cross-sections are shown in Figure 3.5. The cross-sections show that the invert of the bed of the northern floodplain is approximately 2 m below the level of the main channel bank.

While there is a single main creek channel, there are a number indistinct minor flood channels on the northern floodplain, which are typically 1 m to 2 m deep. Small farm dams have been constructed across these flood channels to collect overland flow.

Figure 3.5 indicates the locations of the nearby broad flood breakout paths from the channel to the floodplain. It also shows a 2 m deep flood channel on the southern (right) floodplain which receives flows from the reach of the main channel to be diverted.

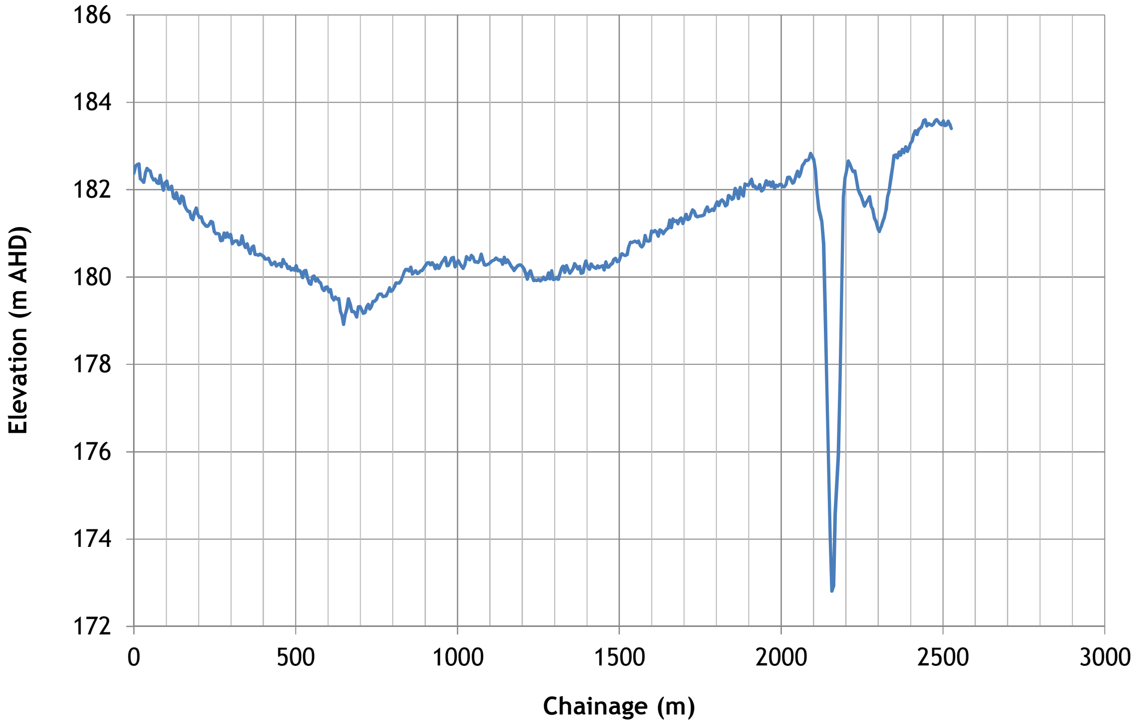

Figure 3.3 – Floodplain section A at U/S end of diversion

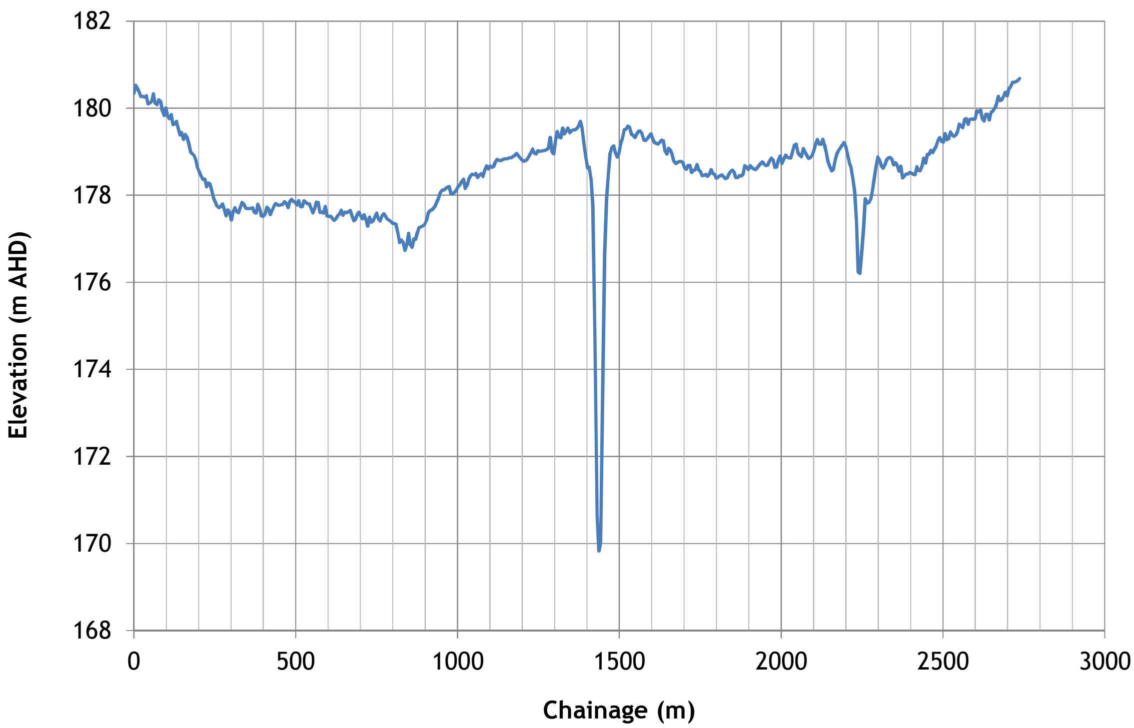

Figure 3.4 – Floodplain section D at U/S end of diversion

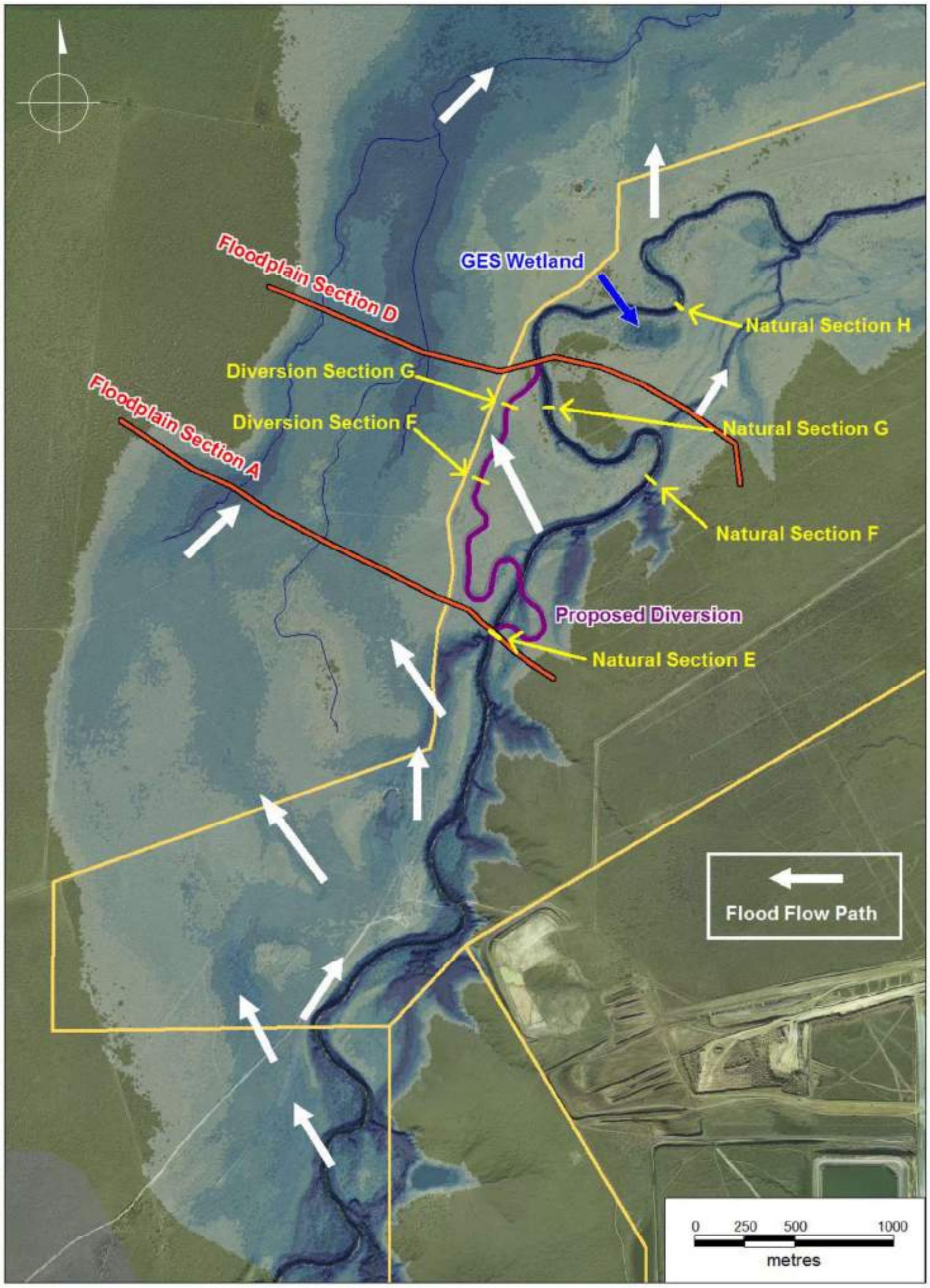

Figure 3.5 – Floodplain flows and section locations near proposed diversion

3.4 CHANNEL FORM

The channel banks appear well vegetated and relatively stable. Imagery acquired in 2013 shows no evidence of significant channel movement when compared to photographs taken in 2004.

Figure 3.6 – Stream morphology site SM8 – facing upstream

The channel bed slope from the upstream ML boundary to the Isaac River is a uniform 0.12% (1 in 830). The reach of Phillips Creek to be diverted is shown in the aerial photo in Figure 3.5. This reach has a length of approximately 2.45 km.

In the vicinity of the proposed diversion, the channel shape is very uniform. This is illustrated in Figure 3.7, which overlays all cross-sections extracted at 50 m intervals along a 4.5 km reach of Phillips Creek including the proposed diversion (the locations are shown in Figure 3.9). Side slopes are generally similar on both sides of the channel.

The channel cross-section geometry can be typified by the generalised cross-section in Figure 3.8, which was created from the cross-section data presented in Figure 3.7 (the chart shows the median channel width over the range of channel depths and the 10th and 90th percentiles). The "median" channel can be described as having:

- A base width of approximately 10 m;
- A side slope of 1V in 1H for most of the bottom 3 m of channel depth;
- A side slope of 1V in 2H from a depth of 3 m to 6 m above the bed;
- A side slope of 1V in 3.4H to the top of the channel.

The channel is typically approximately 7 m to 8.5 m deep. These depths correspond to design flow rates around the 1 in 5 Annual Exceedance Probability (AEP) flow. At some locations, significant flow breakout paths occur at depths down to approximately 7.5 m. At others, the channel depths exceed 9m. At a depth of 8.5 m, the channel top width is typically approximately 45 m.

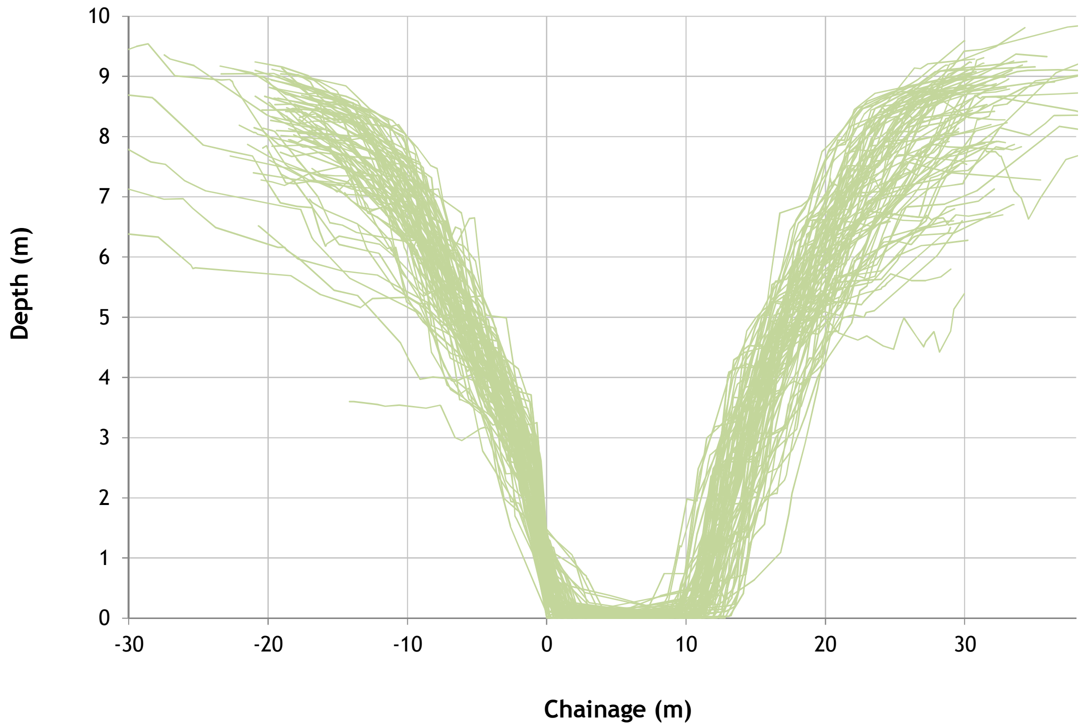

Figure 3.7 - Cross-section geometry in the vicinity of the reach to be diverted

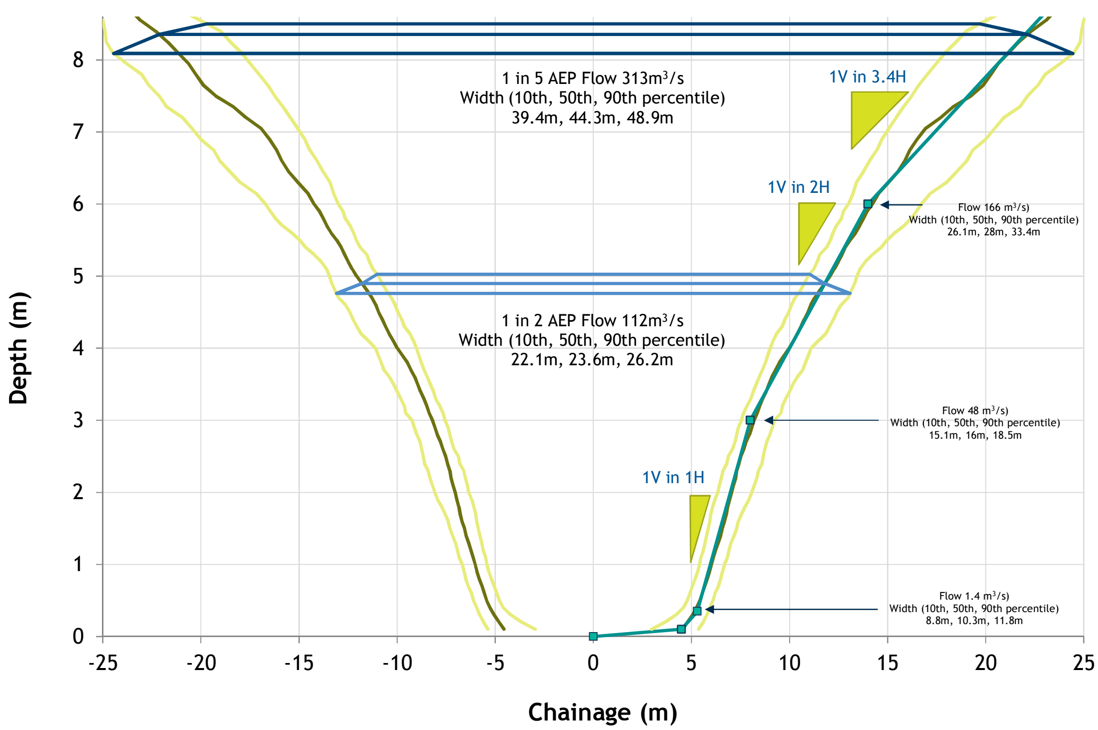

Figure 3.8 - Generalised Cross-Section in the vicinity of the reach to be diverted

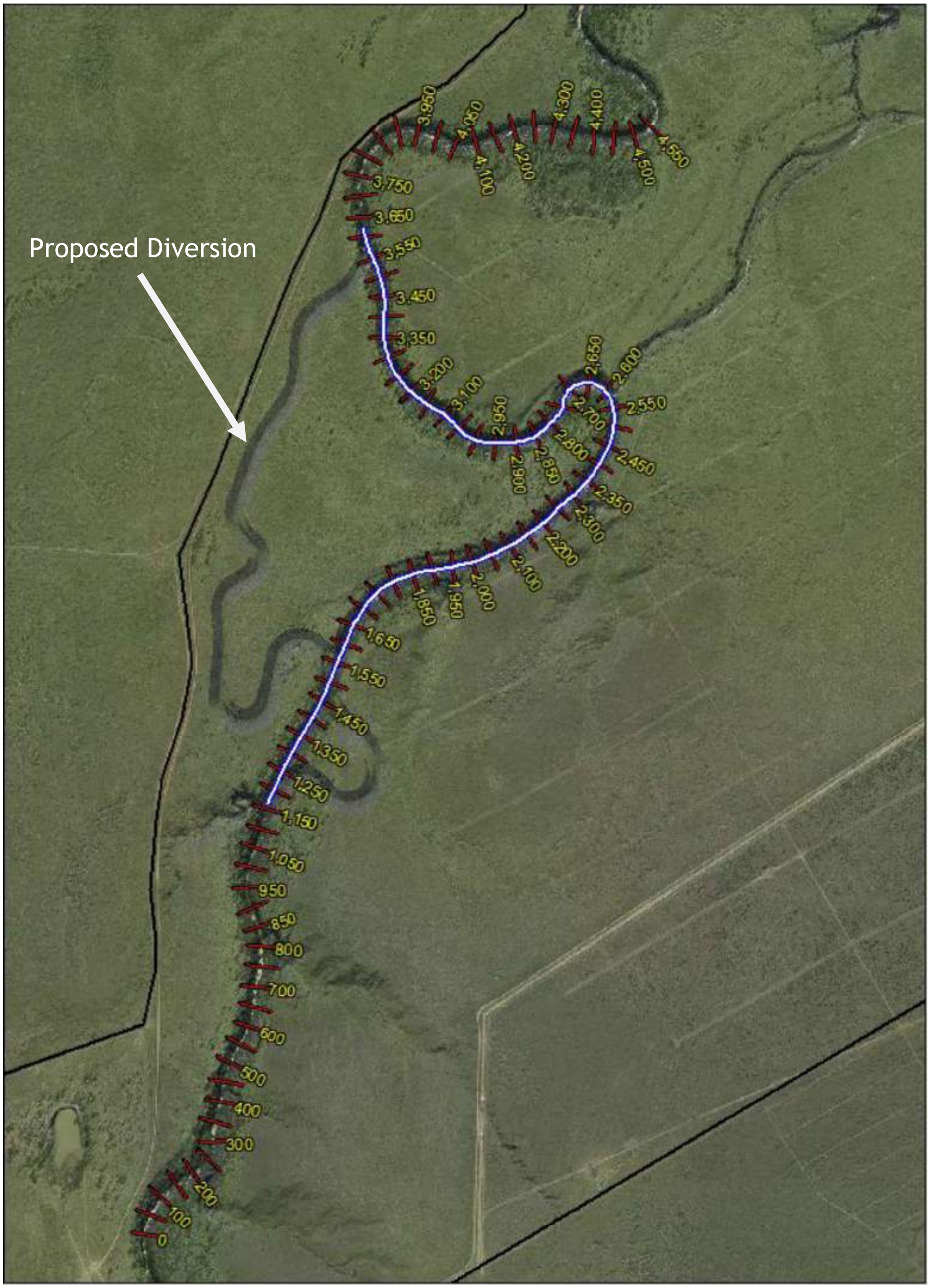

Figure 3.9 – Proposed reach to be diverted (cross-section chainages)

3.5 BEDLOAD SEDIMENT CHARACTERISTICS

Phillips Creek carries high sediment loads. Like many other waterways in the Fitzroy Basin, the bed is draped by a thick layer of coarse sand, as shown in Figure 3.6.

Particle size distributions established from bed sediment samples taken in the project area are shown in Figure 3.10 (the locations of the sample sites are shown in Figure 3.11).

All samples were very similar, comprising at least 95% uniformly graded sand (0.06-2.0 mm). The particle size distributions are similar to that presented for a sample taken further upstream in Phillips Creek for the Australian Coal Association Research Program (ACARP) stream diversion project (Fisher Stewart, 2002).

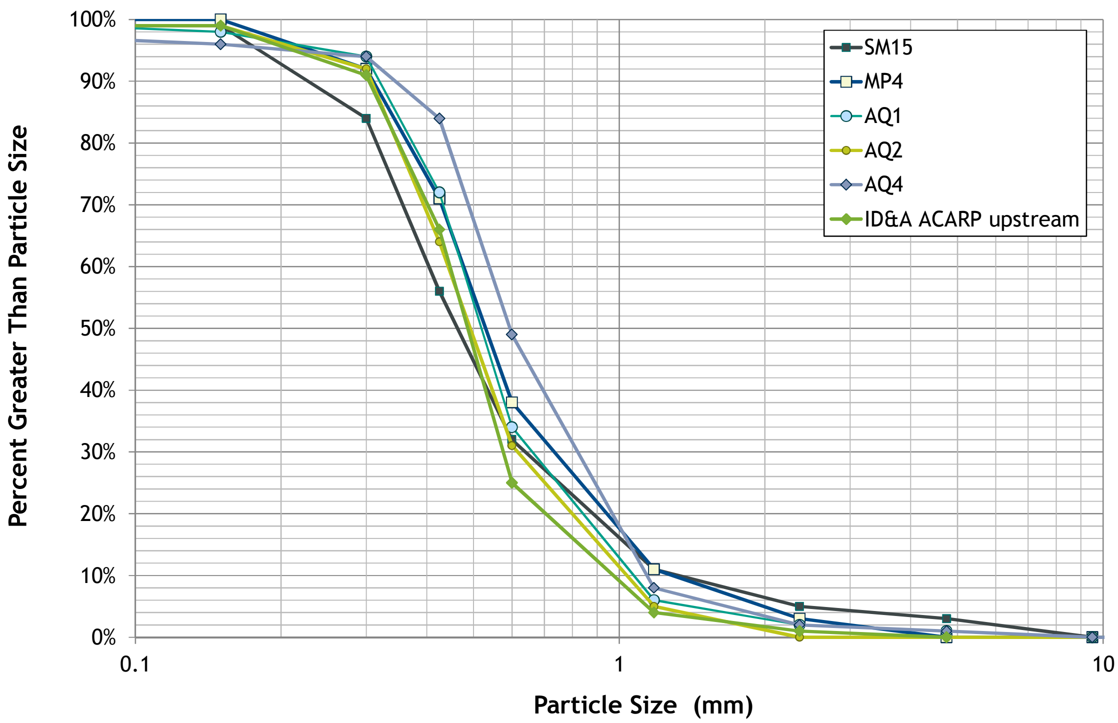

Figure 3.10 – Phillips Creek bedload sediment particle size distribution

3.6 FIELD ASSESSMENT OF STREAM MORPHOLOGY AND VEGETATION

AustralAsian Resource Consultants was commissioned by Lake Vermont Resources Pty Ltd to complete an aquatic ecology and stream morphology assessment over the project area (AARC, 2016).

The assessment included a survey of stream habitat, ecology, macro-invertebrates, stream sediment quality, surface water quality and stream morphology in Phillips Creek, the Isaac River and wetland areas on the site. Details of the assessment relevant to this functional design are repeated in the following sections. Further details can be found in the AARC report which is provided as Appendix 2.

Stream morphology assessments were completed at nineteen sites along Phillips Creek to provide a comprehensive field assessment of the landform and channel characteristics (e.g. depth, width, composition, bank stability, etc.), riparian vegetation and aquatic habitat features. Locations of all stream morphology survey sites are shown in Figure 3.11. At each cross-section, the following details were noted:

- Depth of channel;
- Width of channel;
- Slope of banks;
- Stability of banks;
- Stream substrate type including a sediment sample;
- Details of water (if present) including colour, depth and a sample;
- Overhangs;
- Debris and tree roots; and
- Vegetation either within the channel or on the banks (i.e. the surrounding vegetation).

A photographic record was prepared for direct comparison as part of future monitoring activities. Photograph sites along the reach to be diverted are shown in Figure 3.12 to Figure 3.13.

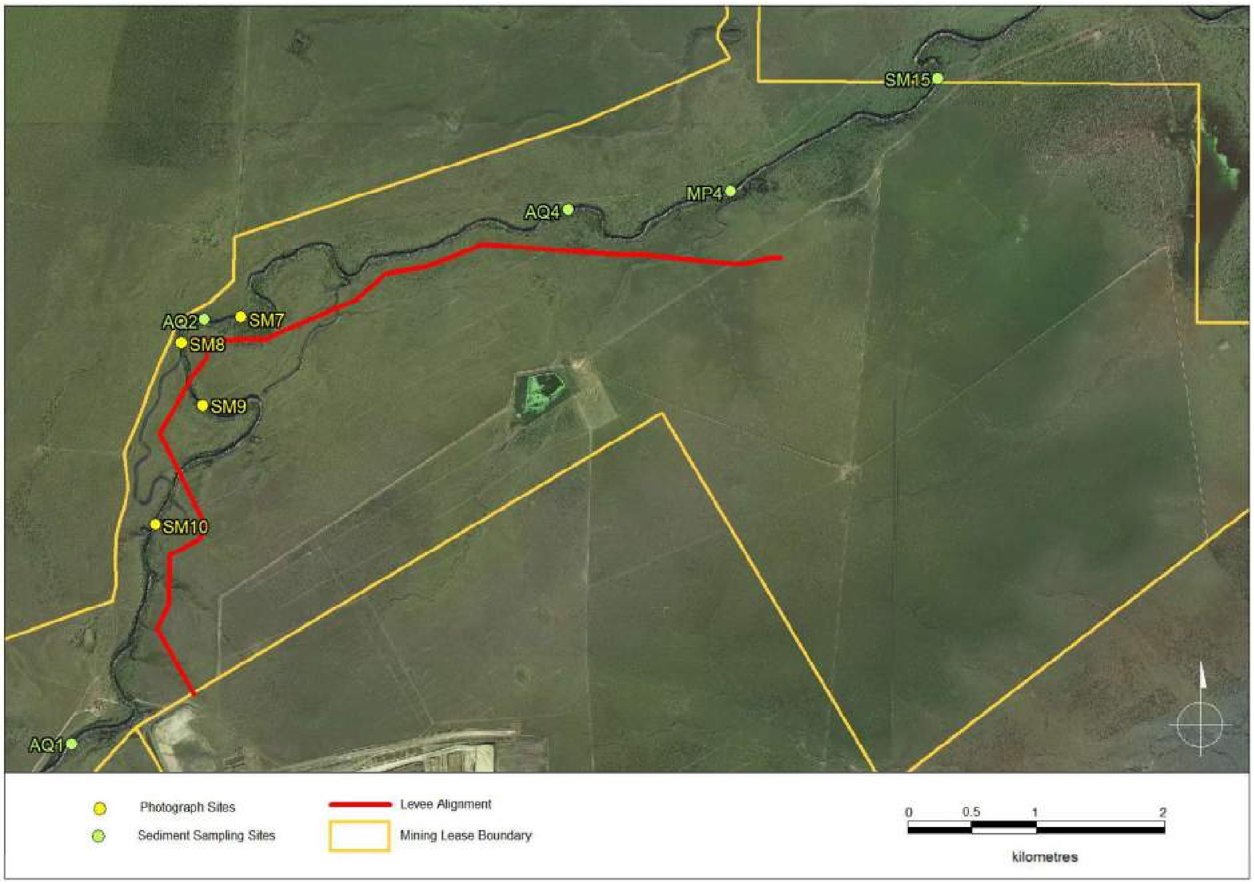

Figure 3.11 - Field monitoring and sediment sampling points

Figure 3.12 – Stream morphology site SM9 – facing upstream

Figure 3.13 – Stream morphology site SM10 – facing upstream

3.7 SOILS AND SUBSOILS

AARC has undertaken preliminary sampling of agronomic and erosion parameters of surface soils as part of the Lake Vermont Northern Extension Soil and Land Suitability Assessment (AARC, 2013). Relevant information from this report is reproduced below.

The Lake Vermont North Project area exists within a largely depositional landscape associated with the meandering Phillips Creek. During flood events the creek is a source of fresh alluvium derived from sedimentary and basaltic sources from upper catchment areas.

The surface soils in the vicinity of the proposed diversion alignment have been identified as part of the Booroondarra soil management unit (see Figure 3.14 below). Characteristics of the Booroondarra Soil Management Unit have been summarised as follows:

Distinguishing features: Loamy surfaced, sporadically bleached, red non-sodic texture contrast or gradational soils on level or gently undulating alluvial plains and occasional terraces adjacent to larger stream channels.

Australian Soil Classification: Red, Brown Dermosols;

Topography and Landform Attributes: Alluvial plains on lower tributaries and floodplains, consisting of recent Quaternary alluvium.

Geology Unit: Quaternary sands, clays and gravels (Qa)

Native Vegetation: Moreton Bay Ash, occasional Poplar Box, bloodwood, Blue Gum, buffel.

Physical Attributes: The Booroondarra SMUs possess dark brown or black surface horizons overlying reddish brown lower subsoils. The distinguishing feature of the Booroondarra is the red subsoil colour. It indicates the alluvium has been in-situ for some time and profile development is relatively mature. These soils are characterised by their blocky or lenticular subsoil structure. Subsoil sodicity and salinity can be present or absent with some sites moderately high in sodium and salts. These soils are notable for their soft consistence and sand content in their sub-surface horizons. Coarse sandy material is often found within pore spaces between soil peds at depth. These soils can be gradational or texture contrast with topsoils ranging from sandy loams through to light clays and subsoils ranging from light medium clays through to medium heavy clays. These soils are moderately well to well drained.

Chemistry: Depending on their age and landscape position, the Booroondarra soils can be highly sodic. These soils are typically extremely alkaline with plant available nutrients restricted by high pH (pH>9.0). High levels of hydroxyl ions may be caustic to plant roots and root hairs. These soils have relatively high Ca/Mg ratios indicating that calcium ions dominate the cation exchange sites. Due to the flocculating effect of calcium these soils have well developed soil structure with some examples expressing strong lenticular structure, slickensides/cutans and other vertic properties. These soils are low in Nitrate Nitrogen and the trace element Boron indicating that they have low fertility levels with existing vegetation adapted to these conditions.

Soil erodibility: The R1 (Dispersion Ratio) is a measure of the amount of silt and clay that disperses during testing compared with the total amount of silt and clay present. As such, it is a direct laboratory measure of soil dispersion and is useful when used in conjunction with ESP and Ca/Mg ratio for predicting soil physical behaviour.

Depending on their age and landscape position the Booroondarra soils can be sodic and saline. These subsoil constraints, when present, become limiting below 80 cm. Slaking and dispersion will lead to soil erosion at or below 80 cm. These soils have high levels of fine sand and moderate to high levels of clay with low silt levels. These soils may develop a relatively solid matrix of finer and coarser particles leading to soil structural issues. However, due to low silt levels this issue will have on minor significance. R1 values on average are approximately 0.56 which indicates a low dispersion ratio.

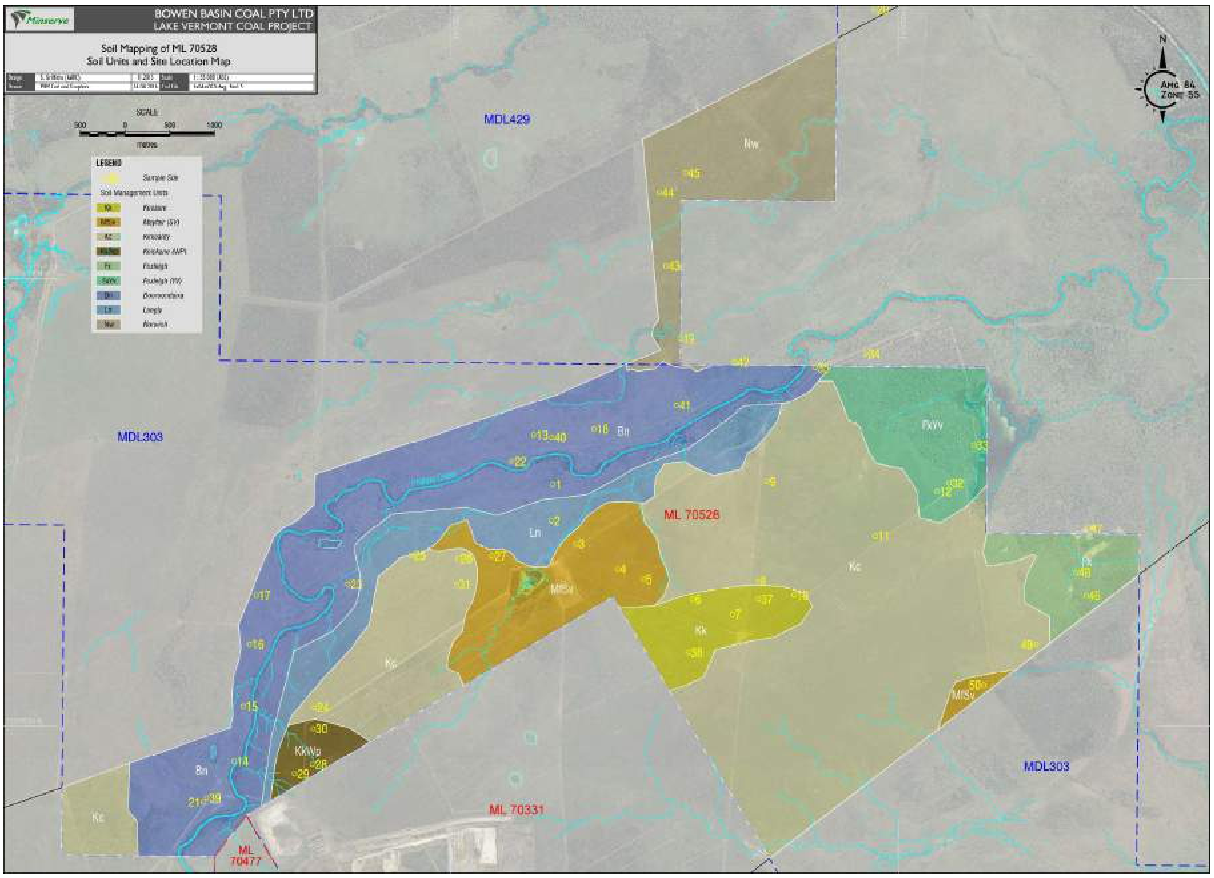

Figure 3.14 - Soil mapping across the ML

4 Existing Hydrologic and Hydraulic Conditions

4.1 CATCHMENT DESCRIPTION

Phillips Creek has a catchment area of approximately 422 km^2 upstream of the proposed stream diversion, and approximately 514 km^2 to the confluence with the Isaac River.

The catchment extends west approximately 45 km from the western mine lease boundary and east to the Isaac River confluence approximately 6 km downstream of the eastern mine lease boundary.

Surrounding land uses include low intensity cattle grazing and open cut mining. The Saraji Mine open cut coal mine is situated approximately 6.5 km upstream of the Project site. Impacts from Saraji Mine include discharges to Phillips Creek and an existing diversion of the creek. The existing Lake Vermont mine also has approval to discharge to Phillips Creek.

4.2 CATCHMENT HYDROLOGY

4.2.1 Flow Characteristics

The Department of Natural Resources and Mines maintains data for a streamflow gauge operated on Phillips Creek at Tayglen between 1968 and 1988. The catchment area to the gauge location (20 km upstream of the proposed diversion (see Figure 4.1)) is 344 km^2.

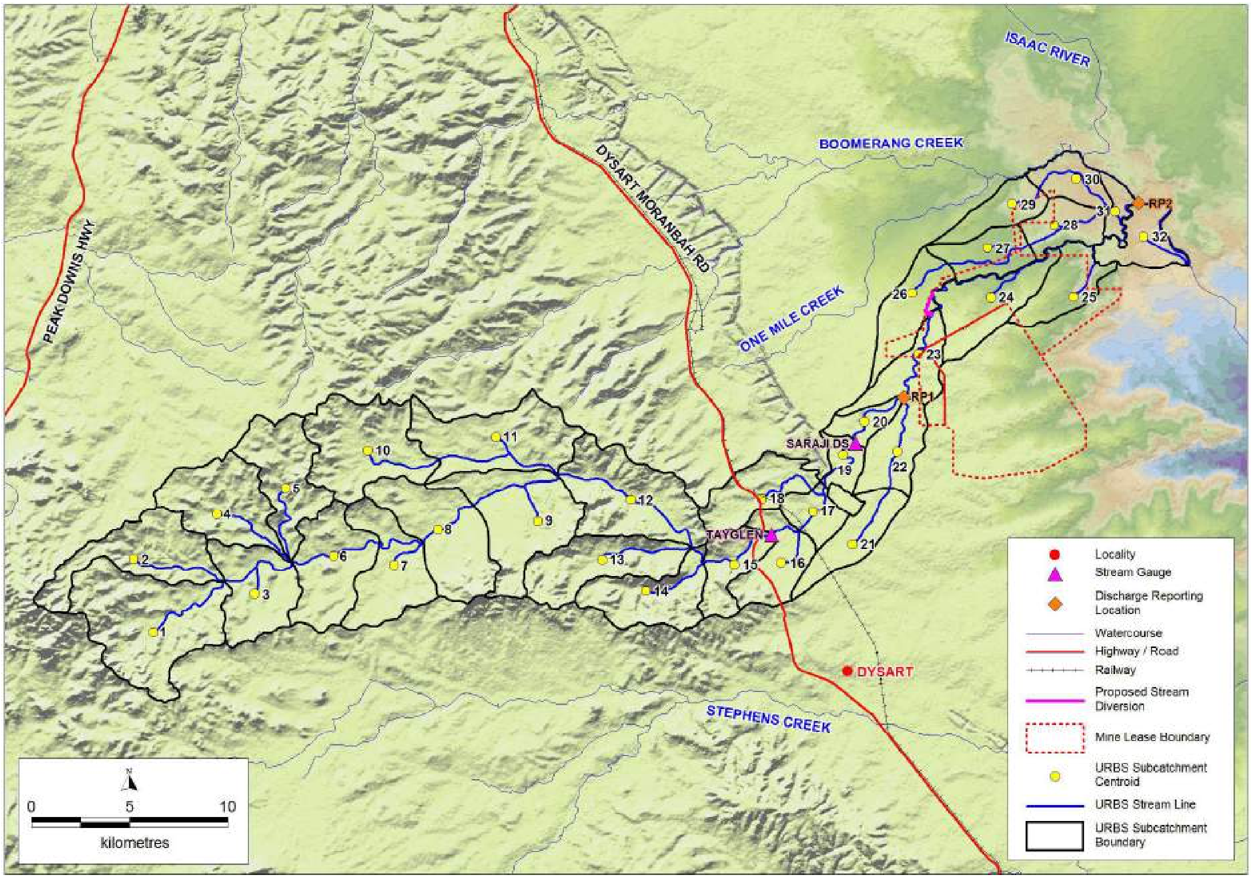

Figure 4.1 - Phillips Creek catchment and URBS node configuration

A typical sequence of recorded flows from this station is shown in Figure 4.2. The creek is characterised by brief periods of flow interspersed by long periods of no flow. This ephemeral behaviour is typical for streams in this part of the Fitzroy Basin.

The median annual flow over the period of record was approximately 12,730 ML/a (52 mm of runoff), most of which occurred in the summer months (as shown in Figure 4.3). The mean annual runoff coefficient was approximately 8% (adopting average catchment rainfall of 620 mm).

Figure 4.4 compares flow frequency curves for a number of gauged catchments in the Isaac River catchment. The figure shows that for Phillips Creek, flow only occurred approximately 22 % of the time, which is similar to other creeks in the nearby vicinity.

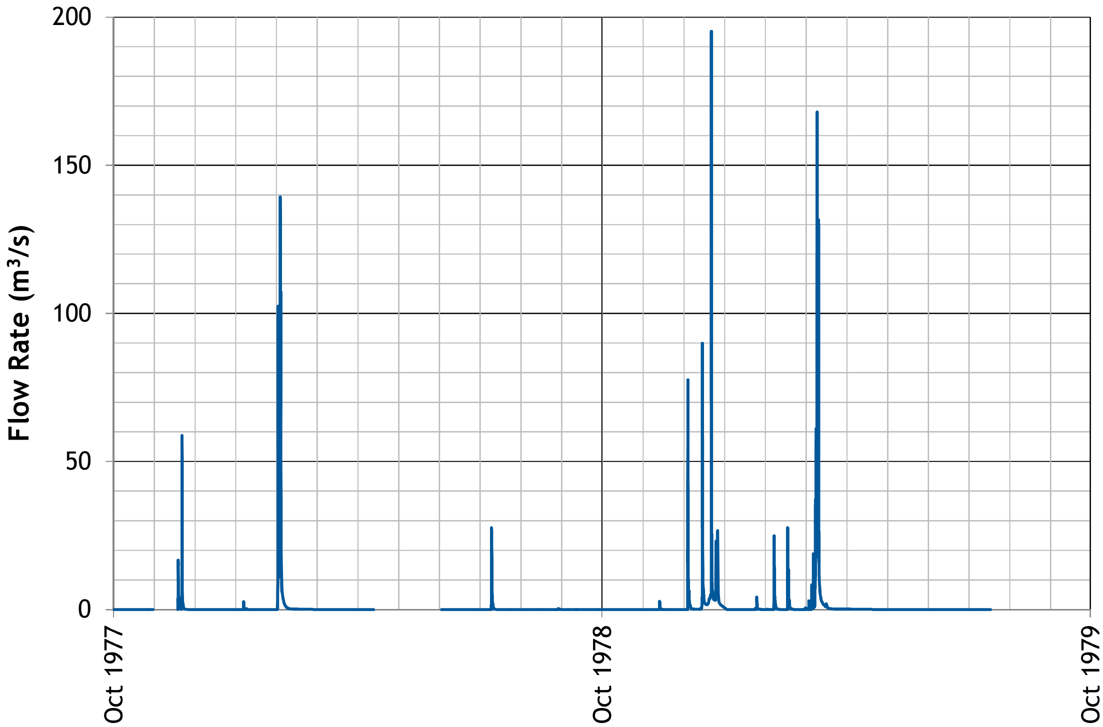

Figure 4.2 – Sample flow sequence – Phillips Creek at Tayglen 1977 - 1979

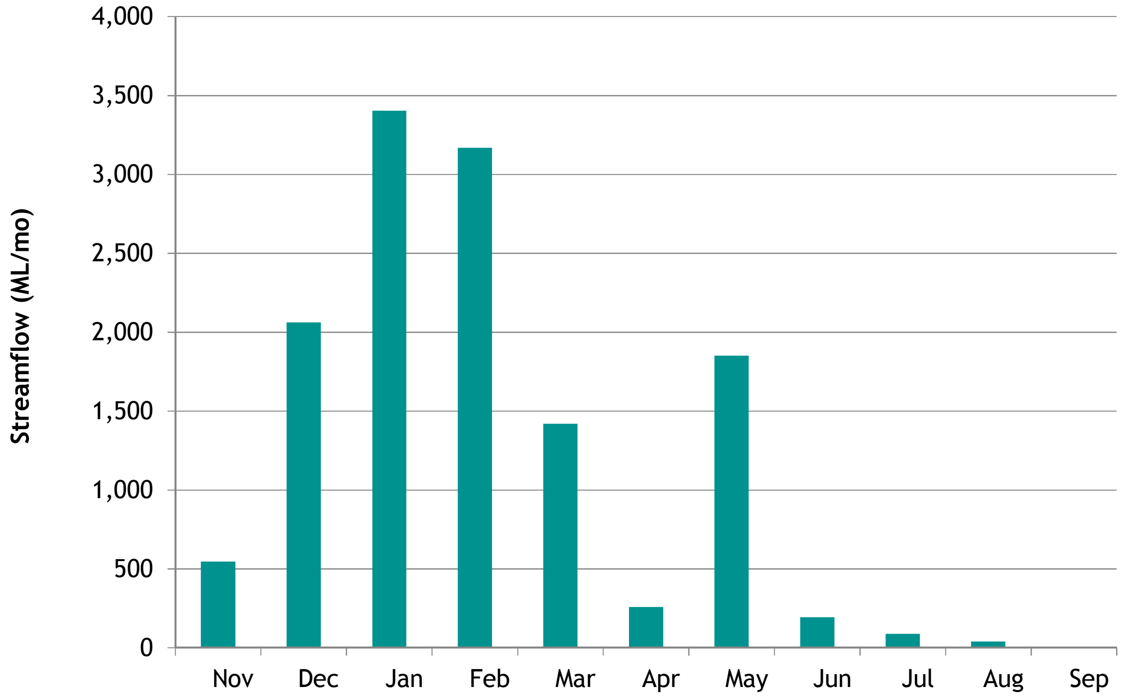

Figure 4.3 – Measured mean monthly streamflow – Phillips Creek at Tayglen 1968-1988

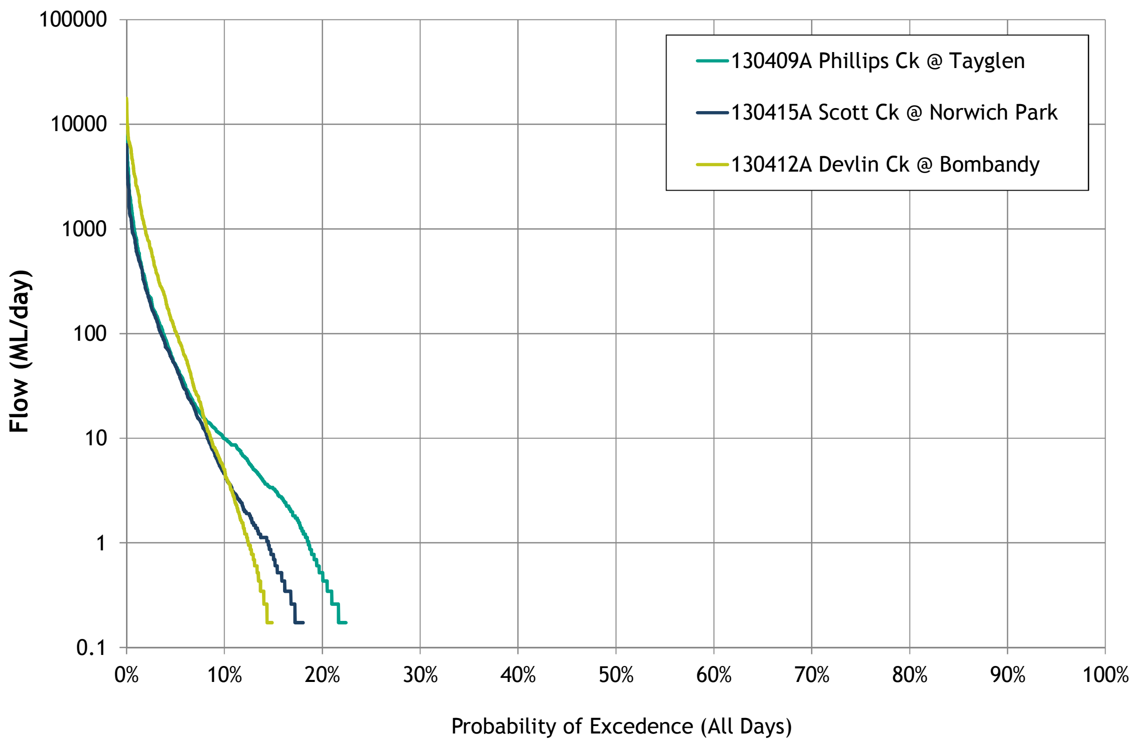

Figure 4.4 – Recorded frequency curves at nearby DNRM gauges (no flow days included)

4.2.2 Flood Flow Conditions

An URBS runoff-routing model was used to estimate design flood discharges in Phillips Creek.

The model covers the entire Phillips Creek catchment and consists of 32 sub-catchments. The configuration of the Phillips Creek URBS model is shown in Figure 4.1.

The model was calibrated against recorded discharges in Phillips Creek at BMA's Saraji DS gauge for two events: January 2008 and December 2010. The estimated peak design discharges from the calibrated model were then verified against Flood Frequency Analysis (FFA) results for DNRM's Tayglen Gauge (gauge no. 130409A) (see Figure 4.5).

Full details are provided in Appendix A (Phillips Creek Flood Model Report).

Design flood discharges were obtained from the model for the 1 in 2, 1 in 50, 1 in 100 and 1 in 1,000 AEP design events. Design rainfall depths for the 1 in 2, 1 in 50 and, 1 in 100 AEP events were determined using procedures outlined in ARR (1998). The 1 in 1,000 AEP design rainfall depths were determined using the CRC Forge methodology (Hargraves, c.2004). Design flood hydrographs are shown in Figure 4.6.

The critical storm duration for most design flood events is approximately 6 hours. Table 4.1 shows the peak design discharges for the 1 in 2, 1 in 50, 1 in 100 and 1 in 1,000 AEP events at the following four locations (shown on Figure 4.1):

- Tayglen gauge;
- Saraji DS gauge;
- Reporting point RP1, immediately upstream of the proposed stream diversion; and
- Reporting point RP2, at the Isaac River confluence.

Table 4.1 - Design peak discharges

Discharge Reporting Location	Design peak Discharge (m^3/s)			
	1 in 2 AEP	1 in 50 AEP	1 in 100 AEP	1 in 1,000 AEP
Philips Creek at Tayglen gauge	97	804	1,043	2,557
Phillips Creek at Saraji DS gauge	106	879	1,142	2,721
Phillips Creek upstream of proposed diversion (RP1)	112	928	1,207	2,820
Phillips Creek at Isaac River Confluence (RP2)	126	1,032	1,344	3,114

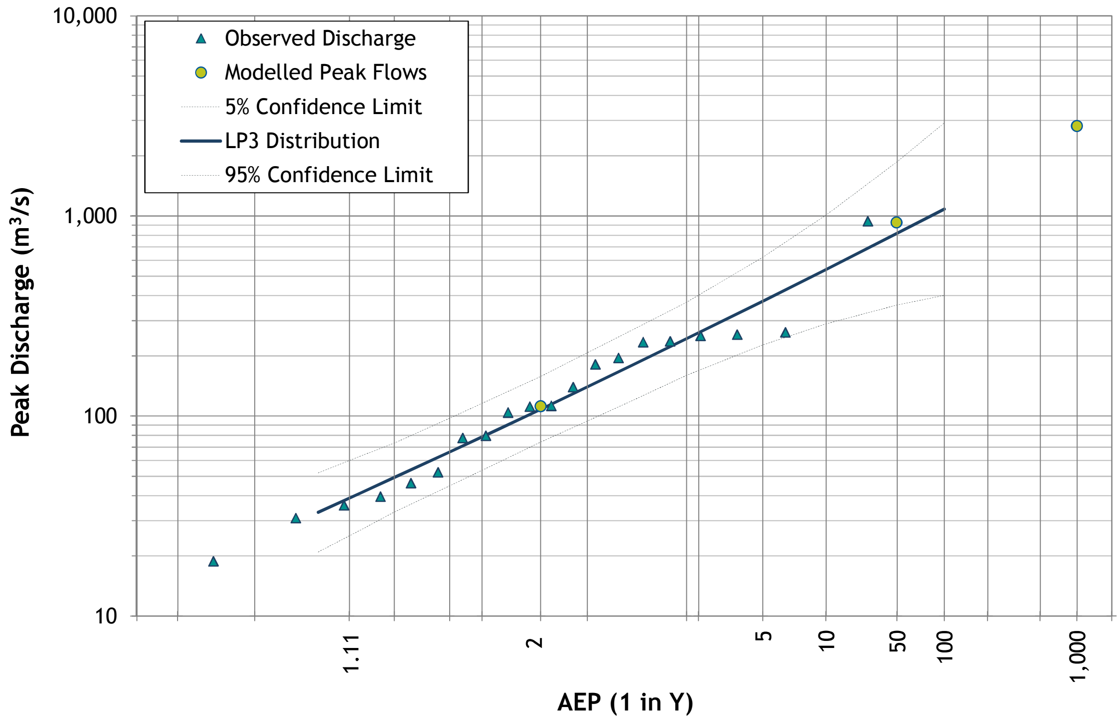

Figure 4.5 - Modelled peak discharges and flood frequency analysis at Tayglen

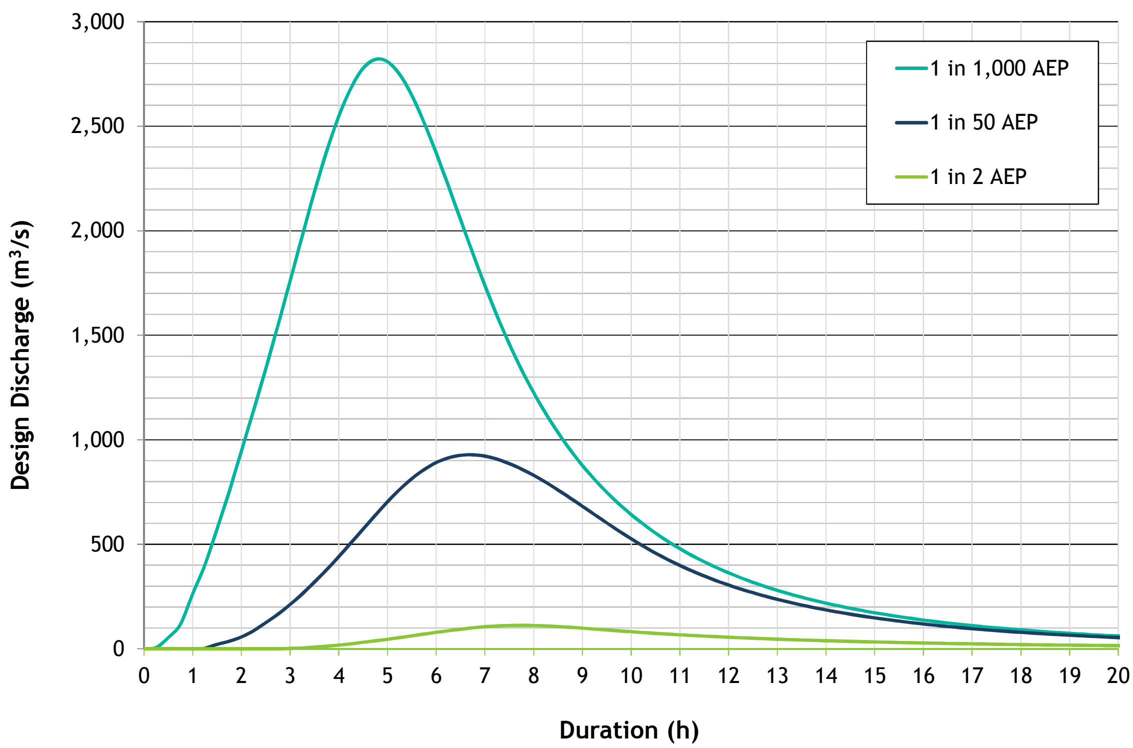

Figure 4.6 - Design discharge hydrographs at RP1 - 1 in 2, 1 in 50 and 1 in 1,000 AEP

4.3 HYDRAULIC CONDITIONS

4.3.1 Methodology

Due to the complex nature of the various watercourses and their interactions in the study area, the TUFLOW hydrodynamic model (WBM, 2008) was used to simulate the flow behaviour of Phillips Creek for the 1 in 50 and 1 in 1,000 AEP design events for existing conditions and post-diversion conditions.

TUFLOW represents hydraulic conditions on a fixed grid by solving the full two-dimensional depth averaged momentum and continuity equations for free surface flow. The model automatically calculates breakout points and flow directions within the study area.

The HEC-RAS modelling software was used for analysis of flow conditions in lower (in-channel) flows – in particular for checking conditions in the 1 in 2 AEP flood event which is referred to in the DNRM guidelines.

Topographic survey data for the study area was provided by Lake Vermont Resources. This data was converted into a digital terrain model (DTM) for use in the hydraulic modelling and mapping tasks.

Full details of the TUFLOW model are provided in the Phillips Creek Flood Model Report (WRM, 2014), which is included as Appendix A.

4.3.2 Flood Extents

The extents of flooding in the 1 in 50 AEP and 1 in 2 AEP design flood events is shown in Figure 4.7 and Figure 4.8 respectively.

The figures show that during the 1 in 2 AEP flood, all flow is contained in bank within the Phillips Creek main channel. There is some localised inundation on the northern floodplain and around Lake Vermont, due to local catchment runoff.

In the 1 in 50 AEP flood event, the extent of flooding is significantly greater, with much of the northern floodplain conveying floodwaters. Floodplain flow depths are relatively shallow – typically less than 0.5 m in the immediate vicinity of the main channel near the proposed diversion – but increasing to 1.5 m further north.

There is relatively little inundation on the southern floodplain. There is an area of high ground immediately adjacent to the reach to be diverted within the large meander on the right bank. Flow is also conveyed from this meander via a flood channel on the south bank.

4.3.3 Flood Velocity, Shear Stress, and Stream Power

Nearby point values of modelled flood velocity, shear stress and stream power at the peak of the 1 in 50 AEP flood event are shown in Figure 4.9, Figure 4.10, and Figure 4.11. The figure shows velocities are high within the main channel banks. There are locally high values of shear stress and stream power on the banks of channels, but otherwise velocity, shear stress and stream power are relatively low.

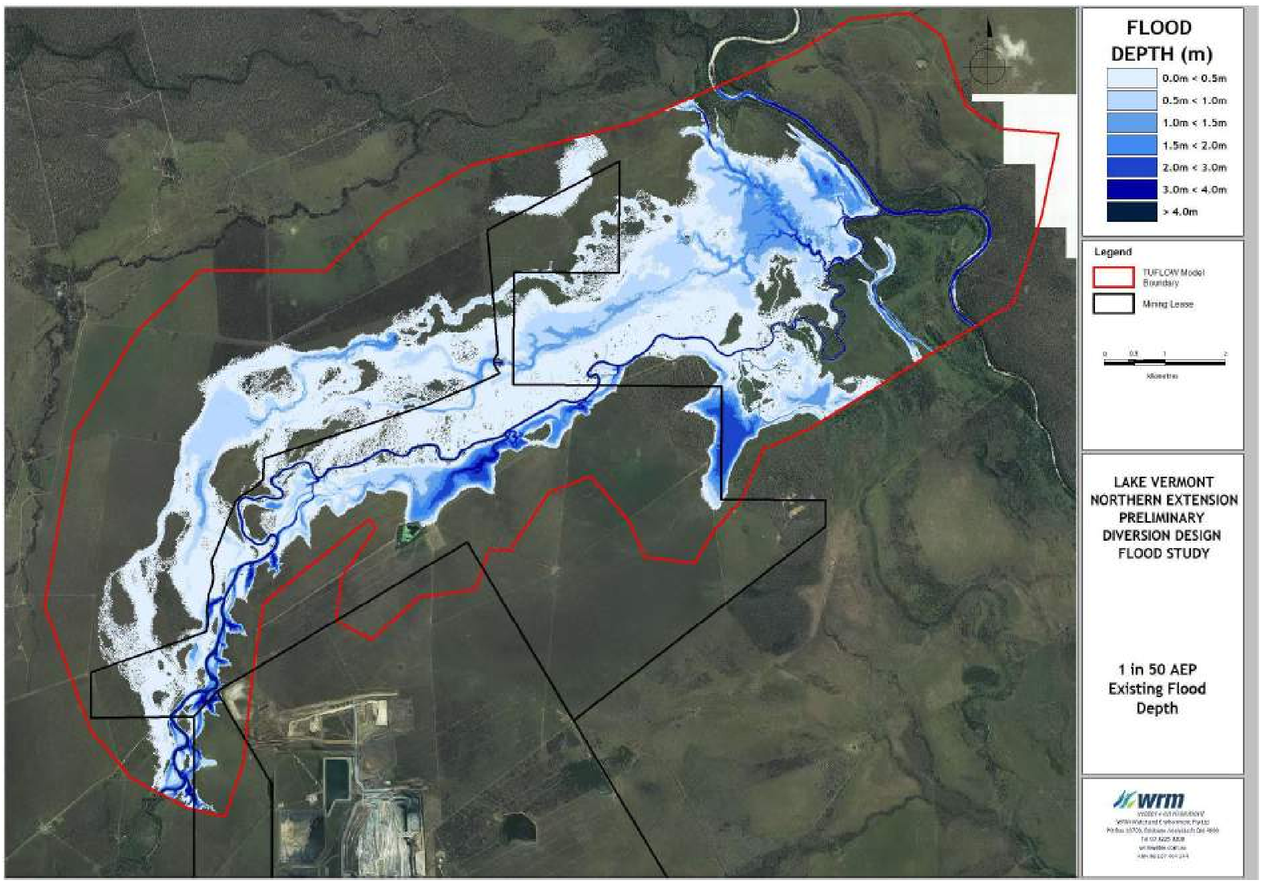

Figure 4.7 - 1 in 50 AEP existing conditions flood depth

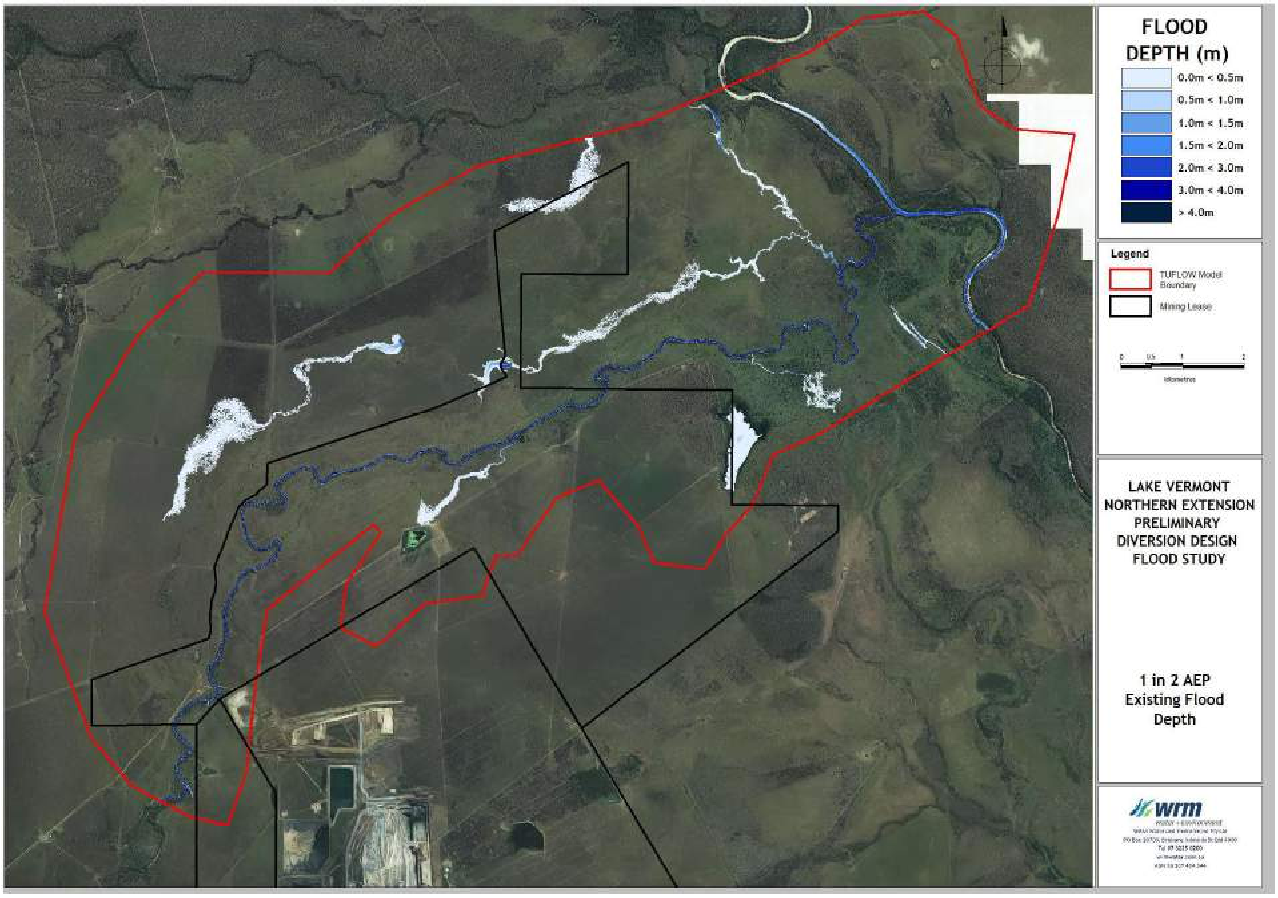

Figure 4.8 - 1 in 2 AEP existing conditions flood depth

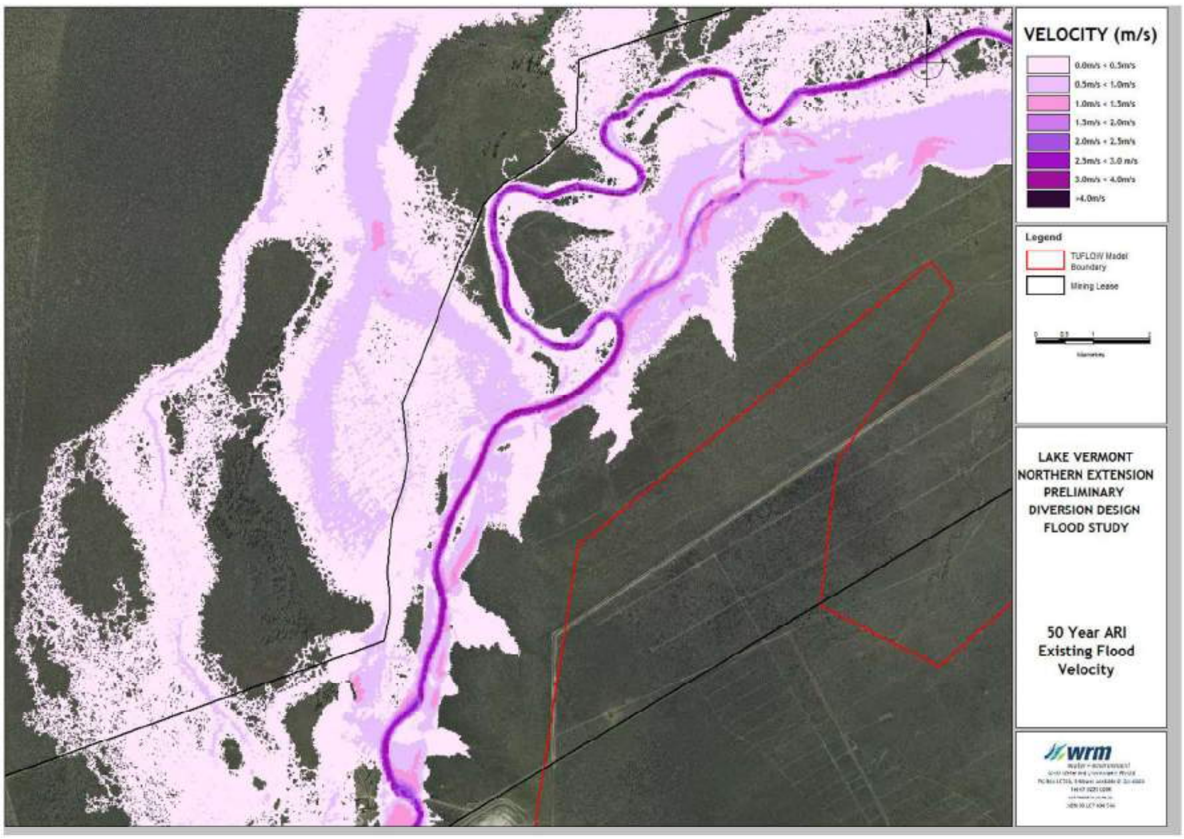

Figure 4.9 - Map of design 1 in 50 AEP existing conditions local flood velocity

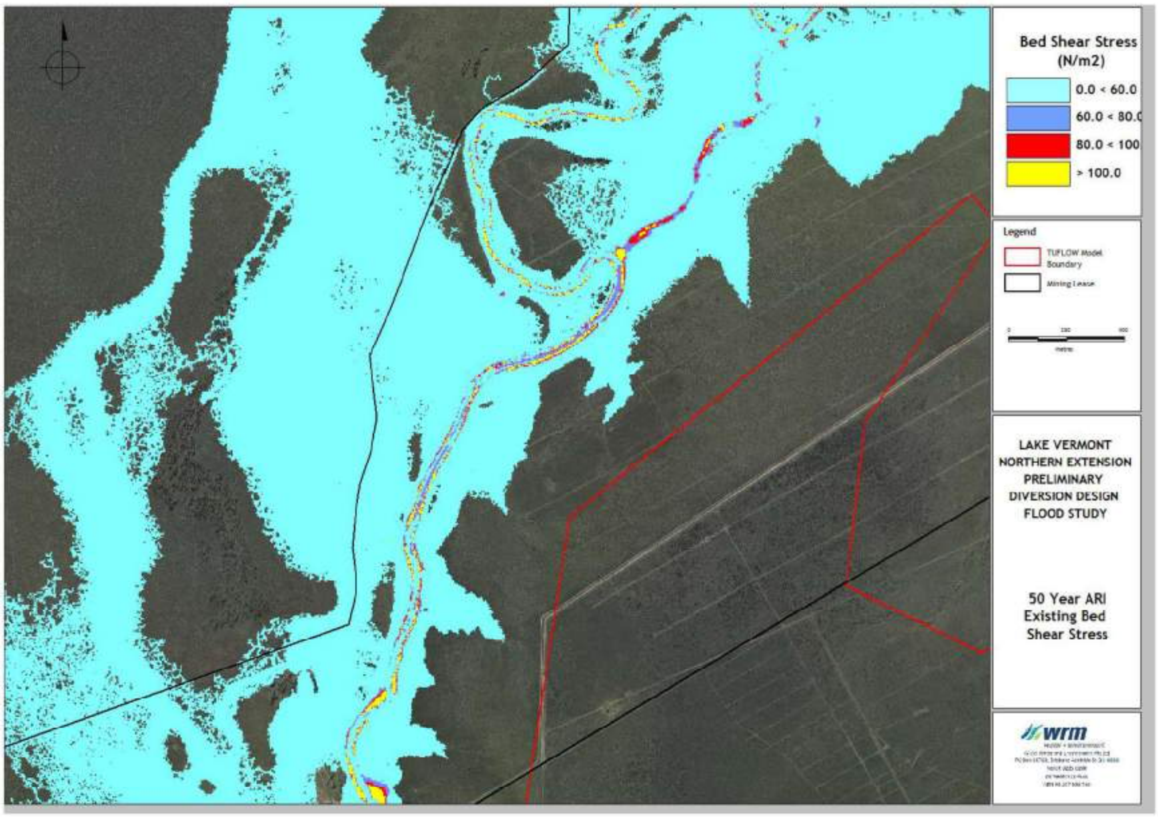

Figure 4.10 - Map of design 1 in 50 AEP existing conditions local bed shear stress

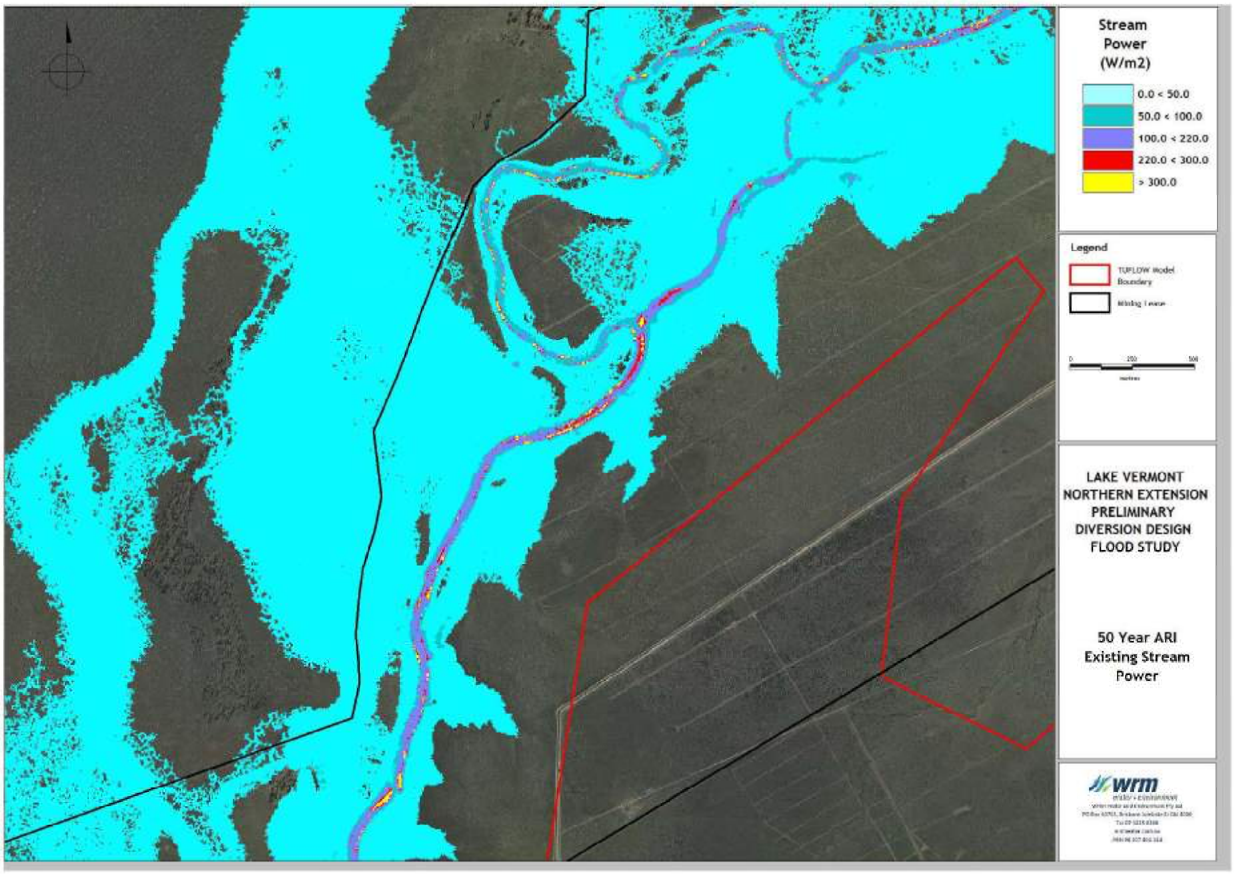

Figure 4.11 - Map of design 1 in 50 AEP existing conditions local stream power

5 Design Details

5.1 DIVERSION GEOMETRY

The proposed stream diversion and levee alignments are shown in Figure 5.1. The proposed 7.8 km long levee would provide immunity from Phillips Creek flooding in a 1 in 1,000 AEP design flood, and has been located at the edge of the proposed mine disturbance area.

The following considerations have been made in developing this alignment:

- Aim to maximise access to the coal resource underlying the creek;
- Confine the diversion alignment to the ML;
- Maintain an offset of 100 m from the top of bank to the toe of the proposed levee;
- Achieve a diversion design which mimics the existing hydraulic conditions in the immediate reaches of Phillips Creek by:
    - Providing a main channel slope which matches the existing creek channel slope;
    - Introducing meanders which have similar amplitude, wavelength, sinuosity and bend radius to the existing creek; and
    - Providing a main channel with a similar geometry to the existing channel – but with side slopes having a reasonable prospect of stabilisation through revegetation during construction.

The intention is that the stream will be stable, and require minimal maintenance during mine operations. It should ultimately achieve a state of dynamic equilibrium with the adjoining reaches such that ongoing management is not required.

To achieve the same channel slope as the existing creek, the upstream end of the diversion is located approximately 500 m upstream of the proposed diversion plug/levee - at chainage 1200 m. Several small-radius bends (similar to others noted in Figure 3.2) were introduced into the channel to achieve the required length. This alignment will necessitate filling of the remnant channel which would otherwise link adjacent meanders (between CH1100 and CH1500).

As shown in Figure 5.2, both the proposed diversion and the diverted reach are approximately 2.45 km long with a slope of approximately 0.12 % (1 in 830). Longitudinal profiles of the bed invert of the proposed diversion and the diverted reach of the existing creek are shown in Figure 5.5. Table 5.1 shows a comparison of the existing and proposed geomorphic characteristics.

Table 5.1 - Changes to typical channel geomorphic characteristics

Parameter		Existing Creek	Proposed Diversion
Length (km)		2.45	2.45
Bed Grade (%)		0.12%	0.12%
Bed Width (m)		7.2-11.2	9.0
Top Width (m)		30-50	35-50
Depth to floodplain (m)		7-9	7-9
Meander Radius (m)		>60m	>50m
Meander Sinuosity Index		1.7	1.7
Meander Wavelength (m)		200	270
Meander Amplitude (m)		75-340	50-225
1 in 2 AEP	Mean Velocity (m/s)	1.5	1.4
	Mean Bed Shear Stress (N/m^2)	30.8	30.4
	Mean Stream Power (N/m s)	45.5	41.7
	Hydraulic Gradient (%)	0.14%	0.12%
1 in 50 AEP	Mean Velocity (m/s)	2.1	1.7
	Mean Bed Shear Stress (N/m^2)	62.1	45.6
	Mean Stream Power (N/m s)	132.4	88.9
	Hydraulic Gradient (%)	0.12%	0.09%

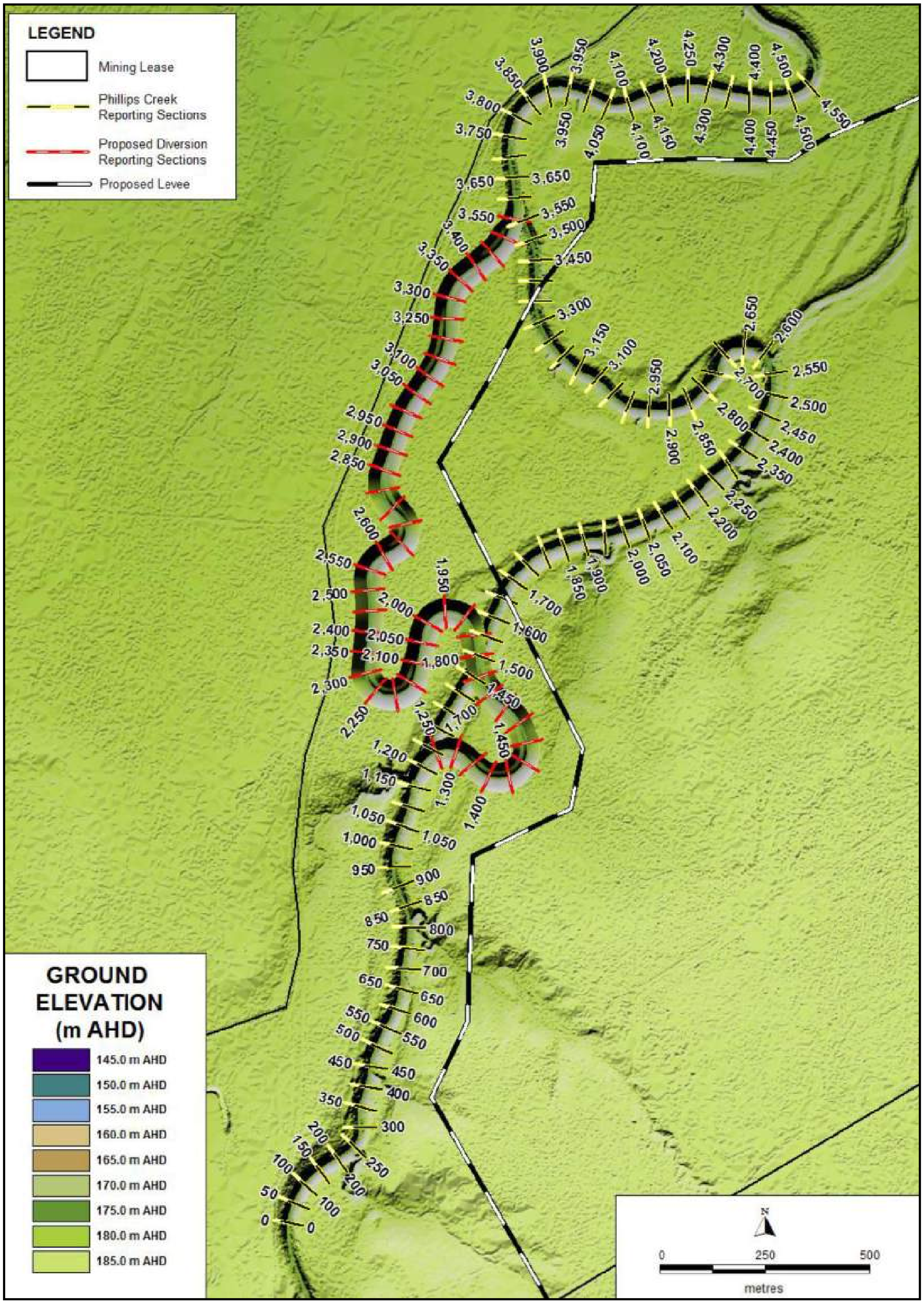

Figure 5.1 - General arrangement of proposed diversion and nearby levee

The proposed diversion channel geometry is approximately 9 m deep and 65 m wide at top of bank (see Figure 5.2). A compromise had to be made between matching the typical cross-section of the existing channel (which has relatively steep slopes), and ensuring that post-construction, the side slopes are flat enough to be stabilised prior to full revegetation.

As the bedslope, channel geometry and hydraulic characteristics are similar to the existing channel, the proposed diversion channel will exhibit similar sediment transport characteristics to the existing channel. However, during later design stages, consideration should be given to over-excavation of the channel bed to a depth of approximately 0.5m below the level of the modelled sand bed so that sand can migrate through the channel without significantly increasing bed levels. Sand extracted from the existing channel could be placed in the bed to ensure there is a source of sand to migrate downstream and replace material deposited in the diversion channel during the initial flow events.

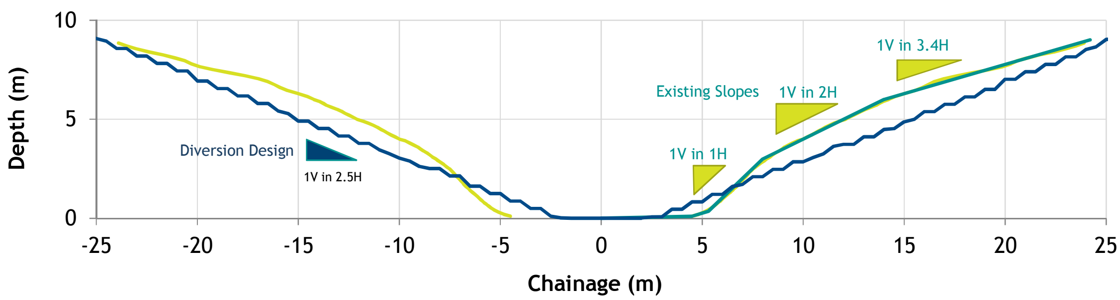

Figure 5.2 - Typical channel cross-sections - existing channel and proposed diversion

A 5m wide bench has also been introduced halfway up the inside bank of all major channel bends. This is illustrated in Figure 5.3.

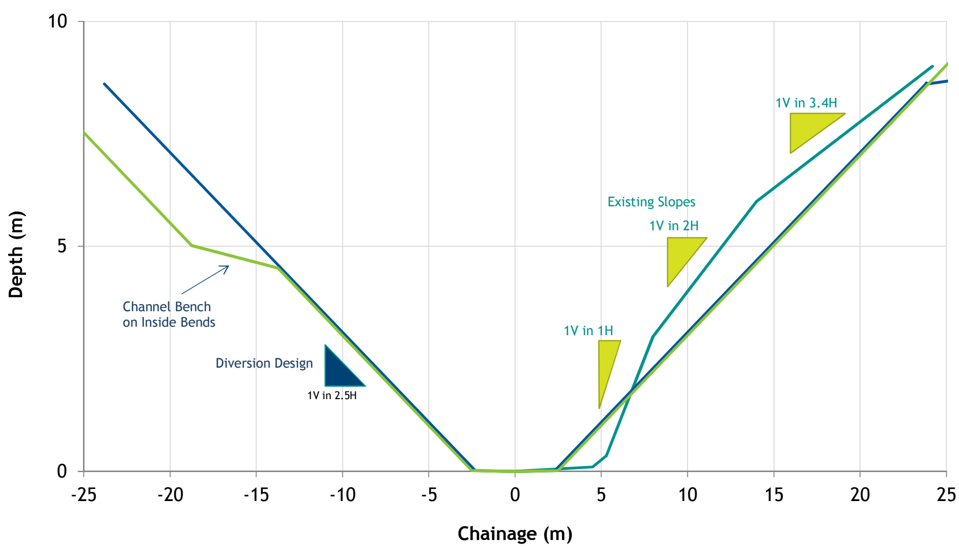

Figure 5.3 - Typical bench on inside bank

As shown in the floodplain cross-sections in Figure 5.4 and Figure 5.5, the new channel is generally located on or close to the higher sections of the floodplain near the existing perched channel. The distribution of flow from the channel to the floodplain will therefore be similar to the existing conditions as much as practical.

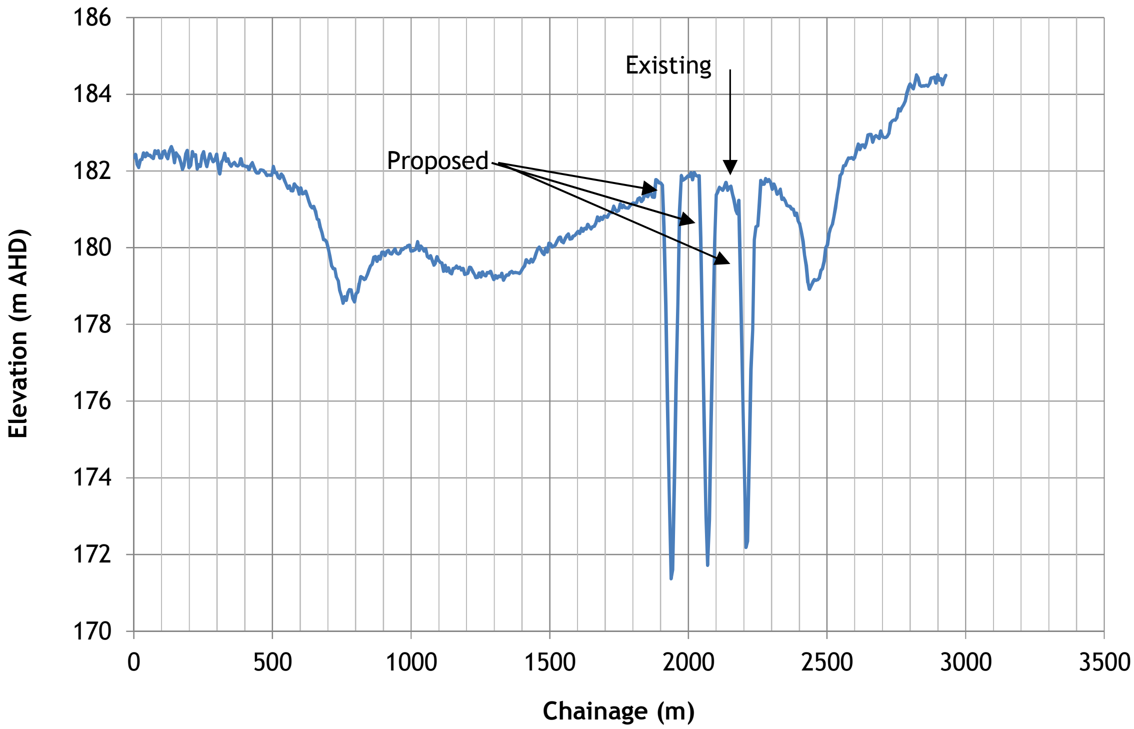

Figure 5.4 – Floodplain/diversion cross-section B

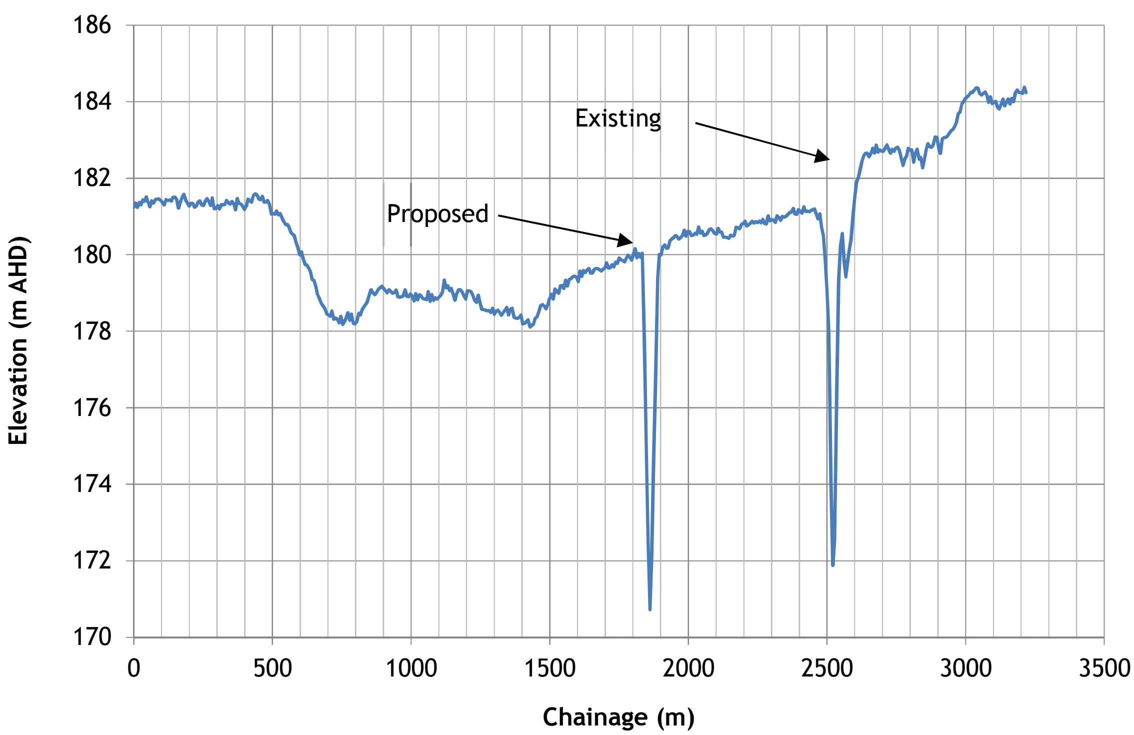

Figure 5.5 – Floodplain/diversion cross-section C

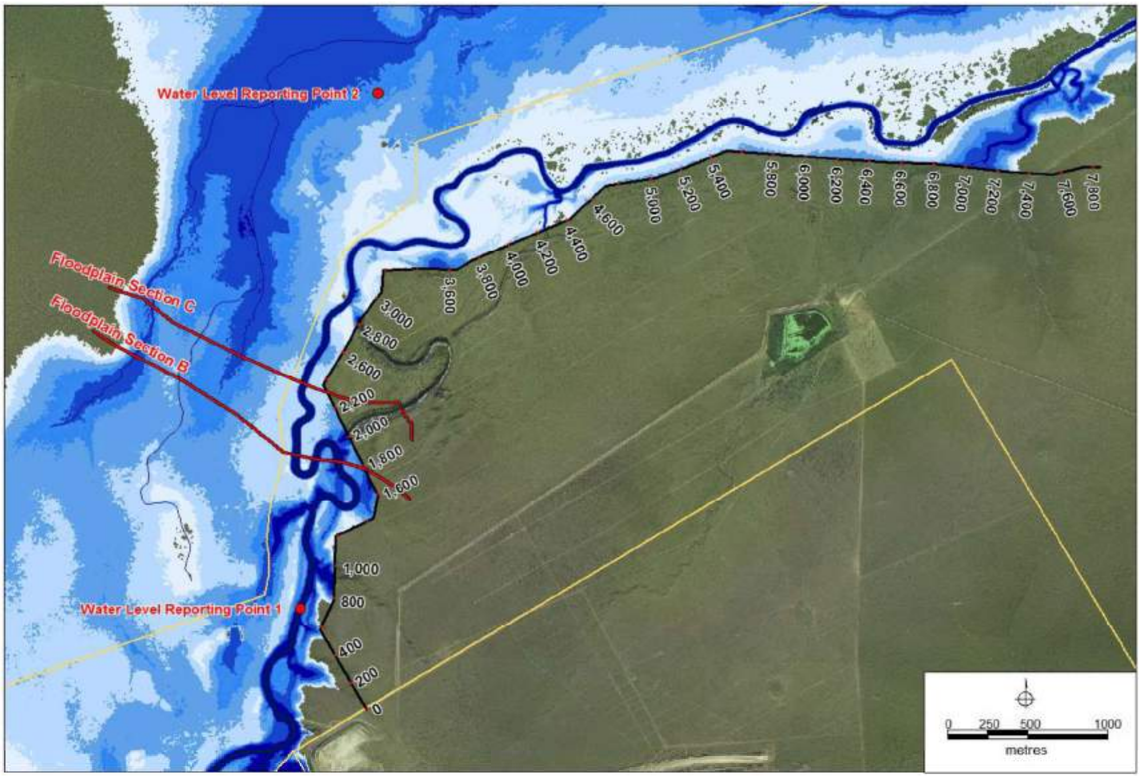

Figure 5.6 – Locations of water level reporting points and floodplain sections

5.2 REVEGETATION

Detailed geotechnical design and revegetation planning of the diversion will be undertaken as part of detailed design. Revegetation will be undertaken to ultimately achieve similar conditions to the existing stream.

The establishment and maintenance of riparian vegetation will be essential for bank stability. Root systems from trees and shrubs provide much of the erosion resistance for channel widening from the shear stresses of flowing water and grasses protect the soil surface from raindrop splash erosion and overland flows.

Tree and shrub root systems take time to establish and grass root systems cannot provide sufficient depth and strength to provide the necessary erosion protection. The revegetation design must therefore provide for the rapid establishment of high strength, deep root systems to protect the soil surface from raindrop splash and overland flows and provide for long term erosion protection and ecological function.

Further investigations of the subsoil conditions will be required to inform the detailed channel and revegetation design. It is possible that in-situ soils will need to be ameliorated - either in-situ, manufactured on site or imported to allow vegetation to establish and persist.

Revegetation works will include a combination of, native grass, shrub and tree species. The potential benefits of a compost blanket (to provide soil surface protection, restart micro-biological soil processes, and retain soil moisture) to aid rapid vegetation establishment will be considered during design.

Vegetation to be seeded will include cover crops and non-invasive grass species for short and medium term erosion protection and native grasses, shrubs and trees for long term erosion protection.

Consideration will be given to planting and direct seeding of Vetiver Grass (Chrysopogan zizanioides). Vetiver Grass has been developed specifically for erosion control purposes. It is a stiff barrier grass that is planted in a similar manner to a shrub or tree. This particular cultivar is sterile and is tolerant to a wide range of soil conditions. Its greatest benefit is its rapid growth and massive root structure. The roots can grow 2 to 3 m deep in the first twelve months and have been measured to have a mean tensile strength of 75 MPa.

The trees will establish over a number of years and their root systems will take over the stream bank erosion protection role that the Vetiver Grass roots have provided in the short term. The trees may ultimately shade out the Vetiver Grass.

Where possible, existing vegetation will be preserved, and fallen timber or vegetation cleared as part of mining operations will be incorporated into the new channel to rapidly establish habitat.

If possible, the diversion should be constructed 'off-line' until the works have stabilised and the vegetation has become established. It is preferable that the diversion is connected to the Phillips Creek channel at least one wet season after construction.

6 Hydraulic Assessment

6.1.1 Methodology

The existing case hydraulic models (TUFLOW and HEC-RAS) were amended to include the proposed Phillips Creek diversion and the levees required to protect the mine area along the southern bank. Full details of TUFLOW modelling can be found in the flood model report in Appendix A.

The HEC-RAS model was used for the assessment of low-flow conditions. The cross-section layout of the model is shown in Figure 5.1.

The adopted Manning's 'n' values for both the existing and post-developed Phillips Creek TUFLOW and HEC-RAS models were:

- Channel: 'n' = 0.035
- Banks: 'n' = 0.05

The hydraulic model is uncalibrated. These values are based on published values and are consistent with those used for Phillips Creek in the ACARP studies (Fisher Stewart, 2002).

The effect of variations in the adopted roughness on the 1 in 2 AEP hydraulic conditions is summarised in the Sensitivity Analysis results presented in Appendix A. The results show that while the values of the key guideline parameters are sensitive to changes in bank roughness, the findings of this investigation regarding the performance of the design in the 1 in 2 AEP flow are unchanged with different roughness assumptions.

6.1.2 Impacts on Flood Levels

The impact of the proposed works on flood levels along the main channel is illustrated in Figure 6.1. The figure shows that:

- 1 in 2 AEP flood levels are similar to or slightly reduced due to the slightly larger conveyance of the proposed diversion channel, but the impact does not propagate upstream. In larger flows contained in bank – the reduction in water level extends further upstream.
- The reduction in the width of the southern floodplain caused by the proposed levee construction results in an increase in the 1 in 50 AEP flood levels along the diversion channel, and in the downstream reaches.

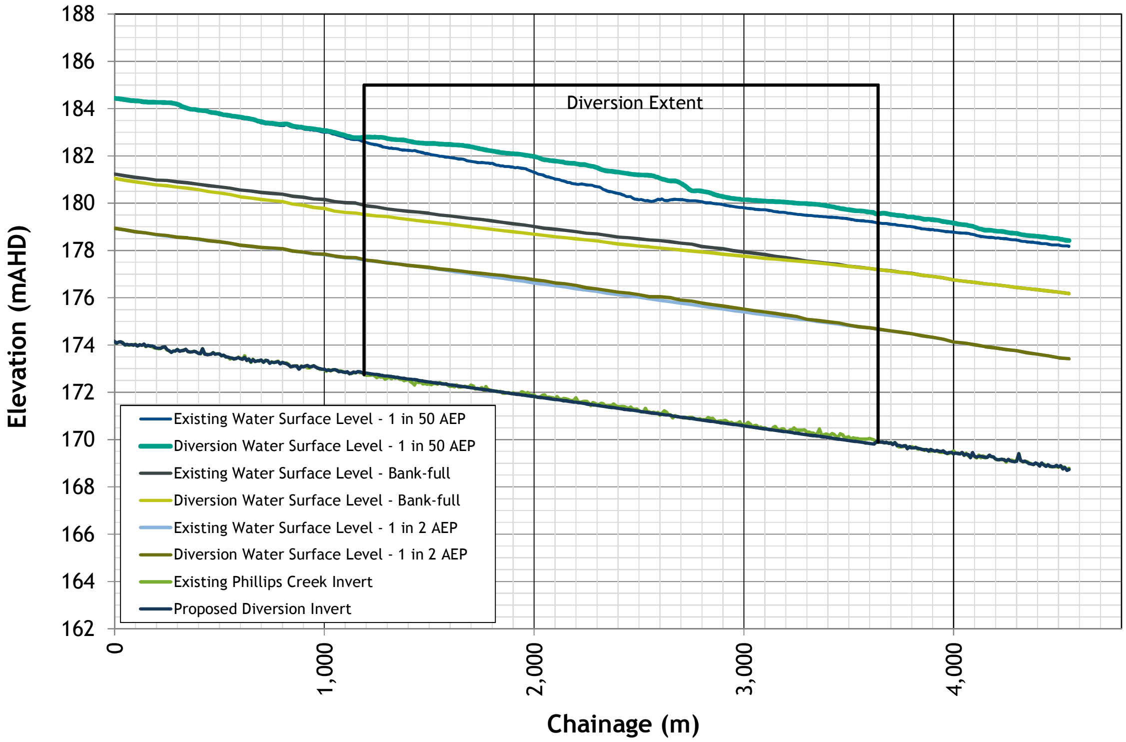

Figure 6.1 – Main channel flood levels (1 in 2 AEP and 1 in 50 AEP)

The impact of the proposed diversion and levee on floodplain flood levels in the 1 in 50 AEP flood is shown in Figure 6.2 and Appendix A. The results show that flood levels are increased by less than 100 mm upstream of the diversion. However, the proposed levee and diversion result in redistribution of flow onto the northern floodplain from the southern floodplain and main channel. There is a corresponding increase in northern floodplain levels of approximately 250 mm to 500 mm and slightly smaller reductions in flood level on the southern floodplain.

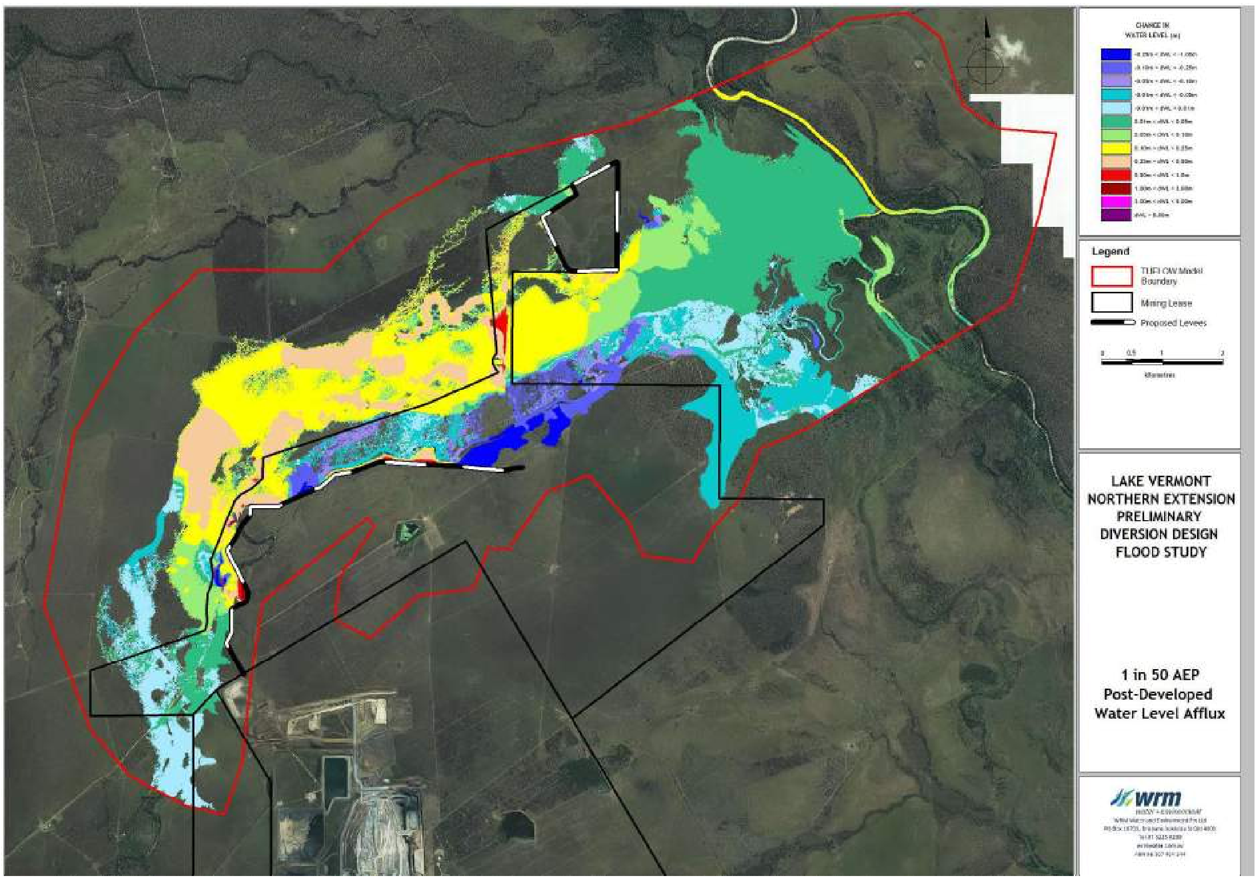

Figure 6.2 - Increase in 1 in 50 AEP flood levels

6.1.3 Guideline Hydraulic Criteria - 1 in 2 AEP

The main channel section-averaged results of the hydraulic modelling of the proposed diversion in the 1 in 2 AEP flood event shown in Figure 6.3 to Figure 6.5 are summarised below. Generally, due to the uniform diversion channel shape, the values within the channel vary more uniformly than in the adjoining reaches.

Shear Stress and Stream Power:

- Downstream of the diversion – there is no change from the existing conditions;
- Upstream of the diversion – there is a very small increase for a distance of 400m, but all values are well below guidelines, and well below values in the nearby existing channel.
- In the diversion itself – the resultant values a relatively uniform, resulting in a reduction in the lower reaches, and a small increase in much of the upstream half, but values are well below background and well within the envelope of naturally occurring values.

Velocity:

- At most locations, the existing velocity is just below the guideline value of 1.5 m/s (typical range is 1.4 m/s to 1.5 m/s).
- Downstream of the diversion, there is no change from the existing conditions;
- Upstream of the diversion – there is a very small localised increase, but the values are below guidelines.
- In the diversion itself – there is a small decrease, to under 1.3 m/s.

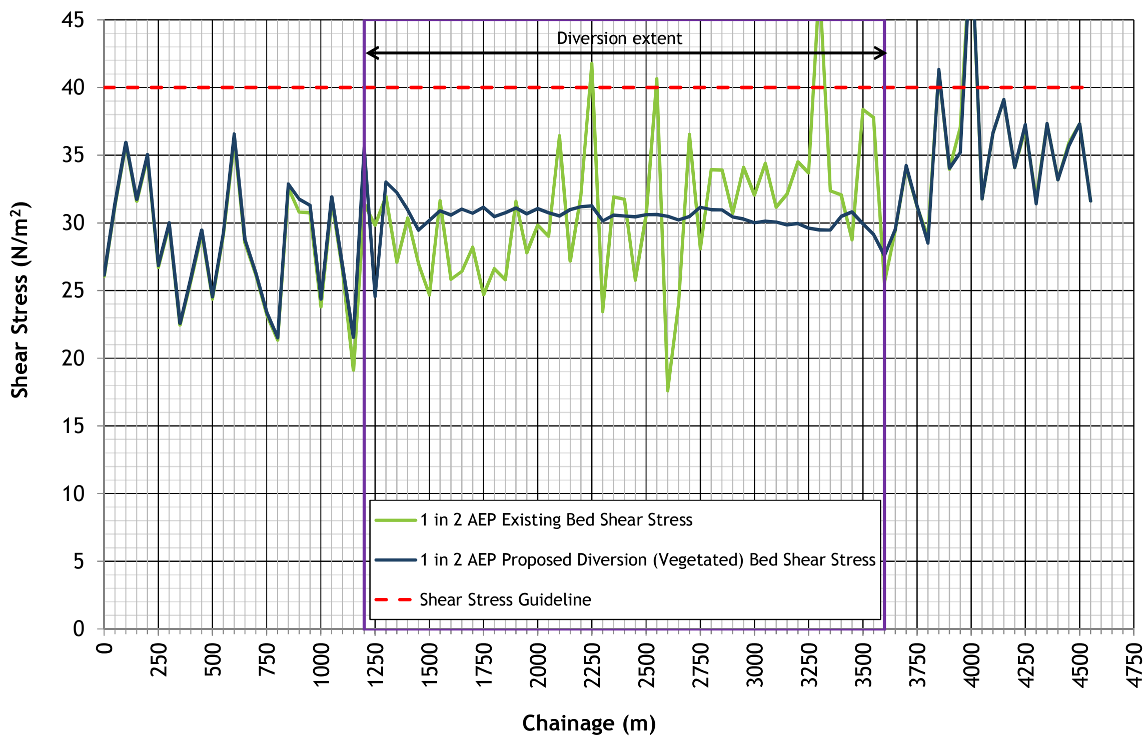

Figure 6.3 - Longitudinal profiles of 1 in 2 AEP section-averaged shear stress

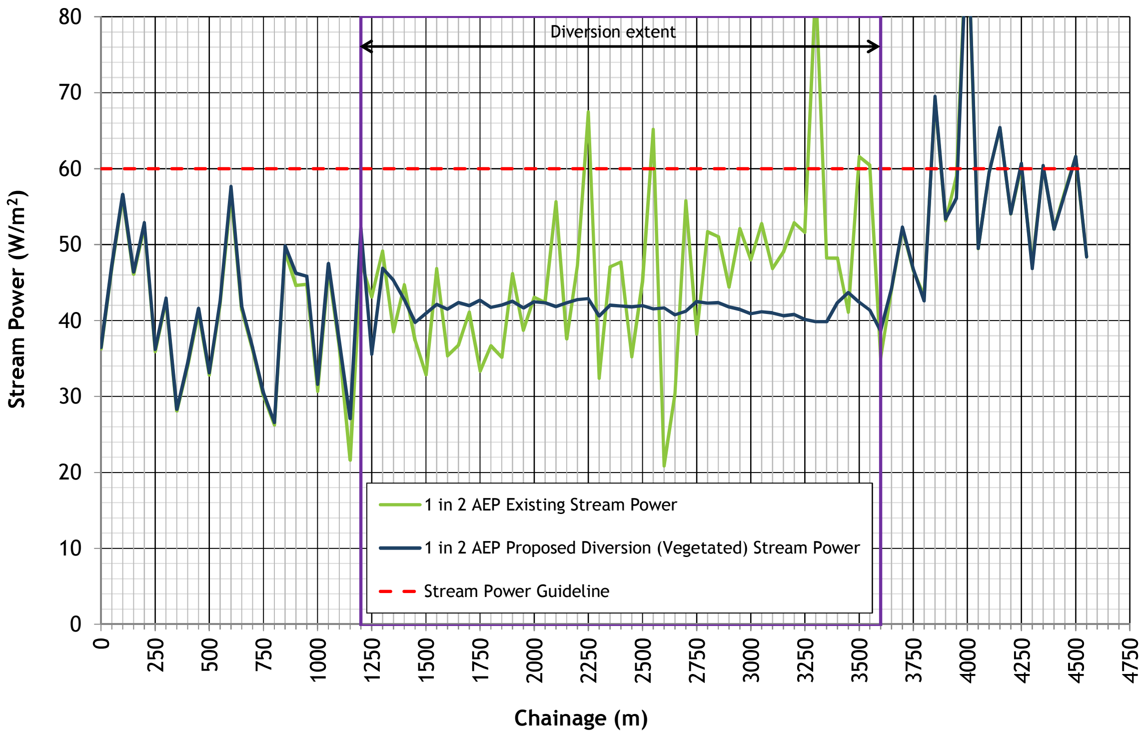

Figure 6.4 - Longitudinal profiles of 1 in 2 AEP section-averaged stream power

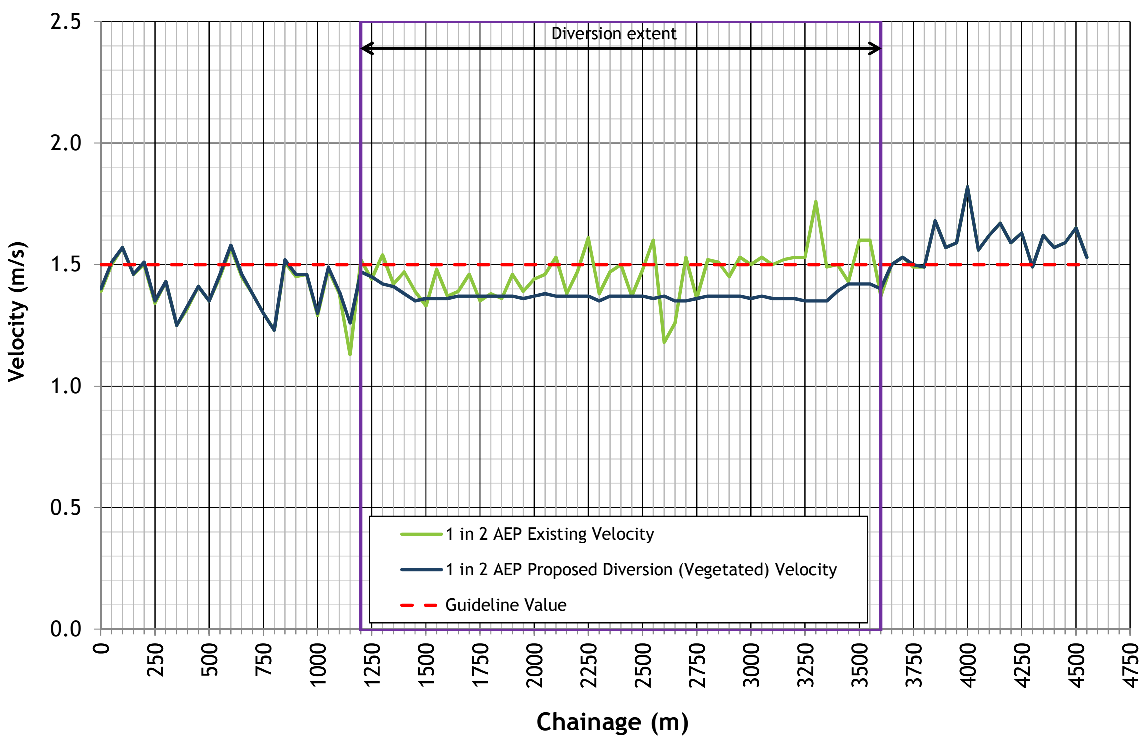

Figure 6.5 - Longitudinal profiles of 1 in 2 AEP section-averaged velocity

6.1.4 Guideline Hydraulic Criteria – 1 in 2 AEP Unvegetated Conditions

The guideline includes hydraulic criteria for un-vegetated conditions (representative of potential conditions immediately post-construction) for the 1 in 2 AEP flood event.

These conditions have been represented in the model by reducing bank roughness within the diversion (Mannings 'n' reduced from 0.05 to 0.035). The main channel section-averaged results are shown in Figure 6.6 to Figure 6.8 and are summarised below.

- In the diversion itself, bed shear stress is reduced, and is well below the guideline value. Stream Power is below guideline levels in the downstream sections of the diversion, but in the upstream half it is above guideline.
- Upstream of the diversion – there is an increase in bed shear stress and stream power, but with the exception of localised areas, the values are below guideline.
- Within the diversion, the velocity is well above the guideline value of 1.0 m/s.
- Upstream of the diversion – there is an increase in velocity to slightly above vegetated guideline values. However, the velocities are consistent with those in other reaches.

The results indicate that post-construction there will be an elevated erosion risk, and this will need to be managed through careful revegetation planning. Stabilisation works may need to be considered to manage the potential for damage during early flows, but this is likely to be mitigated by the relatively cohesive nature of the local soils.

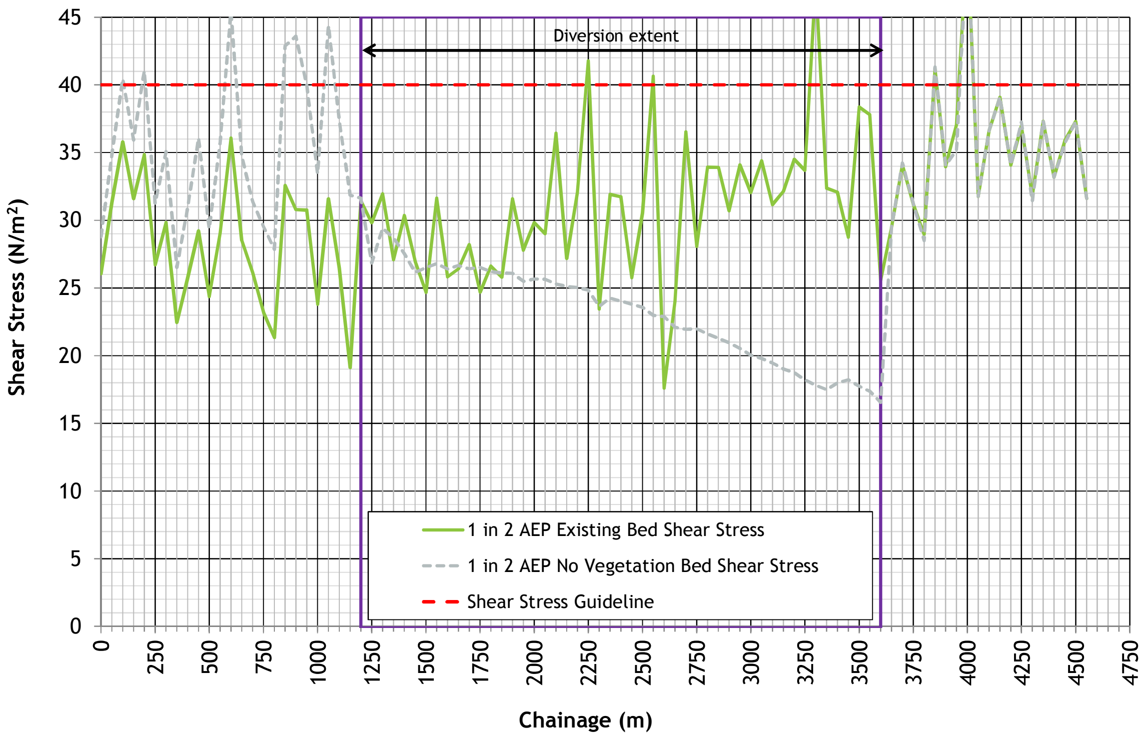

Figure 6.6 – Longitudinal profiles of 1 in 2 AEP section-averaged shear stress (no-veg)

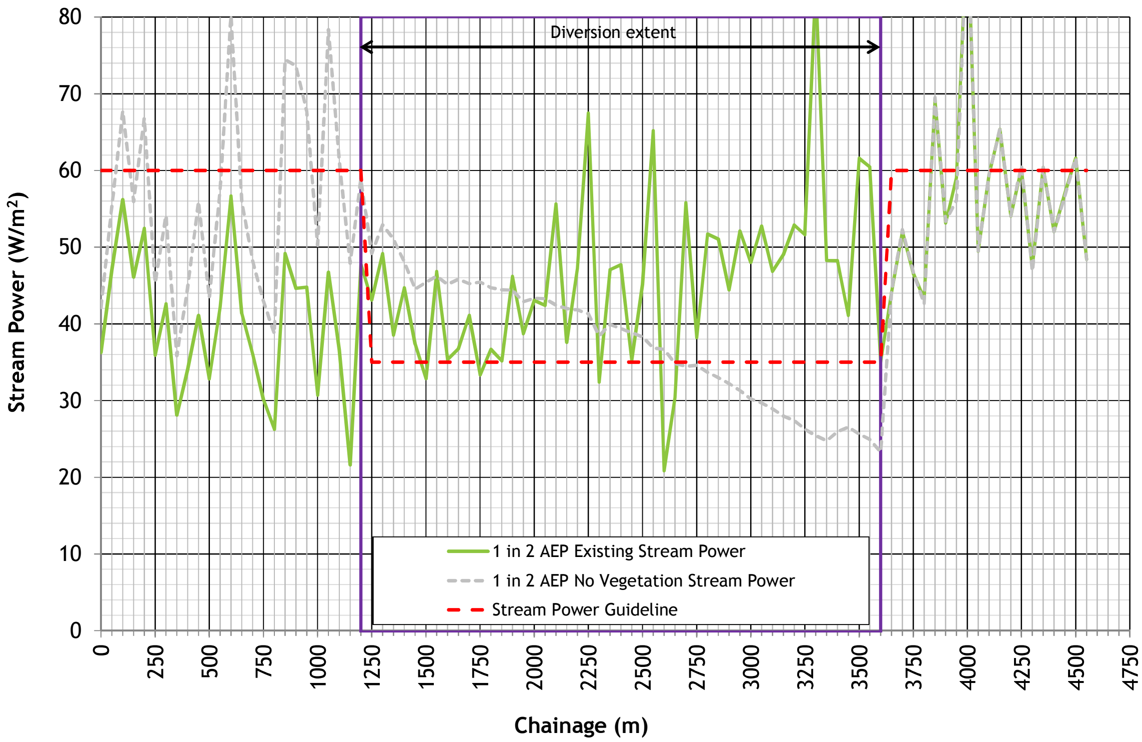

Figure 6.7 - Longitudinal profiles of 1 in 2 AEP section-averaged stream power (no-veg)

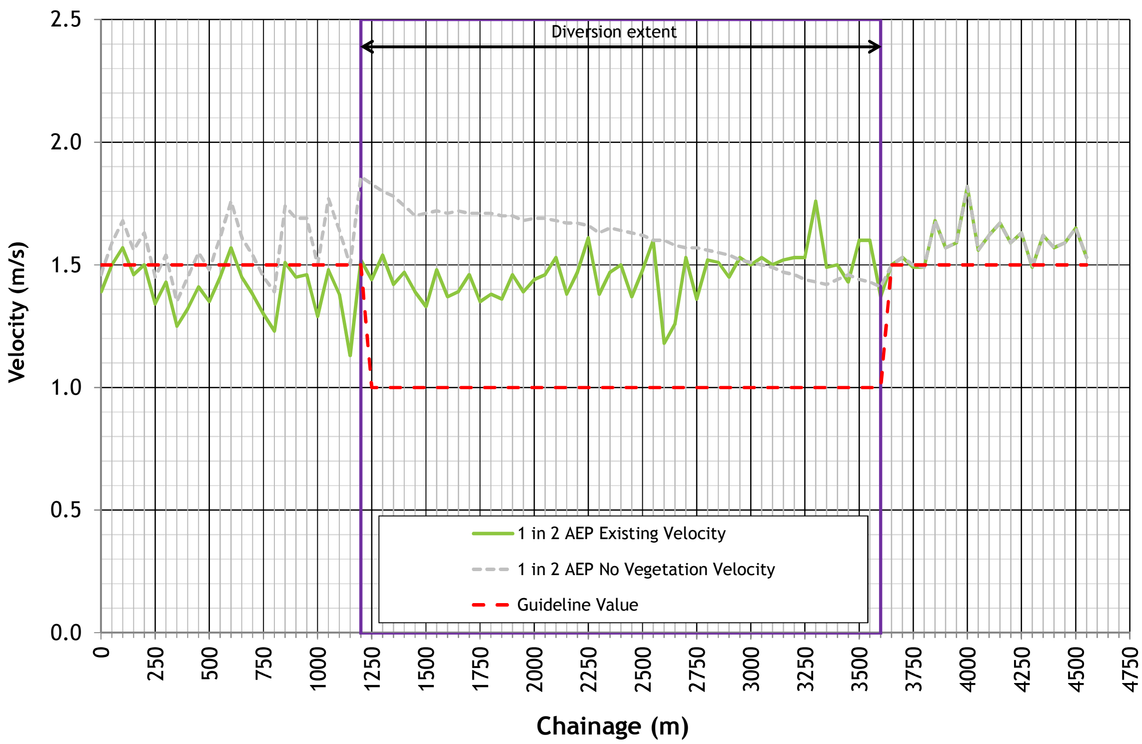

Figure 6.8 - Longitudinal profiles of 1 in 2 AEP section-averaged velocity (no-veg)

6.1.5 Hydraulic Conditions - Bankfull Flow

While the Diversion Guidelines refer to the 1 in 2 AEP flood, the existing Phillips Creek channel contains significantly larger flows within its banks. Bankfull flows are recognised to be important in the geomorphic evolution of Australian streams.

To gauge the impact of the proposed diversion channel hydraulics in bank-full flows, the HEC-RAS model was used with a flow of 240m^3/s (between the 1 in 2 AEP and 1 in 5 AEP flows).

The main channel section-averaged results of the hydraulic modelling of the proposed diversion in this flood event shown in Figure 6.9 to Figure 6.11 are summarised below. Generally, due to the uniform diversion channel shape, the values within the channel vary more uniformly than in the adjoining reaches.

Shear Stress and Stream Power:

- Downstream of the diversion – there is no change from the existing conditions;
- Upstream of the diversion – there is an increase of approximately 10% of the existing values in this reach. However, the values are similar to those occurring in other nearby reaches. The change is caused by the slight reduction in water surface level through the diversion shown in Figure 6.1, which in turn increases upstream flow velocities.
- In the diversion itself – the resultant values are relatively uniform, resulting in a reduction compared to the lower reaches.

Velocity:

- Downstream of the diversion, there is no change from the existing conditions;
- Upstream of the diversion – there is an increase of up to 10% of the existing values in this reach. However, the values are similar to those occurring in other nearby reaches.
- In the diversion itself – there is a small decrease.

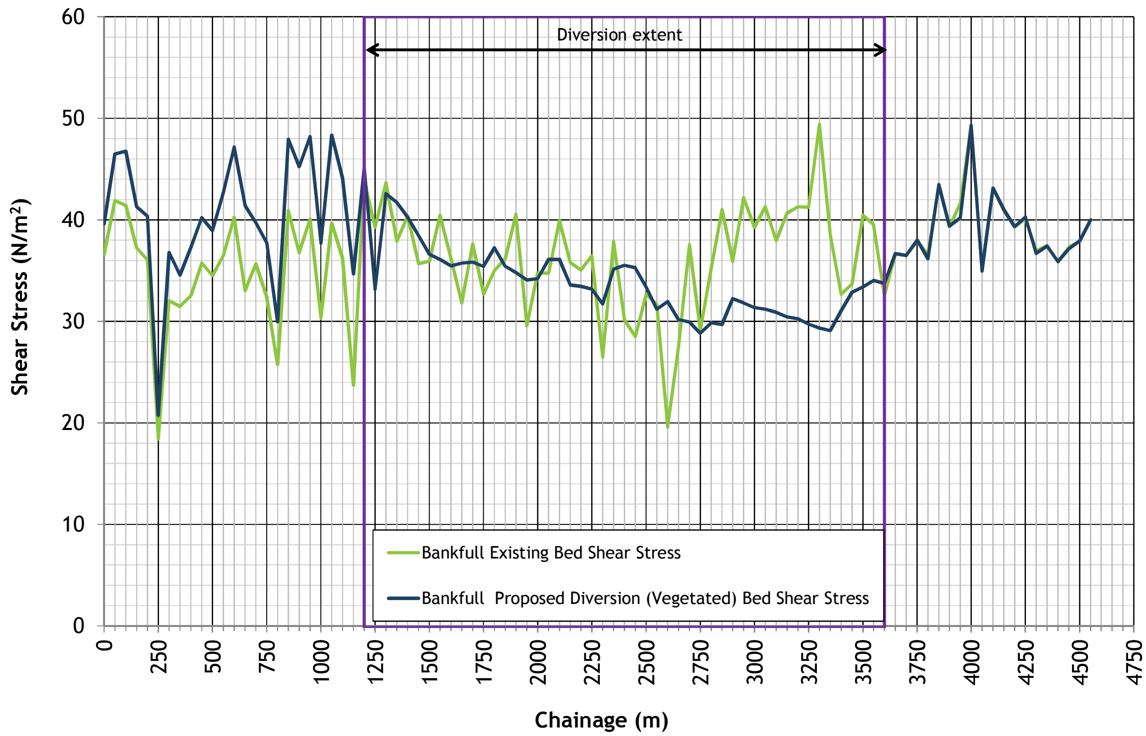

Figure 6.9 - Longitudinal profiles of bank-full section-averaged shear stress

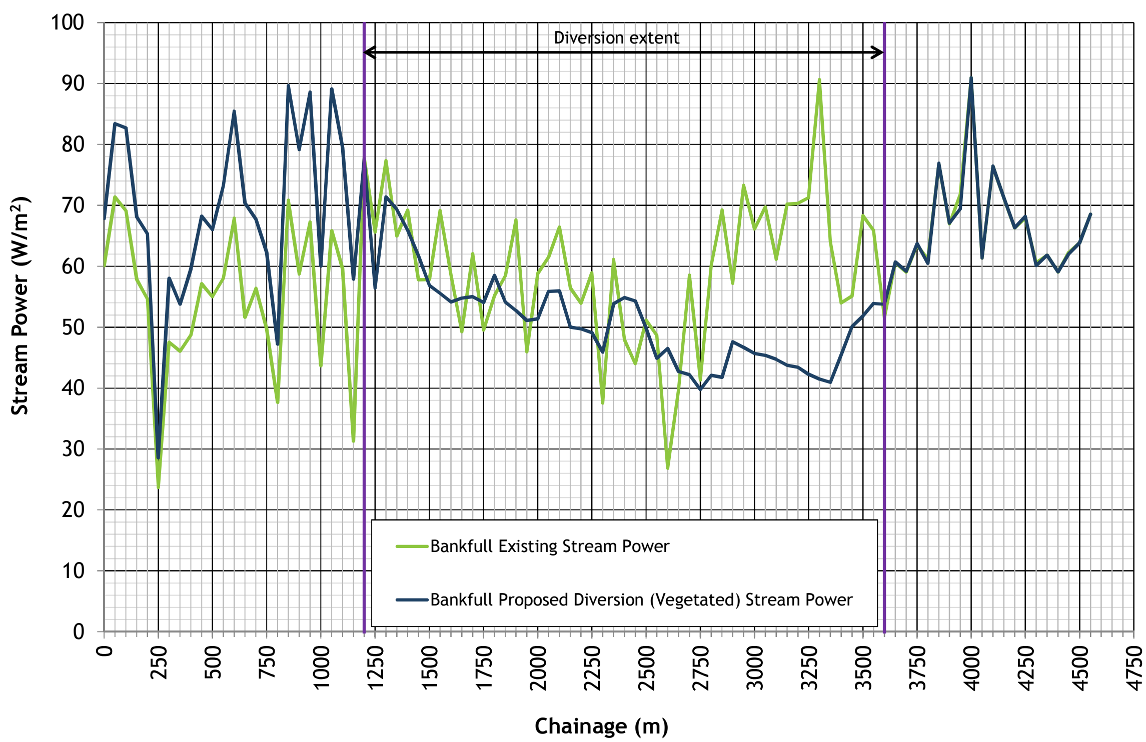

Figure 6.10 - Longitudinal profiles of bank-full section-averaged stream power

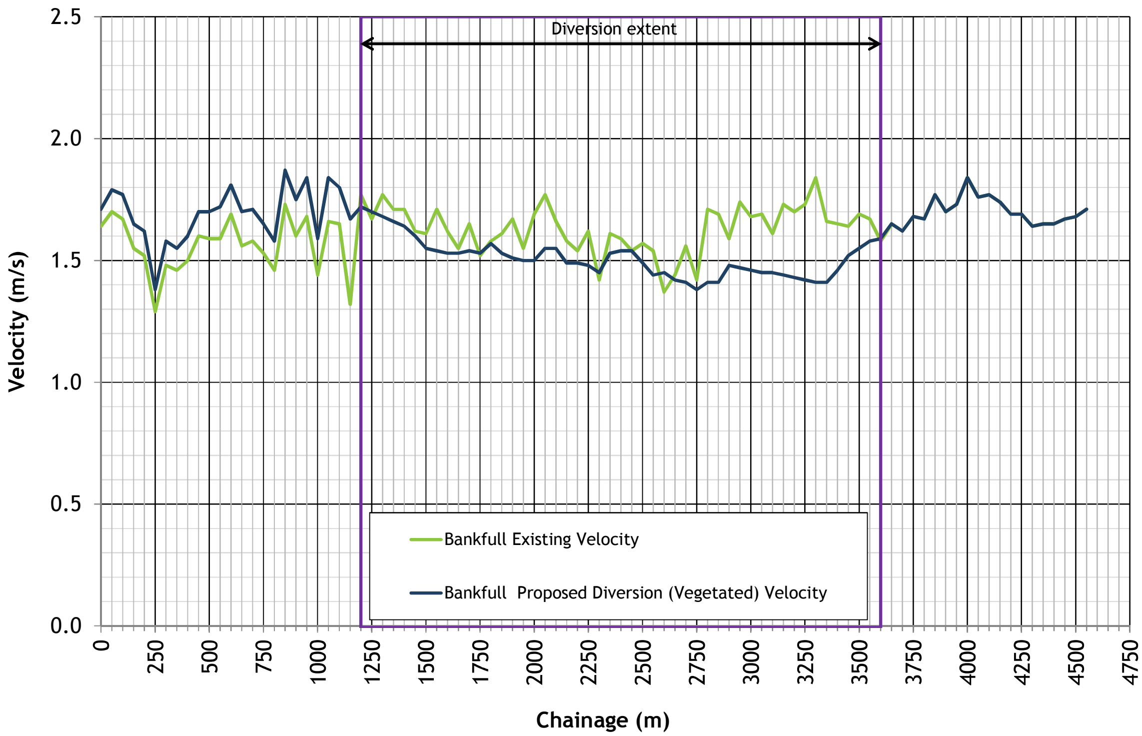

Figure 6.11 - Longitudinal profiles of bank-full section-averaged velocity

6.1.6 Guideline Hydraulic Criteria - 1 in 50 AEP

Shear Stress:

- Downstream of the diversion – there is generally an increase from the existing values, but all values are under guideline values.
- Upstream of the diversion – there is generally a small increase, with some isolated sections slightly above guidelines in both existing and proposed cases.
- In the diversion itself - there is generally a decrease in values, with one isolated section at CH2150 (the apex of a tight radius bend) the exception (where values also exceed guideline values).

Stream Power:

- Downstream of the diversion – there is generally an increase from the existing values - but all values are under guideline values.
- Upstream of the diversion – there is generally a small increase. However, except for chainage 0 m, all sections are below guidelines.
- In the diversion itself, there is generally a decrease in values to well below guideline levels – with one isolated section at CH2150 the exception, the apex of a tight radius bend, where values also exceed guideline values.

Velocity:

- At most locations (with the exception of a 150 m reach upstream of the diversion), the existing velocity is less than guideline of 2.5 m/s (typical range is 1.7 m/s to 2.5 m/s).

- Downstream of the diversion, there is a small increase from the existing conditions. With the exception of a 100 m reach just downstream, all reaches are below guideline values.
- Upstream of the diversion – there is a very small increase in velocity.
- In the diversion itself – the velocity is significantly reduced to well below guideline values.

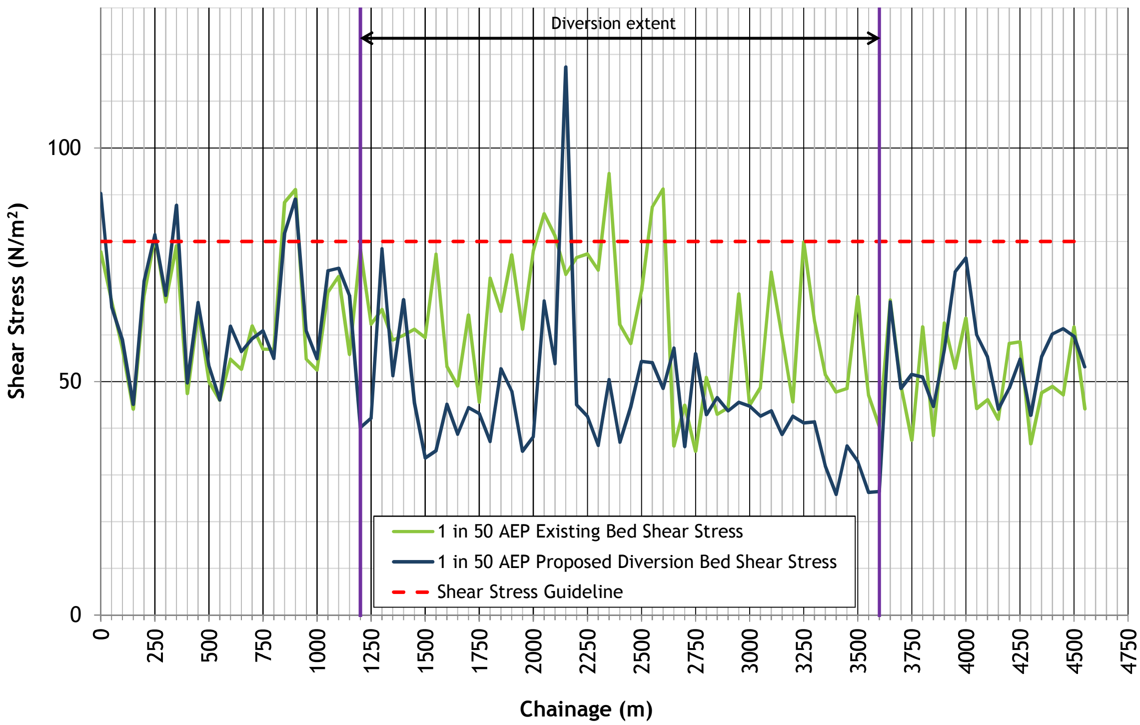

Figure 6.12 – Longitudinal profiles of 1 in 50 AEP section-averaged shear stress

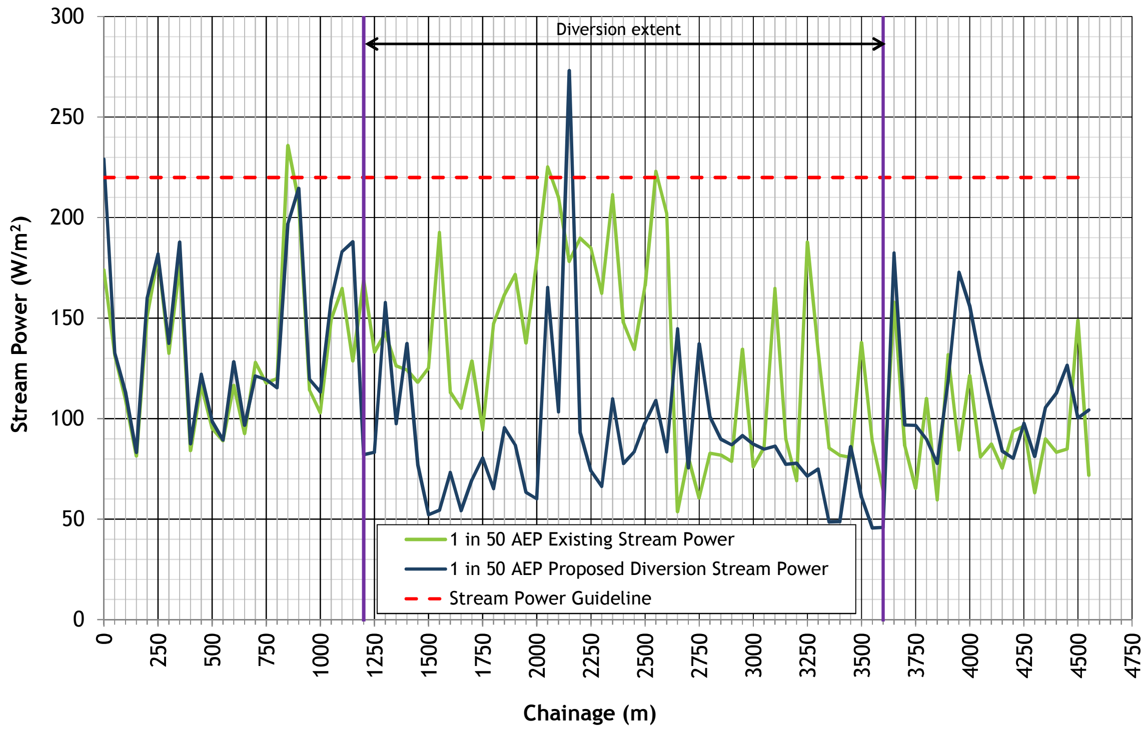

Figure 6.13 - Longitudinal profiles of 1 in 50 AEP section-averaged stream power

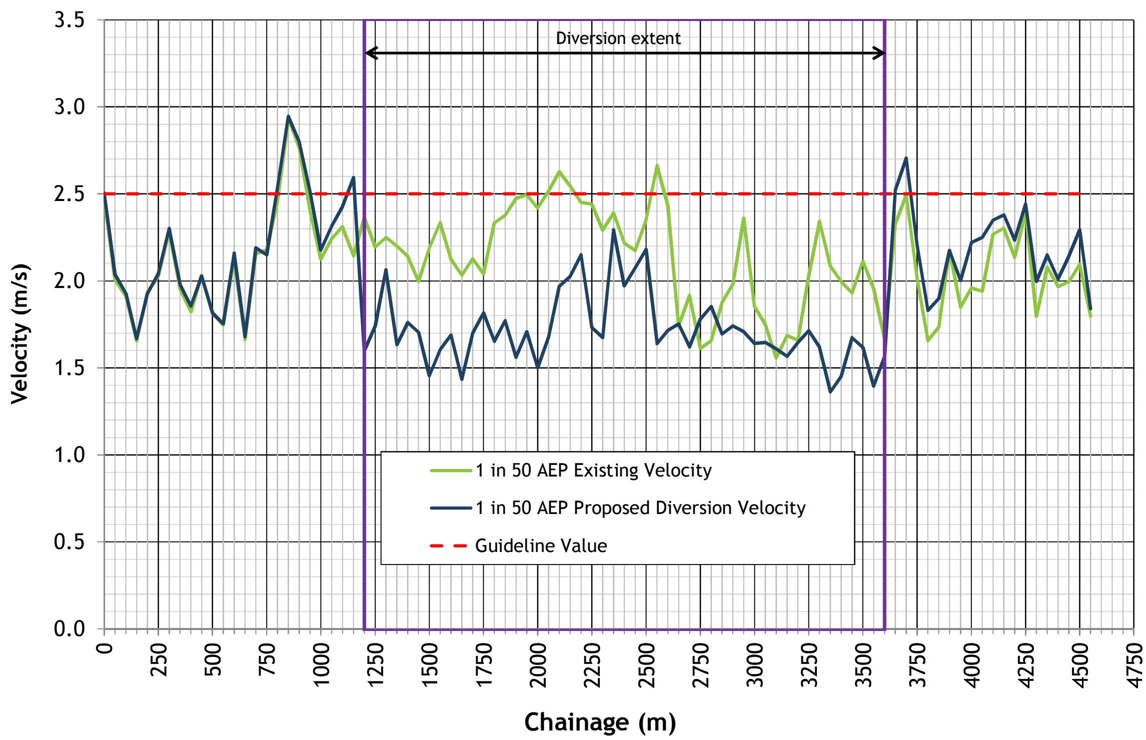

Figure 6.14 - Longitudinal profiles of 1 in 50 AEP section-averaged velocity

6.1.7 Distribution of flow in large floods

While construction of the proposed levees and diversion will result in redistribution of flow between the channel and floodplains, the impact on the duration of flooding is small. Figure 6.15 compares floodplain depth hydrographs before and after construction, at the points on the floodplain indicated in Figure 5.6.

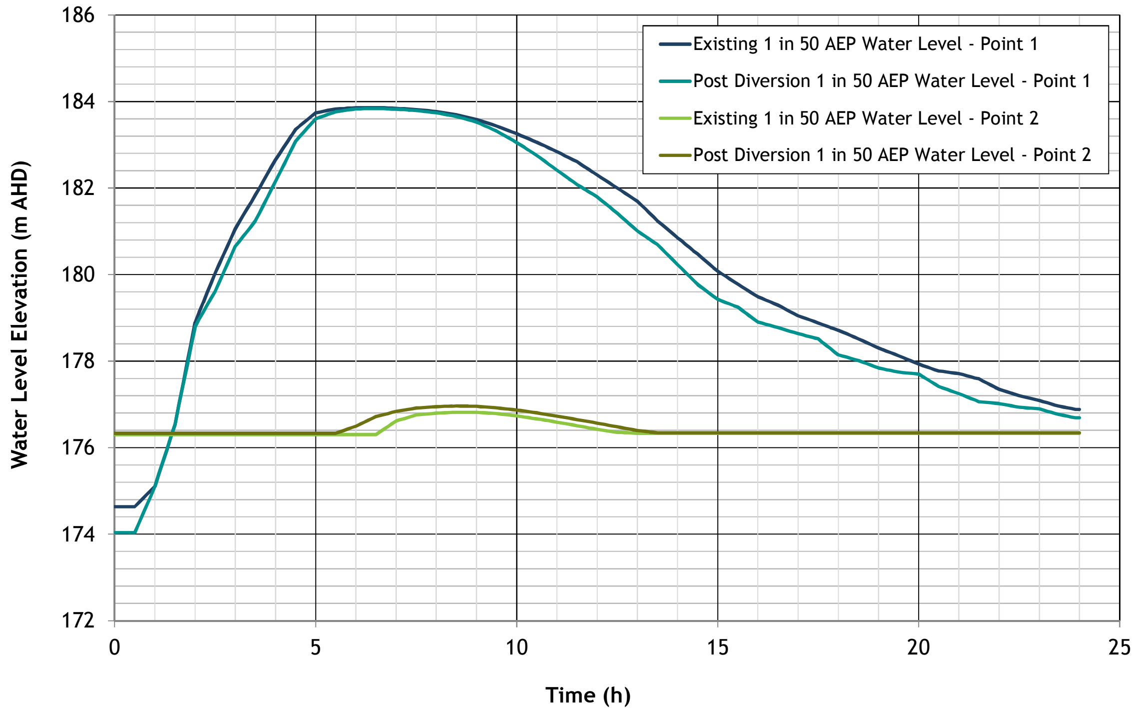

Figure 6.15 - Impact on 1 in 50 AEP floodplain hydrographs - proposed

The proposed changes will also result in changes to the amount of flow in the main creek channel. Figure 6.16 and Figure 6.17 show that while there will be a small reduction in the 1 in 50 AEP in-channel flow at the upstream end of the nearby reaches, there will be a greater proportion of flow through the area immediately downstream of the diverted reach of the channel (refer Figure 3.5 for locations).

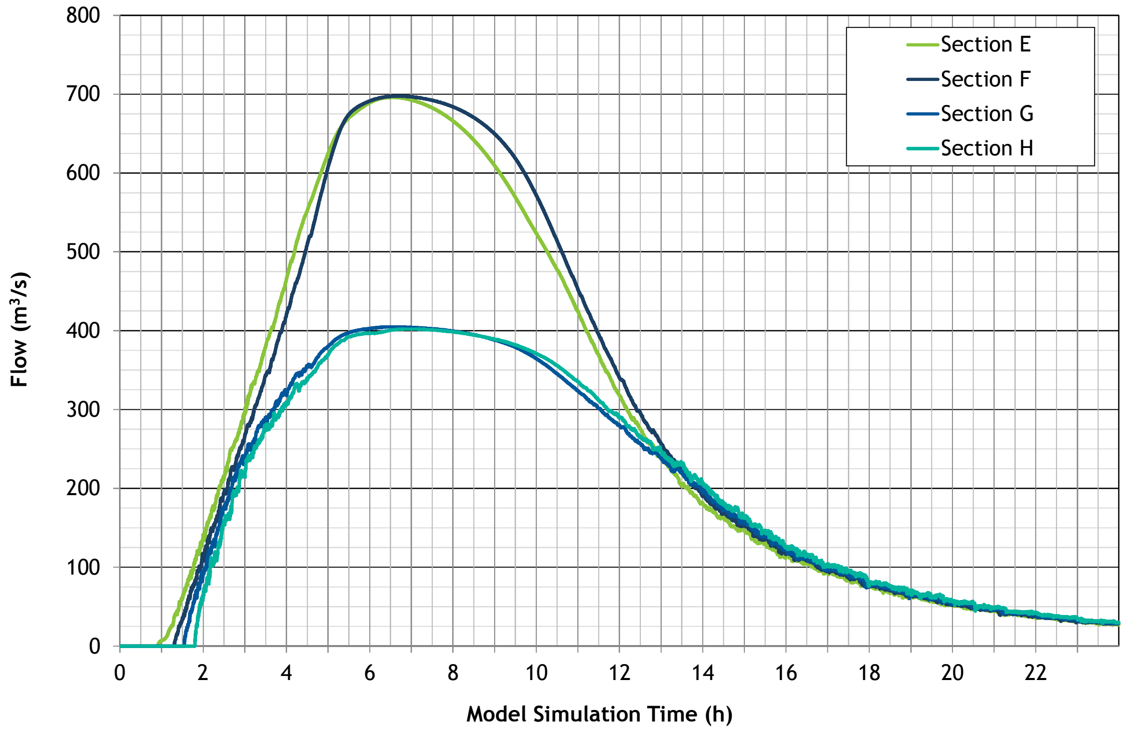

Figure 6.16 - 1 in 50 AEP main channel hydrographs - existing

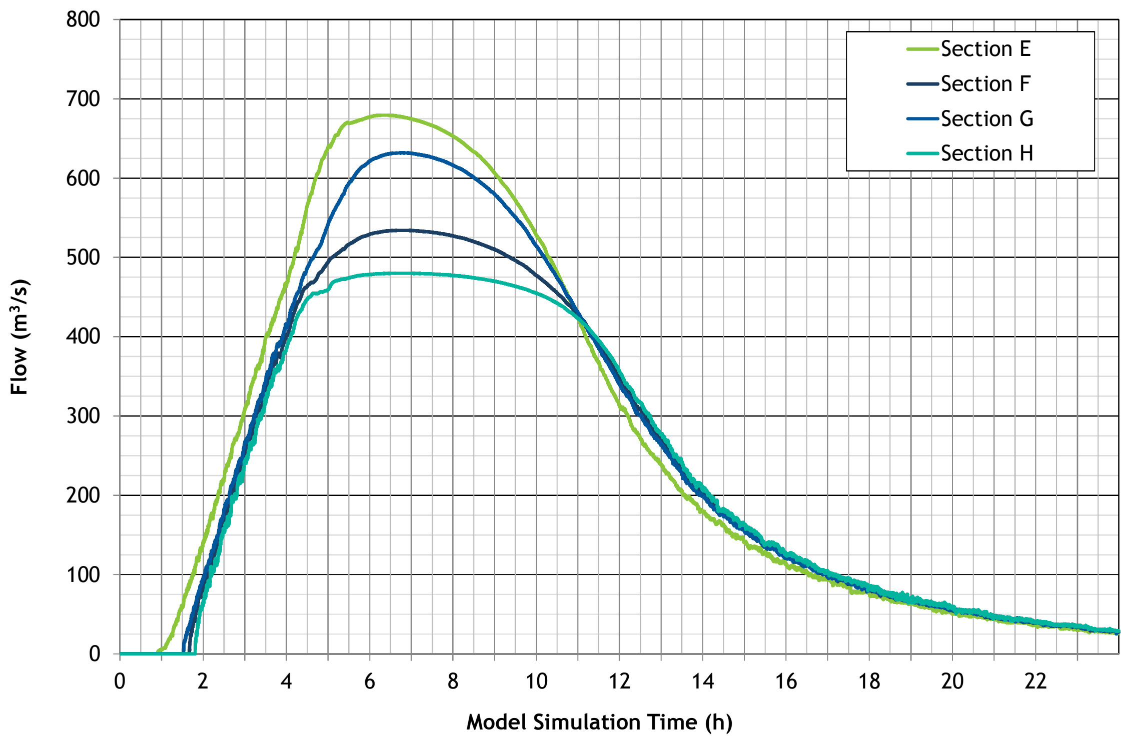

Figure 6.17 - 1 in 50 AEP main channel hydrographs - proposed

7 Monitoring

7.1 GENERAL

The proposed Phillips Creek diversion will be monitored regularly to collect useful data for use in evaluating the performance of the constructed diversion. Collection of monitoring data will help identify any issues with the construction of the diversion and assist with relinquishment of the diversion at mine closure. The monitoring program will be conducted using the process documented in ACARP (2001).

7.2 GOALS AND OBJECTIVES

The overall goal of the monitoring program is for the diversion to be considered as a reach or stream in equilibrium in order to achieve relinquishment. Although the relinquishment process will take many years it is important to begin monitoring early to ensure sufficient data is available to support relinquishment of the diversion. The immediate objective of the monitoring program is to evaluate the performance of the constructed diversion to ensure that any issues are identified early and also to obtain baseline information for use in evaluating the performance of the diversion later in mine life.

7.3 LONG TERM DIVERSION PLAN

Early monitoring of the diversion and the upstream and downstream control reaches will define baseline data for the relinquishment of the diversion license. An application for relinquishment of the diversion license will be submitted to the regulator once mining and rehabilitation works have been completed.

7.4 BASELINE MONITORING

Baseline monitoring will be conducted prior to the construction of the Phillips Creek diversion to provide a reference data set for evaluation of monitoring data collected throughout the life of the monitoring program. During the baseline monitoring period, a control reach located upstream of the diversion and a downstream reach will also be established. Baseline monitoring will include:

- site photography;
- aerial photography;
- survey;
- vegetation characterisation and assessment; and
- flow event monitoring.

7.5 CONSTRUCTION MONITORING

Construction monitoring will be conducted to ensure the diversion is constructed to the design specifications. Construction monitoring will include:

- execution database to record construction activities;
- site photography; and
- aerial photography.

7.6 OPERATIONS MONITORING

Operations monitoring will be conducted after construction works have been completed to maintain channel condition and to identify remedial works. The operations monitoring is a combination of visual assessments and survey data and will include:

- survival of works;
- site photography;
- aerial photography;
- visual assessment;
- index of diversion condition (IDC);
- site survey; and
- flow events monitoring.

Operations monitoring will be conducted in three reaches. The control reach, located upstream of the diversion, the diversion reach and the downstream reach, located immediately downstream of the diversion. The diversion monitoring locations are shown in Figure 7.1.

Table 7.1 shows a timeline of the monitoring requirements for the proposed Phillips Creek diversion over the first 10 years of operation. A more detailed monitoring program will be developed after approval of the diversion concept design.

Table 7.1 - Proposed diversion monitoring schedule

Monitoring Package	Monitoring Activity	1	2	3	4	5	6	7	8	9	10
Baseline Monitoring	Photographs	■	■								
	Aerial Photograph	■	■								
	Survey	■	■								
	Vegetation	■	■								
	Flow Events	■	■								
Construction Monitoring	Execution Database		■								
	Photographs		■								
	Aerial Photograph		■								
Operations Monitoring	Survival of Works			■	■			■			■
	Photographs			■	■			■			■
	Aerial Photograph			■	■	■	■	■	■	■	■
	Visual Assessment			■	■	■	■	■	■	■	■
	Index of Diversion Condition (IDC)			■	■			■			■
	Survey			■				■			
	Flow Events			■	■	■	■	■	■	■	■

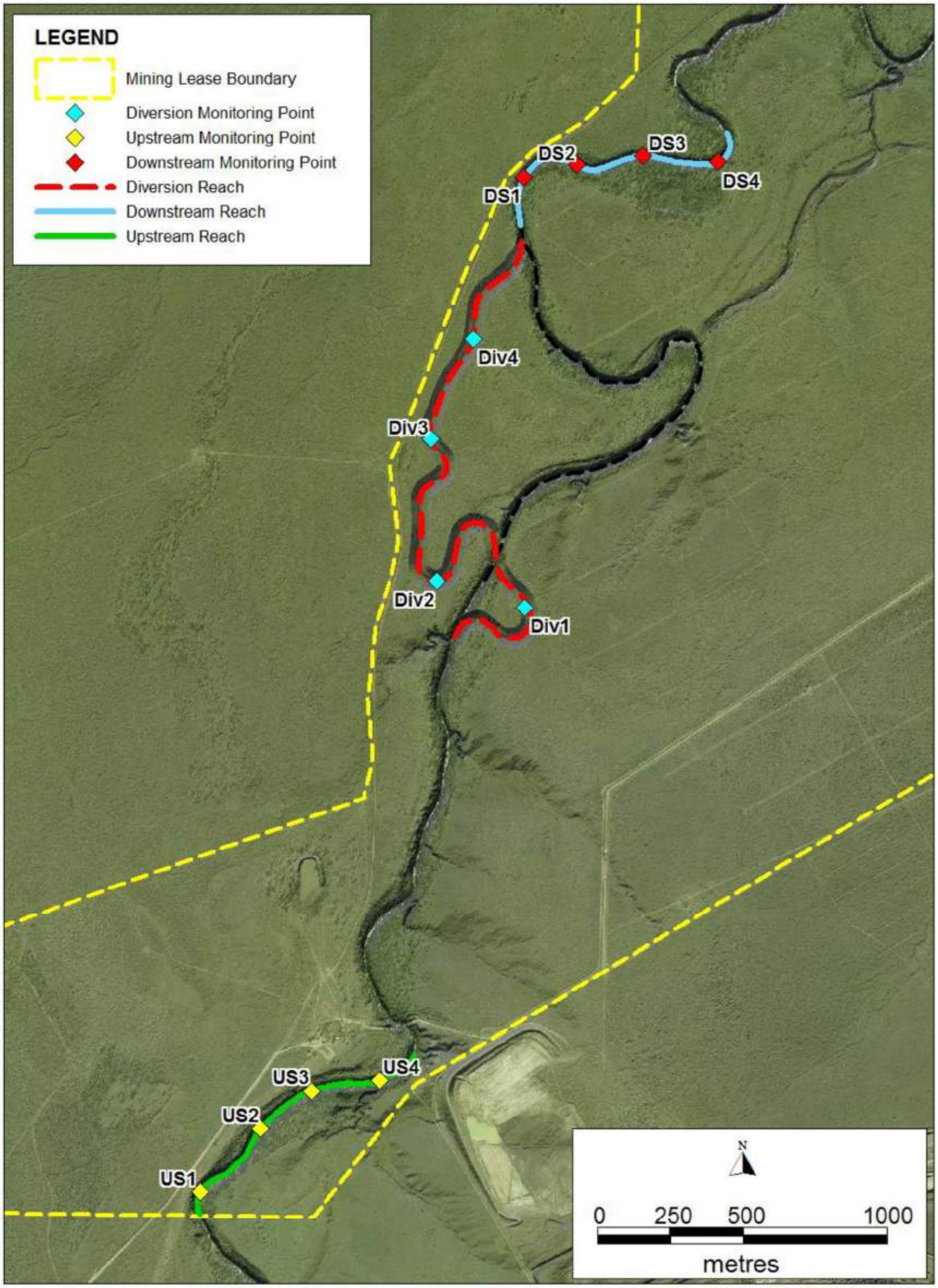

Figure 7.1 – Proposed diversion monitoring system

8 Conclusions

The existing Phillips Creek main channel flows along the southern edge of the Phillips floodplain. To provide access to the underlying coal resource, the creek channel is to be relocated to the northwest, and a levee is to be constructed along the southern floodplain to protect the mine workings.

A functional design has been prepared addressing the guideline objectives and design criteria:

OUTCOME 1 - The design incorporates natural features present in the local watercourses – it replicates the channel length, slope and cross-sectional shape. It incorporates meanders with radii, amplitude and magnitude similar to existing meanders in the adjacent reaches and the reach to be diverted. A revegetation plan will be established which will incorporate local native vegetation to achieve bank stability.

OUTCOME 2 – As the diversion is located on the edge of the floodplain, and it incorporates the above features, it maintains the existing hydrologic characteristics of surface water and groundwater systems.

OUTCOME 3 - The hydraulic characteristics of the design are comparable with those in the existing watercourse, and it is therefore suitable for the region in which the diversion is located.

OUTCOME 4 – As the hydraulic characteristics are largely unchanged, the sediment transport will allows the watercourse diversion to be self-sustaining and is unlikely to result in material or serious environmental harm on upstream and downstream reaches.

OUTCOME 5 - The watercourse diversion and associated structures maintain stability and functionality and are appropriate for all substrate conditions they encounter. The watercourse diversion and associated structures have been designed to maintain stability and functionality under the existing substrate conditions. The available information suggests the diverted channel is likely to encounter similar substrate conditions, but this will be confirmed in later design phases.

Specifically, the following criteria have been considered when developing the proposed diversion design:

1. The diversion ties in with the existing watercourse within the resource tenure boundary. The proposed diversion alignment has been selected to maintain a minimum offset from the top of the proposed diversion bank to the toe of the levee of 100 m, whilst being well within the ML boundary.
2. The stability and performance of the diversion will be assisted by vegetation within the watercourse diversion and adjoining floodplain and will not include artificial structures for grade control.
3. The proposed diversion channel has similar dimensions to the existing channel – and thus has similar design capacity. However, the combined effect of the proposed levee and diversion is to divert some additional flow to the northern floodplain of Phillips Creek, resulting in minor increases to the depth and duration of flooding.
4. The existing channel includes a large meander which contributes significantly to the length of channel being diverted. A number of meanders are to be reintroduced at the upstream end of the diversion which results in a length of channel and bed slope identical to the existing channel. The meanders have similar amplitude, wavelength, sinuosity, and bend radius to bends found in the existing creek channel.
5. The main channel has a similar geometry to the existing channel, but with flatter side slopes to improve the prospect of stabilisation through revegetation during construction.

The hydraulic conditions within the existing and proposed channel have been compared for conditions before and after the proposed development, and to guideline conditions.

Table 8.1 compares the average geomorphic characteristics of the existing and proposed channels.

Table 8.1 – Comparison of typical channel geomorphic characteristics

Parameter		Existing Creek	Proposed Diversion
Length (km)		2.45	2.45
Bed Grade (%)		0.12%	0.12%
Bed Width (m)		7.2-11.2	9.0
Top Width (m)		30-50	35-50
Depth to floodplain (m)		7-9	7-9
Meander Radius (m)		>60m	>50m
Meander Sinuosity Index		1.7	1.7
Meander Wavelength (m)		200	270
Meander Amplitude (m)		75-340	50-225
1 in 2 AEP	Mean Velocity (m/s)	1.5	1.4
	Mean Bed Shear Stress (N/m^2)	30.8	30.4
	Mean Stream Power (N/m s)	45.5	41.7
	Hydraulic Gradient (%)	0.14%	0.12%
1 in 50 AEP	Mean Velocity (m/s)	2.1	1.7
	Mean Bed Shear Stress (N/m^2)	62.1	45.6
	Mean Stream Power (N/m s)	132.4	88.9
	Hydraulic Gradient (%)	0.12%	0.09%

Within the diversion, the design hydraulic conditions are similar to those in the existing channel, and are consistent with the Department of Natural Resources and Mines Guidelines for channel-averaged Shear Stress, Stream Power and Velocity. The results are summarised in more detail in Table 8.2 below.

Table 8.2 - Comparison of modelled guideline hydraulic conditions before and after diversion construction

	Shear Stress	Stream Power	Velocity
1 in 2 AEP			
	Upstream		
	- very small increase - all locations below guideline	- very small increase - all values are below guideline	- very small localised increase - all locations below guideline
	Diversion Reach		
	in the downstream half, shear stress is reduced, in the upstream half there is a small increase in some locations, but values are well below guideline and well within the envelope of naturally occurring values	in the downstream half, stream power is reduced, in the upstream half there is a small increase in some locations, but values are well below guideline and well within the envelope of naturally occurring values	- small decrease, esp in the downstream half.
	Downstream		
	no change	no change	no change
1 in 50 AEP	**Shear Stress**	**Stream Power**	**Velocity**
	Upstream		
	- general increase - isolated locations above guideline in both existing and proposed	- small increase - except for CH0 m, all sections are below above guidelines.	- very small increase - existing velocity generally greater than guideline of 2.5 m/s
	Diversion Reach		
	generally a decrease, with one isolated section at CH2150 (the apex of a tight radius bend) the exception (where values also exceed guideline values)	decrease to well below guideline - with one isolated section at CH2150 (the apex of a tight radius bend) the exception (where values also exceed guideline values)	- significantly reduced to well below guideline values
	Downstream		
	- general increase - all locations below guideline	-general increase -all locations below guideline	- small increase - with the exception of a 100m reach just downstream of the diversion, all reaches are below guideline

Under close to bank-full conditions, there are also small reductions in shear stress, stream power and velocity predicted for the diversion channel itself. In the upstream reaches there will be increases in these parameters (due to the drawdown of the water surface profile through the diversion), but they will be similar to those occurring in the adjacent reaches.

In the 1 in 2 AEP, under post construction (unvegetated) conditions, all parameters will be elevated above existing conditions and guidelines upstream of the diversion and in its upper reaches. The short-term risk of erosion will need to be managed, and if necessary repairs made until vegetation is established.

During detailed design the following issues would be considered in more detail to ensure the diversion meets the desired outcomes:

- Review the results of flood modelling to identify areas where shear stress, stream power and velocity are elevated and propose changes to the design profile and construction materials if necessary to ensure a stable profile.
- Refine the design of the transition zones to reduce the risk of erosion impacts at the upstream and downstream ends of the diversion.
- Undertake more detailed geotechnical investigations into the substrate conditions to ensure the proposed channel design is appropriate for the conditions.
- Undertake a detailed assessment of the soils available for relining and vegetation of the banks. If necessary develop methodologies for remediating or importing soils suitable for sustaining vegetation.
- Develop a detailed revegetation strategy to ensure the banks can be stabilised as rapidly as possible.
- Review the design cross-section and investigate the potential for providing a wider base and steeper base side slopes (more consistent with the existing channel) – to better mimic the shape of the existing channel and reduce the potential for initial undercutting of the banks.
- Investigate refining the design so that the channel is over-excavated to allow sediment movement through the channel. Sand from the diverted reach could be used to fill the invert to replenish the sediment source in the diverted channel.

9 References

AARC (2016)	*'Lake Vermont Northern Extension – Aquatic Ecology and Stream Morphology Assessment'*, Report prepared by AustralAsian Resource Consultants for Lake Vermont Resources Pty Ltd, August 2014.
ARR (1998)	*'Australian Rainfall and Runoff, A Guide to Flood Estimation', Revised Edition, Institution of Engineers, Australia, 1998.*
ACARP (2001)	*'Monitoring and Evaluation Program for Bowen Basin River Diversions – Project C9068', Australian Coal Association Research Program, February 2001.*
Fisher Stewart (2002)	'Bowen Basin River Diversions Design and Rehabilitation Criteria'. Report Prepared for the Australian Coal Association Research Program by Fisher Stewart (2002)
Hargraves (c.2004)	'Final Report, Extreme Rainfall Estimation Project, CRCFORGE and (CRC) ARF Techniques, Queensland and Border Locations, Development and Application', Report prepared by Gary Hargraves, Water Assessment Group, Water Assessment and Planning, Resource Sciences Centre, undated, circa 2004.
DNRM (2014)	'Watercourse Diversions – Central Queensland Mining Industry' Version 5, Department of Natural Resources and Mines, March 2014.

Appendix 1 – Phillips Creek Flood Model Report

Lake Vermont Northern Extension

Phillips Creek Flood Model

Lake Vermont Resources

0622-09-C2, 15 April 2016

Report Title	Lake Vermont Northern Extension – Phillips Creek Flood Model
Client	Lake Vermont Resources
Report Number	0622-09-C22

Revision Number	Report Date	Report Author	Reviewer
1	7 August 2014	AJT	MB/DN
2	15 April 2016	AJT	MB/DN

For and on behalf of WRM Water & Environment Pty Ltd
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Michael Batchelor

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1 Introduction

1.1 BACKGROUND

WRM was engaged by Jellinbah Resources Pty Ltd to undertake an impact assessment of the proposed Lake Vermont Northern Extension. The proposed extension protrudes into the Phillips Creek floodplain and will require the construction of a flood levee, creek diversion, haul road and associated low-level creek channel crossing.

The location of the project is shown in Figure 1.1.

Detailed hydrologic and hydraulic modelling was undertaken for Phillips Creek and the floodplain in the vicinity of the proposed mine extension site. The model results define existing flood conditions in the Phillips Creek floodplain areas as well as conditions following the development of the Lake Vermont Northern Extension project.

The purpose of this report is to outline the basis of the flood modelling and the impacts of the project on flood conditions. Further details of the results of the analysis as they relate to design of the proposed Phillips Creek diversion are outlined in a separate report (Phillips Creek Functional Design Report (WRM, 2014)).

1.2 REPORT STRUCTURE

This report details the modelling methodology and modelling results. The report is structured as follows:

- Section 2 provides a description of the hydrological modelling undertaken for both the existing and post-developed scenarios and includes peak discharges and model calibration details.
- Section 3 presents an overview of the hydraulic modelling methodology undertaken for both the existing and post-developed scenarios.
- Section 4 provides a discussion on the hydraulic modelling results, particularly the impact the proposed mine levee and creek diversion has on the existing flow behaviour of Phillips Creek.
- Section 5 presents a summary of findings of the flood study.
- Section 6 is a list of references.

Figures showing the hydraulic modelling results for both the existing and post-developed conditions are shown in Appendix A and Appendix B. Figures showing the difference in water level between these scenarios are shown in Appendix C. Figures highlighting bed shear stress and stream power for both the existing and post-developed scenario are shown in Appendix D.

The results presented herein should not be used for any other purpose without seeking advice from WRM Water & Environment regarding its applicability.

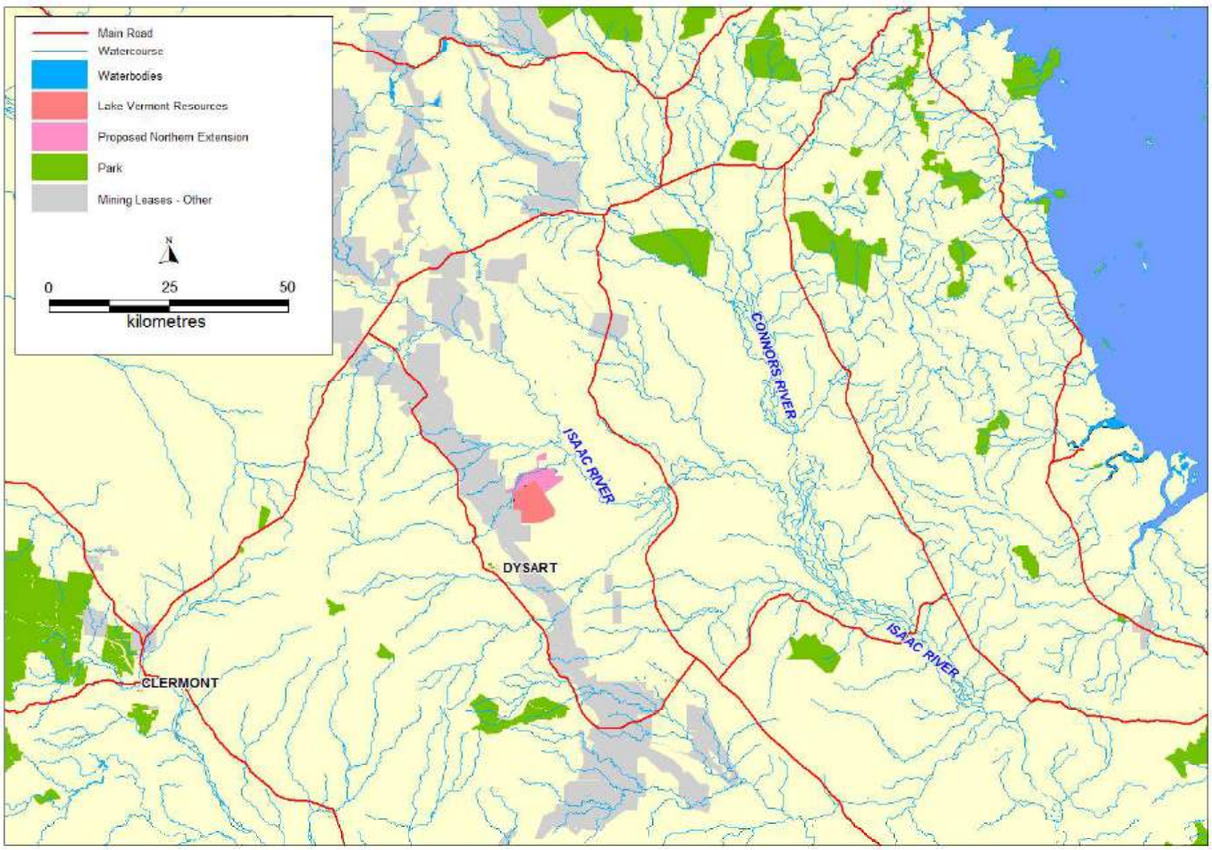


Figure 1.1 - Lake Vermont Northern Extension Project Locality

2 Flood Hydrology

2.1 METHODOLOGY

An URBS (Carroll, 2004) runoff-routing model was used to estimate design flood discharges in Phillips Creek. Phillips Creek has a catchment area of approximately 422km^2 upstream of the proposed stream diversion, and approximately 514km^2 to the confluence with the Isaac River. Design discharges were obtained from the model for the 1 in 2, 50, 100 and 1,000 Average Exceedance Probability (AEP) design events.

For this study, the URBS model was used in the “split mode” which enables the simulation of separate catchment and channel routing. Adopted rainfall losses are subtracted from the total rainfall hyetograph to obtain rainfall excess. Rainfall excess is routed through a conceptual storage representing each sub-catchment of the model before being added to the creek or river channel. Routing through the creek or river system uses the Muskingum method.

The configuration of the Phillips Creek URBS model is shown in Figure 2.1. The model extends west approximately 45km from the western mine lease boundary and east to the Isaac River confluence approximately 6km downstream of the eastern mine lease boundary. The model covers the entire Phillips Creek catchment and consists of 32 sub-catchments.

Design rainfall depths for the 1 in 2 and 1 in 50 AEP were determined using procedures outlined in ARR (1998). The 1 in 1,000 AEP design rainfall depths were determined using the CRC Forge methodology (Hargraves, c.2004).

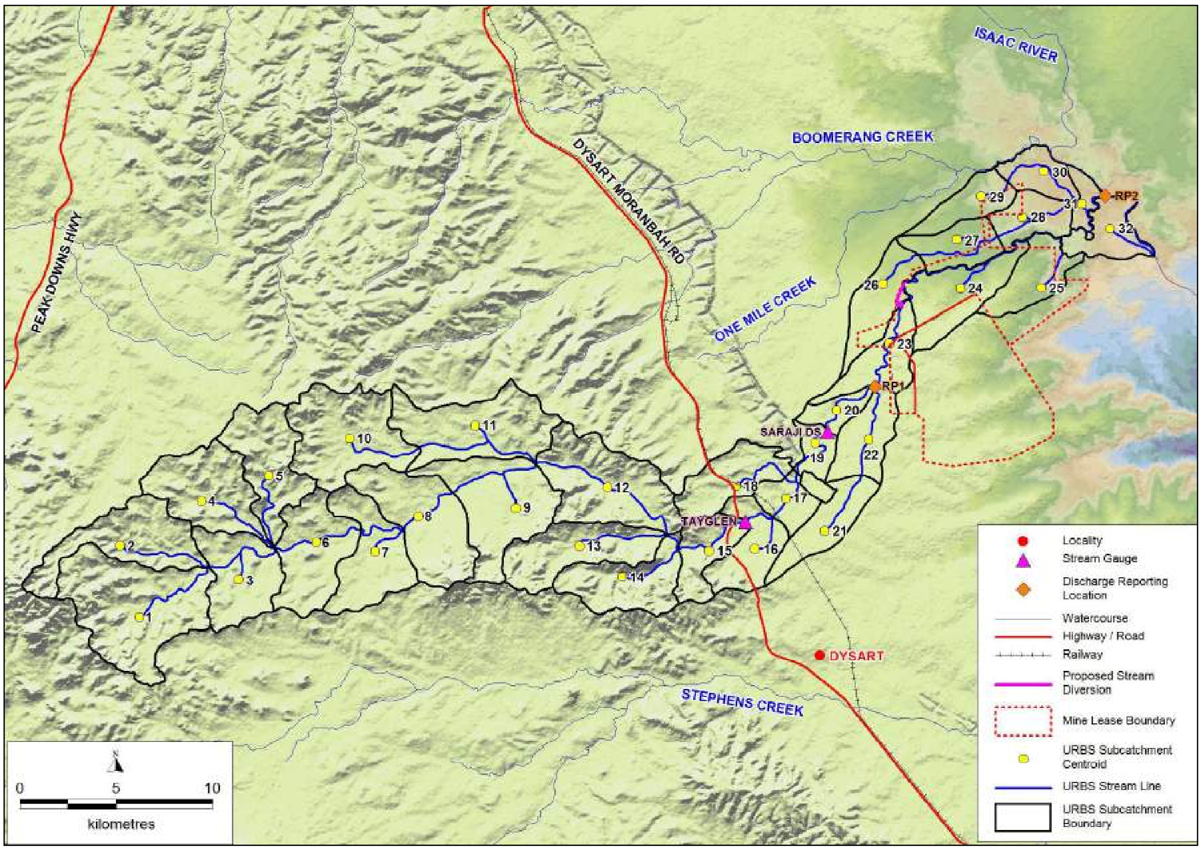


Figure 2.1 - Phillips Creek URBS model layout

2.2 MODEL CALIBRATION

The model was calibrated against recorded discharges in Phillips Creek at BMA's Saraji DS gauge for two events: January 2008 and December 2010. The location of the Saraji DS gauge is shown in Figure 2.1. The calibration of the model for the historical flood events was difficult due to the sparseness of rainfall data across the catchment. However, considering the coarse nature of the available rainfall data, a satisfactory calibration of the model has been achieved for the historical flood events, with respect to the flood peaks, flood volumes and the timing and shape of the hydrographs. Figure 2.2 and Figure 2.3 show the predicted and recorded flood discharge hydrographs along Phillips Creek at the Saraji DS Gauge for the January 2008 and December 2010 flood events. It should be noted that a possible anomaly in the raw data obtained for the December 2010 flood event was observed and the rainfall data was shifted forward by 6-hours to match that of the water level.

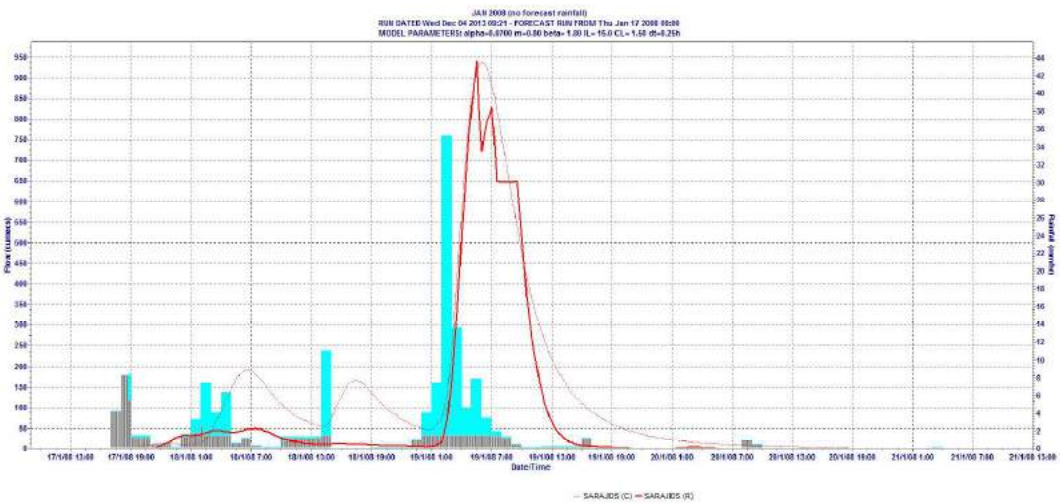


Figure 2.2 – Model Calibration Results – Saraji DS Gauge (January 2008 Event)

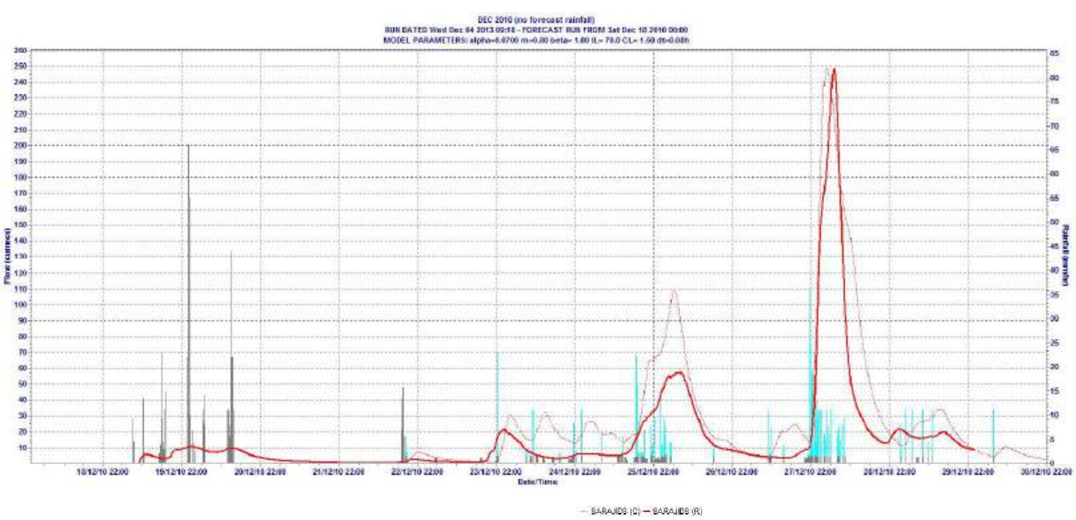


Figure 2.3 – Model Calibration Results – Saraji DS Gauge (January 2010 Event)

2.3 DESIGN FLOWS

The URBS model was run for a range of design rainfall events to derive hydrographs for hydraulic modelling. Table 2.1 shows the adopted uniform initial loss and continuing loss rates for the Phillips Creek URBS model.

Table 2.1 - Adopted Initial and Continuing Losses

AEP (1 in X)	Initial Loss (mm)	Continuing Loss (mm/h)
2	35.0	2.5
50	30.0	2.5
100	25.0	2.5
1,000	0.0	2.5

Table 2.2 shows the URBS hydrologic model parameters adopted from the calibration for use in derivation of the design flows.

Table 2.2 - Adopted URBS Model Parameters

Parameter	Adopted Value
α (channel lag parameter)	0.07
β (catchment lag parameter)	1.8
m (catchment non-linearity parameter)	0.8

Table 2.3 shows the resulting 1 in 2, 50, 100 and 1,000 AEP design discharges at four locations shown on Figure 2.1.

Table 2.3 - URBS Design Peak Discharges

Discharge Reporting Location	Design Peak Discharge (m^3/s)			
	1 in 2 AEP	1 in 50 AEP	1 in 100 AEP	1 in 1,000 AEP
Philips Creek at Tayglen gauge	97	804	1,043	2,557
Phillips Creek at Saraji DS gauge	106	879	1,142	2,721
Phillips Creek upstream of proposed diversion (RP1)	112	928	1,207	2,820
Phillips Creek at Isaac River Confluence (RP2)	126	1,032	1,344	3,114

Table 2.4 shows the critical storm durations that produce the largest peak discharges at each location.

Table 2.4 - URBS Design Storm Critical Durations

Discharge Reporting Location	Critical Storm Duration (hours)			
	1 in 2 AEP	1 in 50 AEP	1 in 100 AEP	1 in 1,000 AEP
Philips Creek at Tayglen gauge	6	6	6	3
Phillips Creek at Saraji DS gauge	6	6	6	3
Phillips Creek upstream of proposed diversion (RP1)	6	6	6	3
Phillips Creek at Isaac River Confluence (RP2)	6	6	6	6

Figure 2.4 shows the 1 in 2, 50, 100 and 1,000 AEP design hydrographs at location RP1, which is located immediately upstream of the proposed diversion. The full range of peak design discharges calculated at this location are shown in Table 2.5

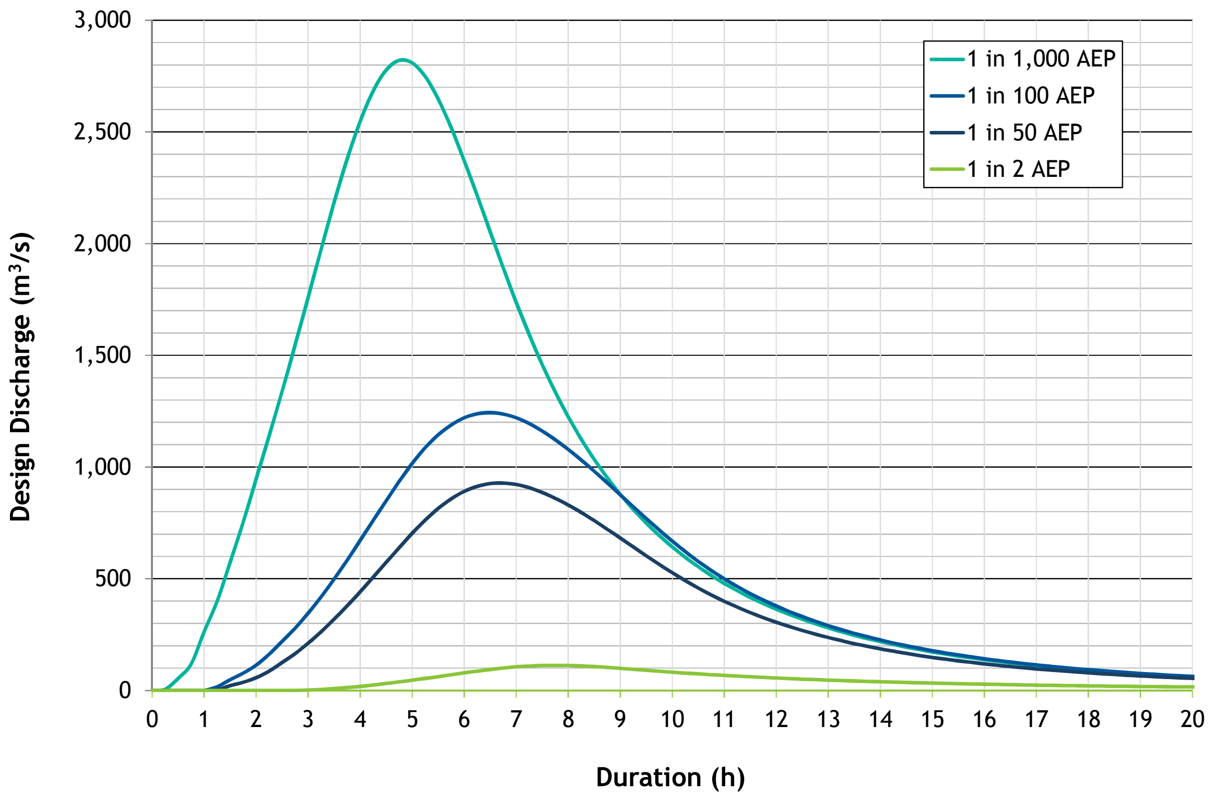


Figure 2.4 - RP1 Design Hydrographs at RP1: 1 in 2, 50, 100 and 1,000 AEP Events

Table 2.5 - Peak Design Flows at RP1

AEP (1 in X)	Peak Design Flows (m^3/s)
2	112
5	313
10	427
20	611
50	928
100	1,207
1,000	2,820

2.3.1 Model Verification

The results of the URBS model were verified by comparing the peak design discharges to the results of a Flood Frequency Analysis (FFA) undertaken to the annual flood peak series from DNRM's Tayglen Gauge (gauge no. 130409A), which operated 20 km upstream of the proposed diversion between 1968 and 1988. The location of the gauge, which had a catchment area of 344 km^2, is shown in Figure 2.1.

The results compared in Table 2.6 and Figure 2.5 show there is very good agreement between the two methods.

Table 2.6 - FFA at Tayglen Gauge

AEP (1 in X)	Design Discharge (m^3/s)			
	FFA			URBS
	0.95	Q_y	0.05	
2	74	108	158	97
50	359	819	1,868	804
100	402	1,083	2,922	1,043

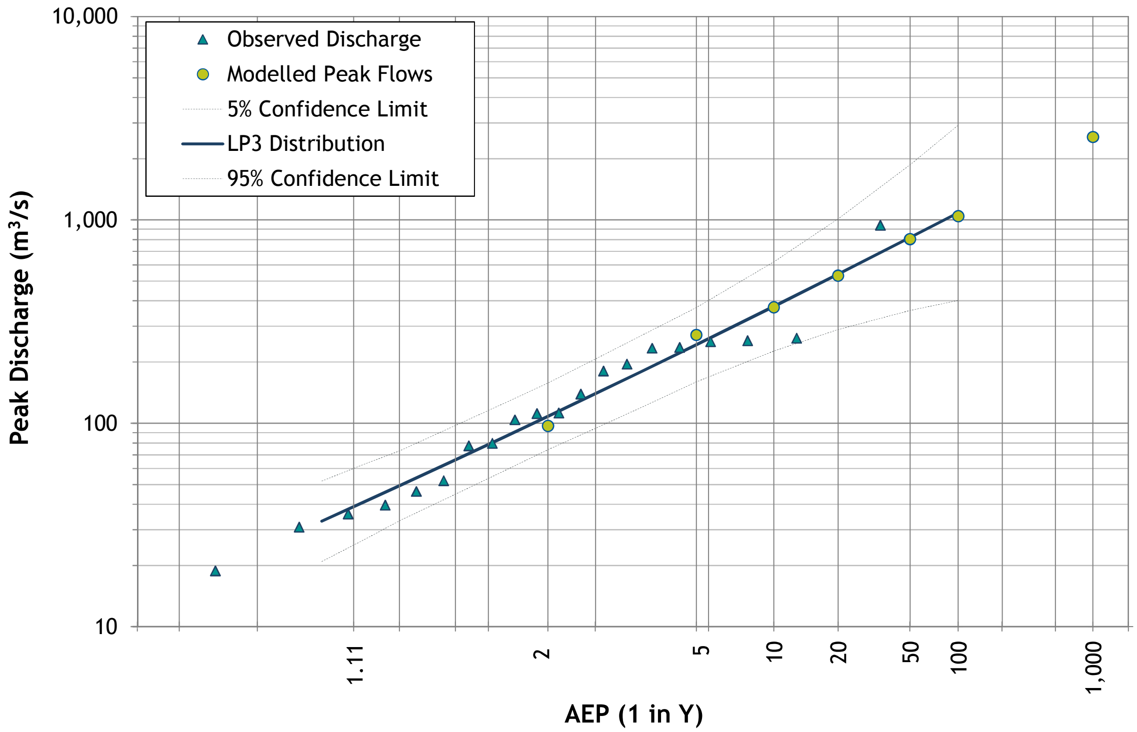


Figure 2.5 - FFA at Tayglen Gauge

3 Flood Hydraulics

3.1 AVAILABLE DATA

Topographic survey data for the study area was provided by Lake Vermont Resources. This data was converted into a digital terrain model (DTM) for use in the hydraulic modelling and mapping tasks. The model is suitable for impact assessment, and assessment of conditions in the immediate vicinity of the proposed diversion.

3.2 MODELLING OVERVIEW

Due to the complex nature of the various watercourses and their interactions in the study area, the TUFLOW hydrodynamic model (WBM, 2008) was used to simulate the flow behaviour of Phillips Creek for the 1 in 2, 50, 100 and 1 in 1,000 AEP design events for existing conditions and post-developed conditions. TUFLOW represents hydraulic conditions on a fixed grid by solving the full two-dimensional depth averaged momentum and continuity equations for free surface flow. The model automatically calculates breakout points and flow directions within the study area.

A 5 m model grid was adopted for the existing and post-developed 1 in 2, 50 and 100 AEP design event models. Due to lengthy model simulation times, a larger 10 m grid was adopted for the existing and post-developed 1 in 1,000 AEP design event models.

The 1 in 2 AEP design event is typically confined to the Phillips Creek channels. For this reason, a HEC-RAS one-dimensional model was developed in order to accurately assess the bed shear stress and stream power for the 1 in 2 AEP existing model scenario. The configuration of the HEC-RAS model was based on the reporting sections shown in Figure 3.3.

3.2.1 Adopted Bed Roughness

The adopted Manning's 'n' values for the existing and post-developed Phillips Creek TUFLOW and HEC-RAS models were:

- Light Scrub: 'n' = 0.07
- Channel: 'n' = 0.035
- Banks and Floodplain: 'n' = 0.05

The adopted overbank 'n' value is somewhat higher than would be indicated by typical vegetation on the floodplain. This slightly higher value was adopted because flow across the floodplain is expected to be relatively shallow, resulting in a higher hydraulic resistance.

The 1 in 2 AEP HEC-RAS model only analysed the channel and overbank areas. As such, the Light Scrub Manning's 'n' of 0.07 was not used in the HEC-RAS model.

3.2.2 Tailwater Conditions

The downstream boundaries of the existing and post-developed models were set well downstream of the mining lease area to minimise the influence of the model boundary on flood behaviour predicted for lease areas. Testing of the hydraulic model revealed that shallow depth overbank flooding occurs on the edge of the northern Phillips Creek floodplain. An additional downstream outflow boundary was incorporated into the model to ensure that this shallow, north flowing water was not impacted by the presence of the model code boundary.

The downstream boundary conditions used for the existing and post-developed hydraulic models were:

- Downstream boundary (Isaac River): Normal Depth with a flood slope of 0.005 m/m;
- Northern Outlet: Normal Depth with a flood slope of 0.002 m/m.

These flood slopes are typical of the flood slopes found in Phillips Creek.

3.2.3 IMPACT OF ISAAC RIVER FLOODWATERS

The project area is in close proximity to the Isaac River. An analysis was undertaken to determine the effect of elevated water levels in the Isaac River on water levels at the project site. This was undertaken using estimates of Isaac River 1 in 100 AEP design flows developed previously by WRM.

The timings of the model inflow hydrographs were adjusted so that the peak inflows in Phillips Creek and the Isaac River coincided. This is a conservative approach to estimating peak flood level.

3.3 POST-DEVELOPED MODELLING

The existing case hydraulic model was amended to include the proposed Phillips Creek diversion and the levees required to protect the mine area along the southern edge of the floodplain (see Figure 3.2). An additional levee was included for the satellite pit to the north. The levees would be sized to protect the operation from flooding in a 1 in 1,000 AEP design flood.

A haul road from the expanded project site to the satellite pit was included in the model as a 30 m wide embankment with a crest level approximately 0.5 m above the natural ground surface. It is envisaged that the channel crossing would be a low-level floodway which would be overtopped in minor flood events, and would cause only localised impacts on water levels. The channel crossing itself was therefore not specifically represented in the post-developed model. During detailed design, cross-drainage structures would also be provided at low points in the natural surface profile to prevent water ponding behind the road embankment, and to mitigate upstream flood impacts. However, for the purpose of this assessment, these structures were excluded from the model. As a result, the model will overestimate the impacts of the haul road on flood levels.

The adopted Manning’s ‘n’ values and tailwater conditions, outlined in Section 3.2.1 and 3.2.2, were identical to those included in the existing scenario models.

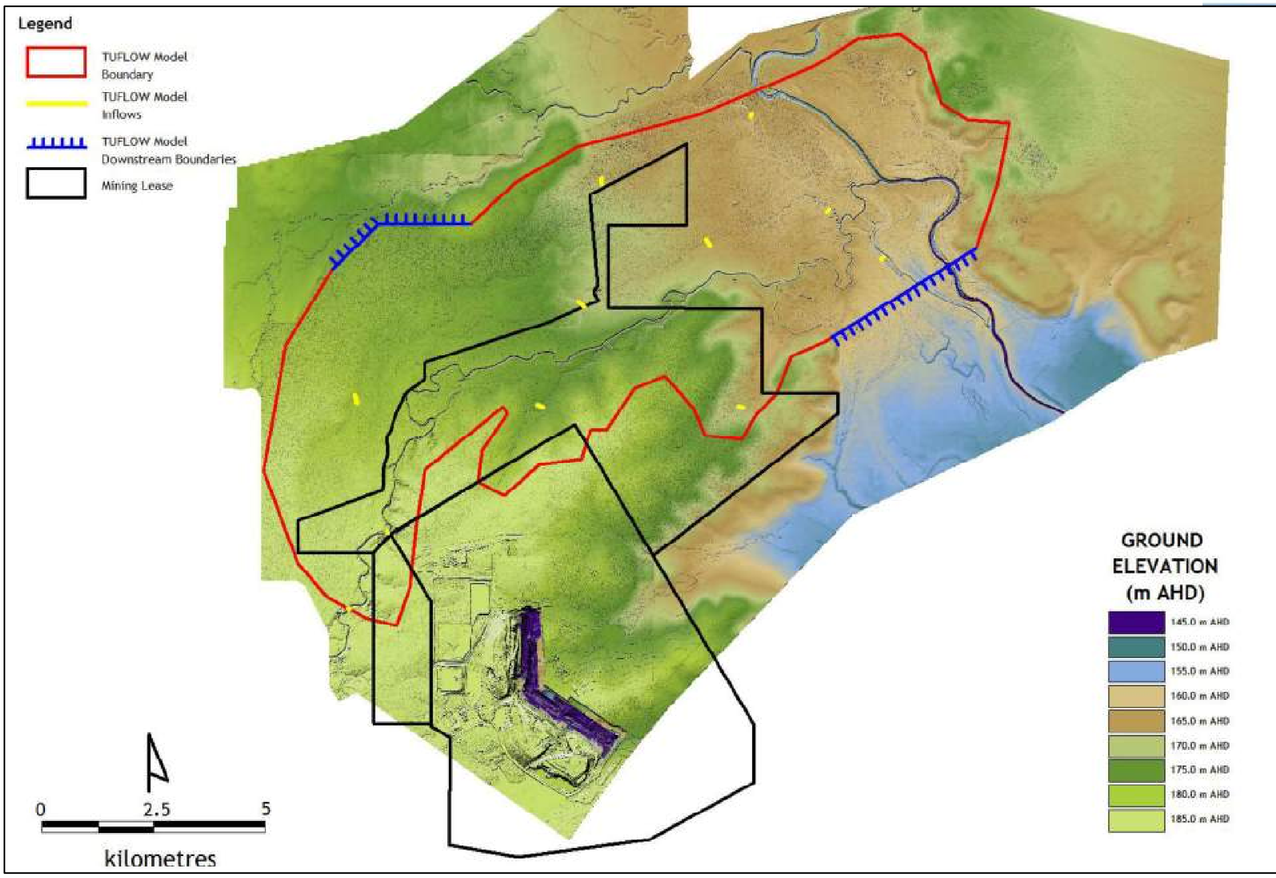


Figure 3.1 - Existing TUFLOW Model Configuration

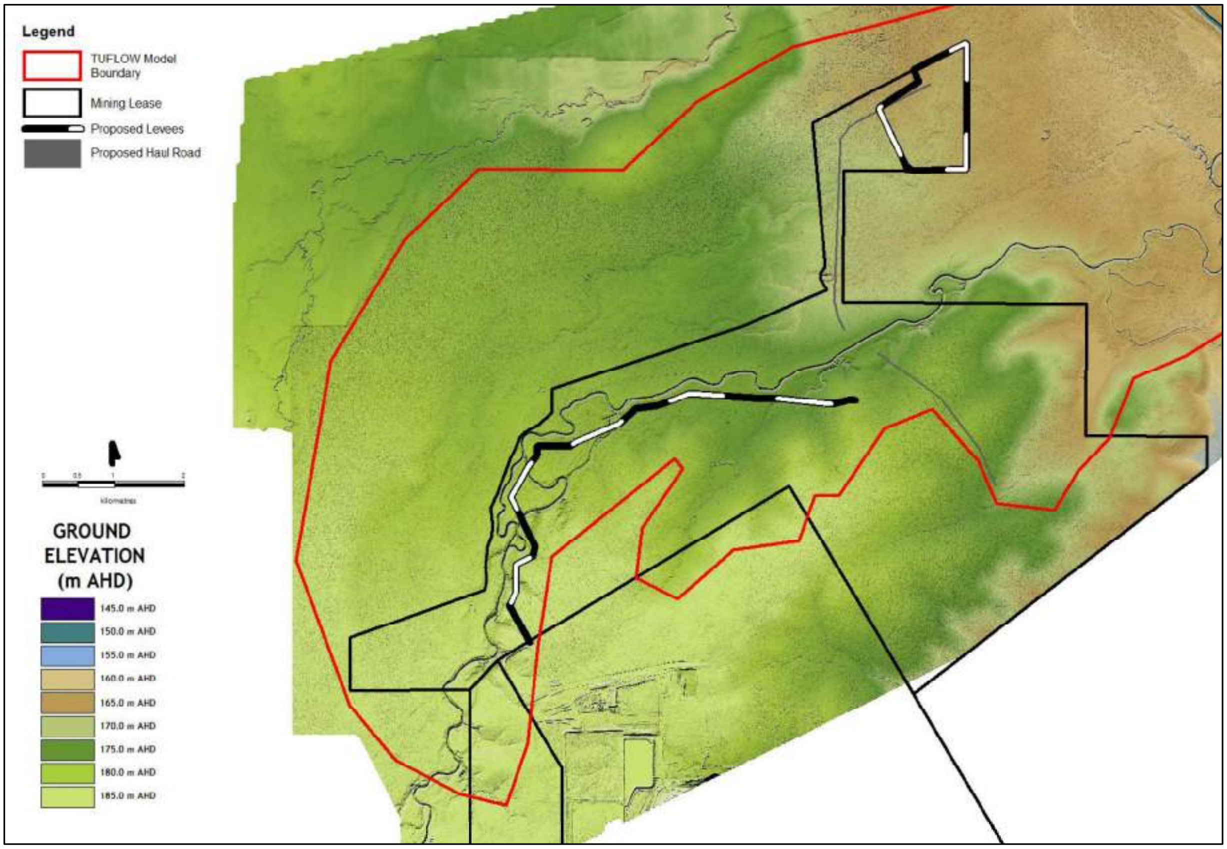


Figure 3.2 - Post-Developed TUFLOW Model Configuration

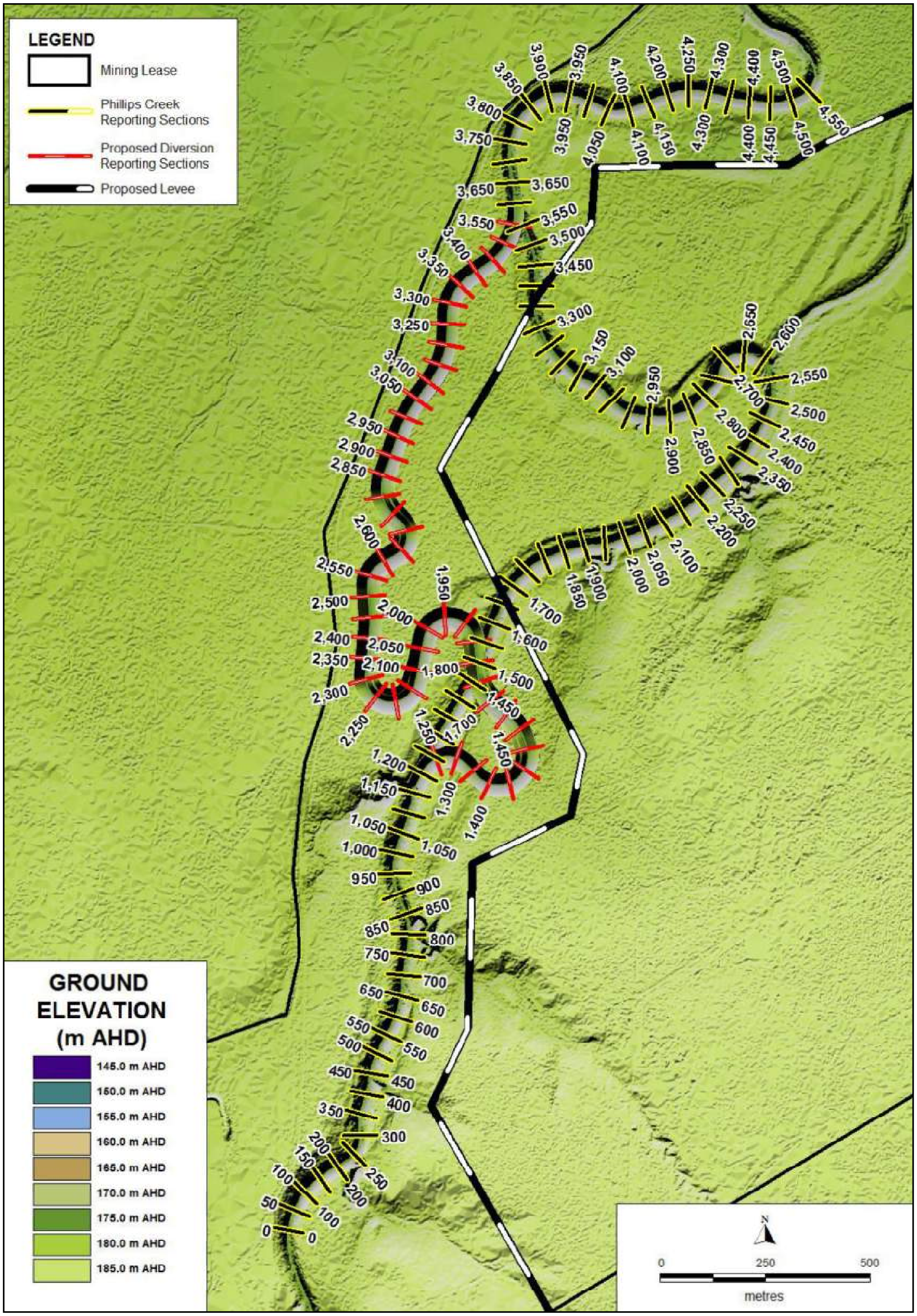


Figure 3.3 – Diversion Analysis Overview

4 Hydraulic Model Results

The TUFLOW model was used to determine design flood levels, depths, extents and velocities on the floodplain in the vicinity of the Lake Vermont Extension Project for the 1 in 2, 50, 100 and 1,000 AEP design floods for the existing and post-developed conditions.

4.1 EXISTING MODEL RESULTS

Flooding in Phillips Creek is generally confined to the channel for the 1 in 2 AEP design event – as shown in Figure 4.1.

Figure 4.2 shows the extent and depth of flooding in the 1 in 100 AEP flood. The results indicate widespread shallow (less than 1 m deep) inundation of the northern floodplain.

Stream velocities in localised areas are high (point velocities greater than 3 m/s) in the Phillips Creek channel for all modelled design events. The velocity in the overbank areas is lower (point velocities less than 1 m/s - see Figure 4.3). Section-averaged velocities range between 1.2 m/s and 1.7 m/s in the 1 in 2 AEP flood event. In the 1 in 50 AEP flood event, velocities range between 1.4 m/s and 2.8 m/s.

Figure 4.2 and Figure 4.3 show the extent and velocity of flooding in the existing case 1 in 1,000 AEP flood event.

Plans showing the depth, extent and velocity for the existing conditions Phillips Creek model are presented in Appendix A.

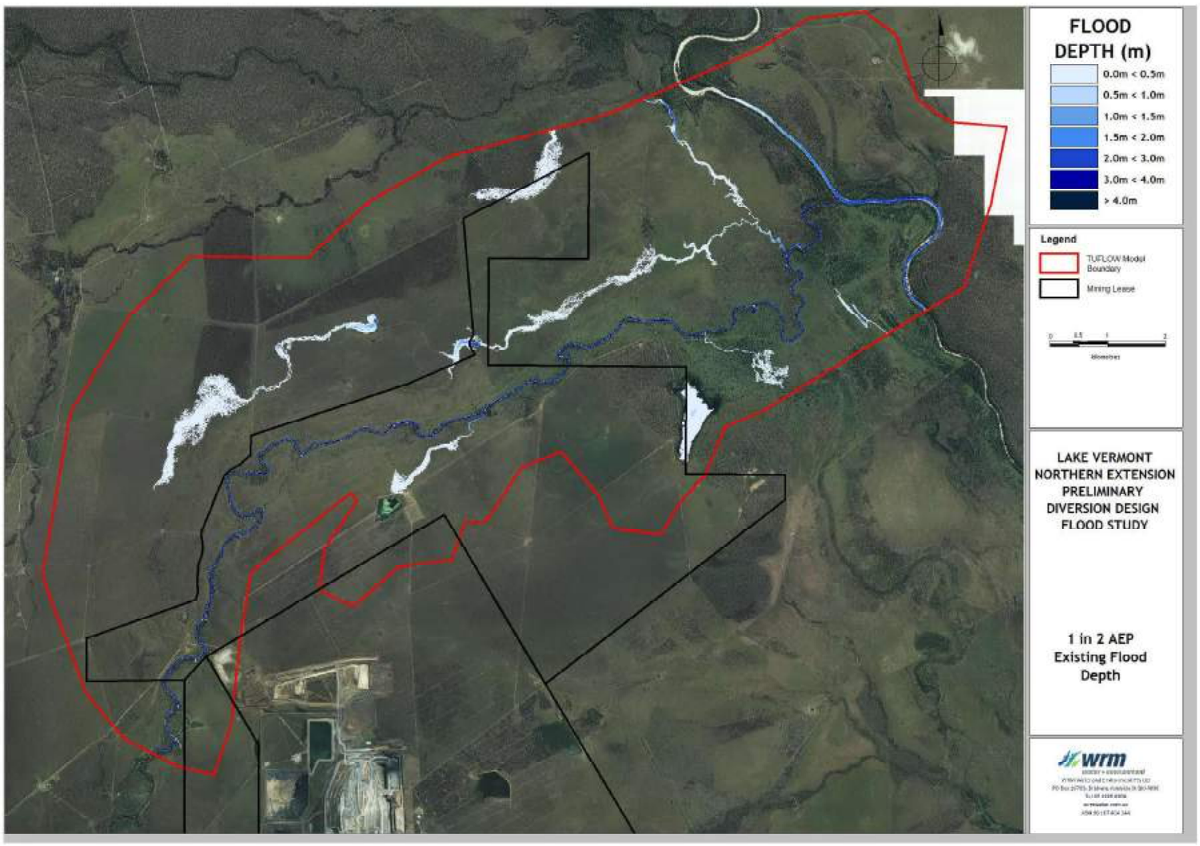


Figure 4.1 - 1 in 2 AEP Existing Flood Depth

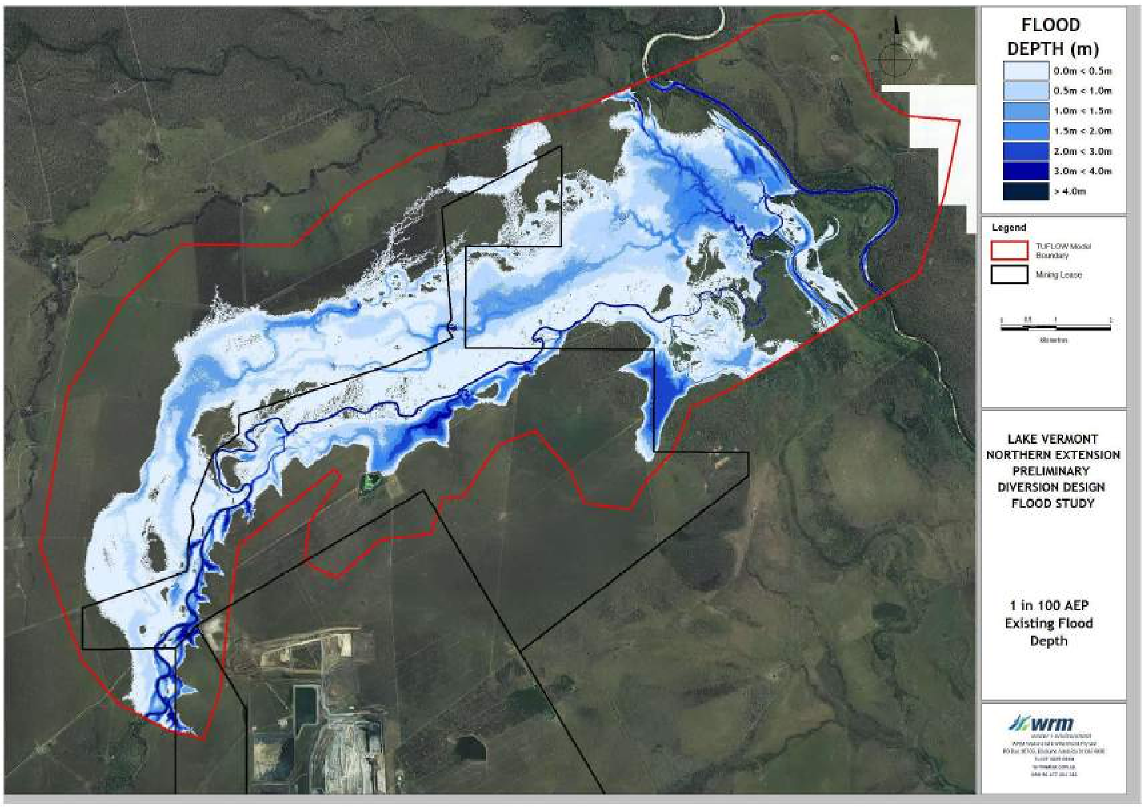


Figure 4.2 - 1 in 100 AEP Existing Flood Depth

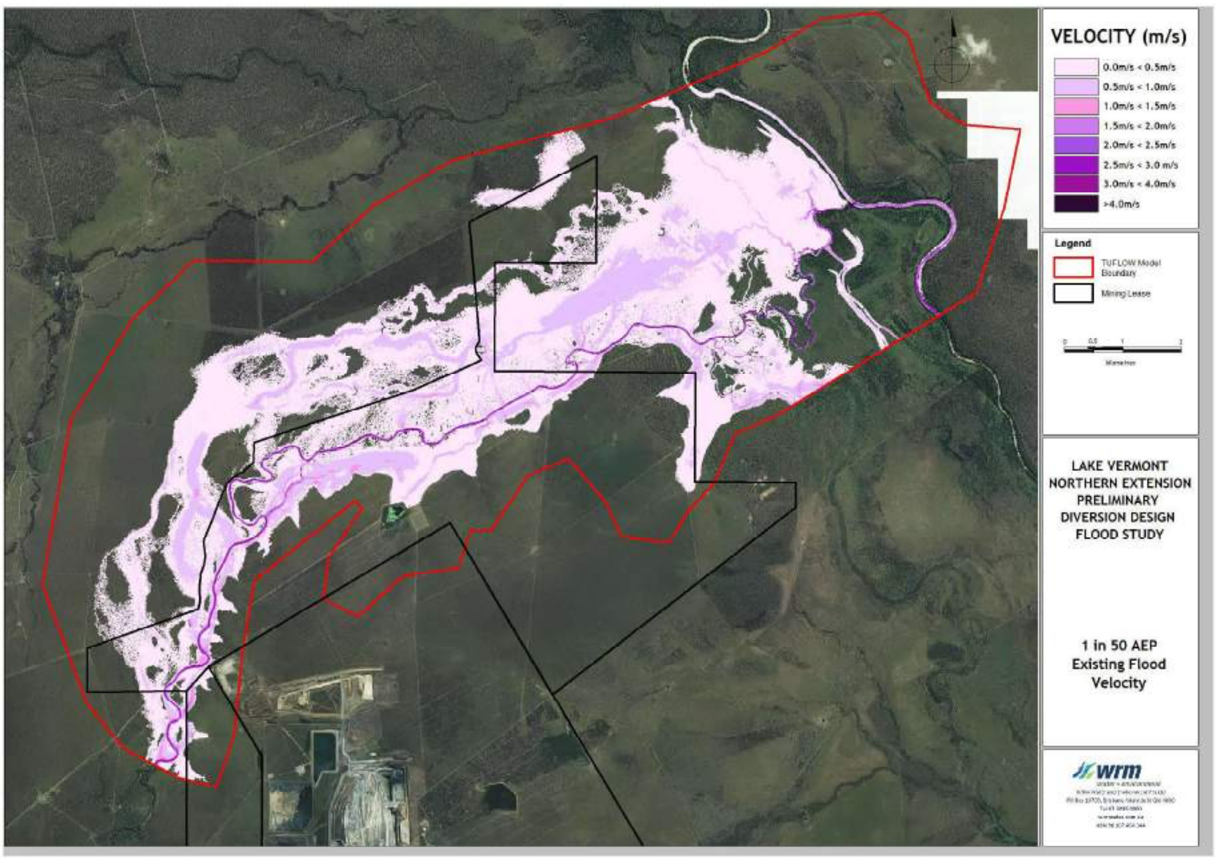


Figure 4.3 - 1 in 50 AEP Existing Flood Velocity

4.2 POST-DEVELOPED MODEL RESULTS

Plans showing the flood depth, extent and velocity for the post-developed conditions Phillips Creek model are presented in Appendix B.

Figure 4.4 shows the extent and velocity of flooding in the post-developed 1 in 1,000 AEP flood event, which is the design flood event for the proposed levees. The depth of flooding along the southern levee is approximately 1.2m, but varies up to approximately 10m, where it crosses existing channels.

Figure 4.5 shows the impact of the proposal on flood levels in the 1 in 100 AEP flood event. The results indicate that the diversion and levees cause some redistribution of flow from the right (southern) to the left (northern) floodplain of Phillips Creek. As a consequence, downstream flood levels on the right floodplain are decreased, and flood levels on the left floodplain are increased. The flood level increase does not propagate upstream of the mine lease.

Plans showing water surface level impact (comparison between the existing and post-developed models) for a range of design floods are presented in Appendix C.

In the 1 in 100 AEP design flood, the flood level increase is generally less than 0.1 m to the north of the project, the exception being nearby localised increases of between approximately 0.5 m and 1.0 m immediately adjacent to the proposed southern levee. The presence of the satellite pit results in localised increase in water levels of 0.2 m and 0.9 m adjacent to the satellite pit levee. The haul road is typically overtopped along the majority of its length however there is a localised impact of between 0.1 m and 0.6 m immediately upstream of the haul road for the 1 in 50 and 100 AEP design events. It is envisaged that culverts will be incorporated into the design of the haul road which will reduce this localised impact.

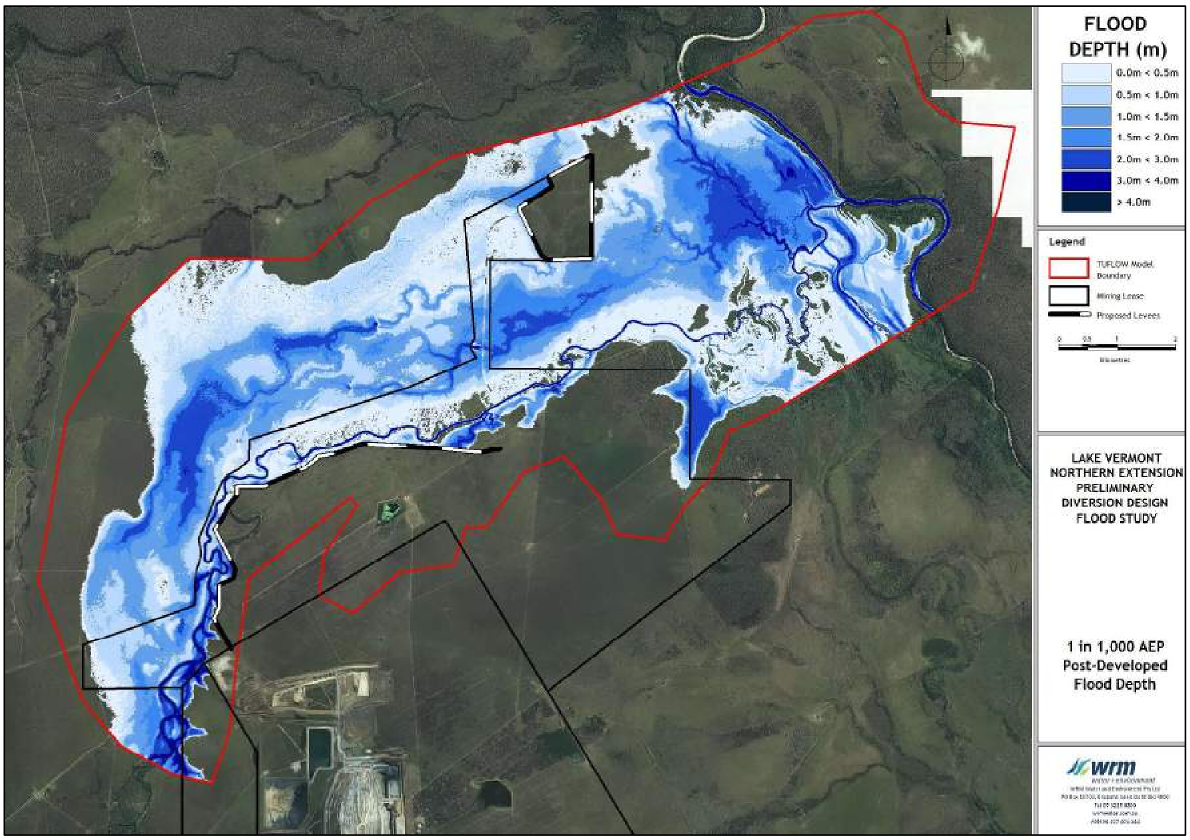


Figure 4.4 - 1 in 1,000 AEP Post-Developed Flood Depth

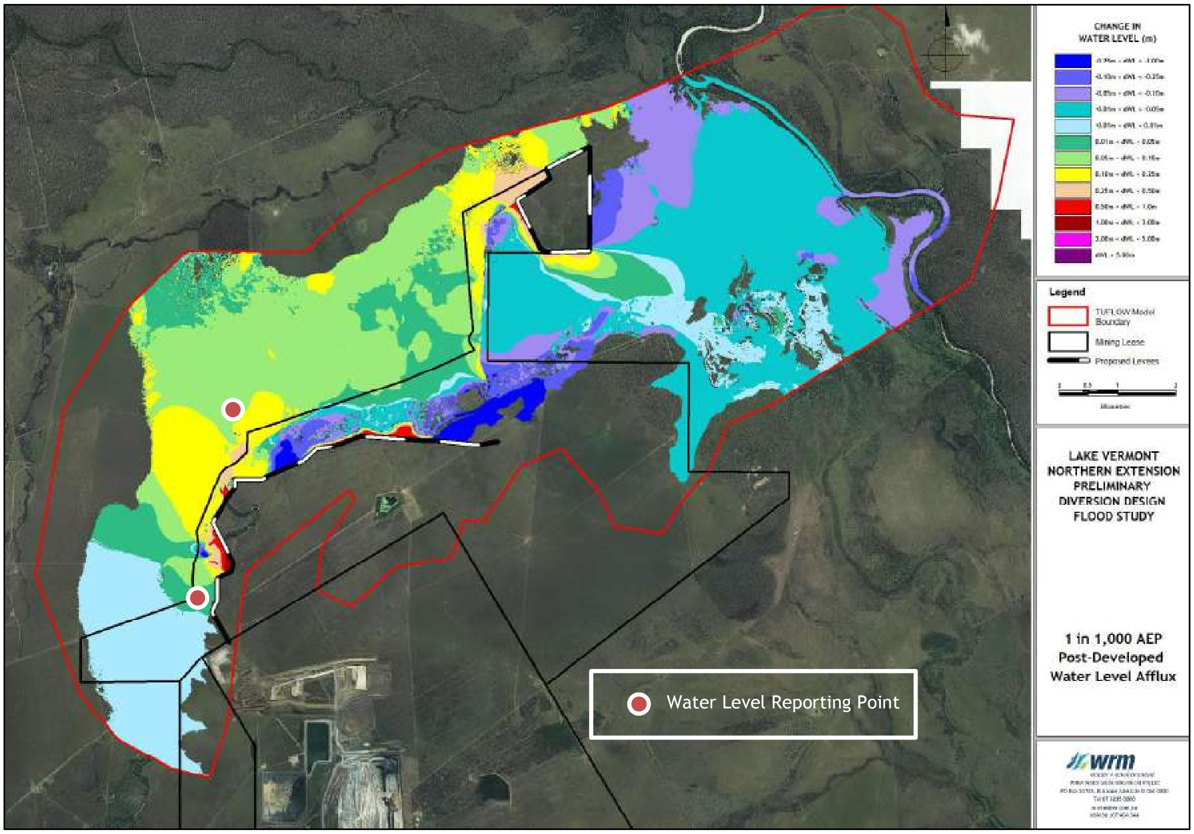


Figure 4.5 - 1 in 100 AEP Afflux

Comparisons of the water levels along the existing Phillips Creek channel and proposed diversion channel for the 1 in 2 and 1 in 50 AEP design events are shown in Figure 4.6. The chainages indicated in Figure 4.6 are shown in Figure 3.3.

The results indicate that the water level near the proposed diversion is slightly higher than the water level under existing conditions for the 1 in 50 AEP design event. This is due to the levee impacting on the direction of flow across the floodplain areas.

The 1 in 2 AEP results show water levels are slightly lower for the post-developed case. This is due to the increased channel conveyance resulting from the slight widening of the proposed diversion compared to the existing channel. The impact of the proposed diversion is minimal on the existing 1 in 2 AEP design event water levels downstream of the proposed diversion.

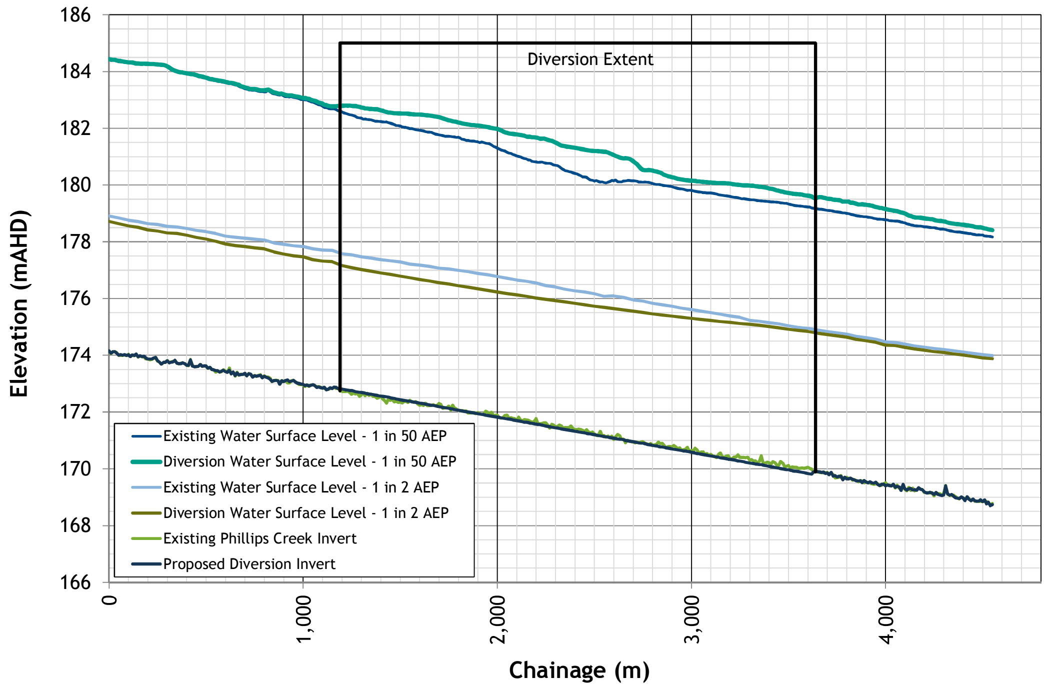


Figure 4.6 – Comparison of Water Surface Levels – Existing and Proposed Channel

A comparison of water levels for the 1 in 50 AEP design event was undertaken and the results are shown in Figure 4.7. Water levels at two (2) reporting points (see Figure 4.5) were extracted from the existing case and post-developed case models for the 1 in 50 AEP design event. Point 1 is located within the Phillips Creek channel, approximately 0.65 km upstream of the proposed diversion. Point 2 is located in the Phillips Creek floodplain area, approximately 0.72 km north-west of the Phillips Creek channel.

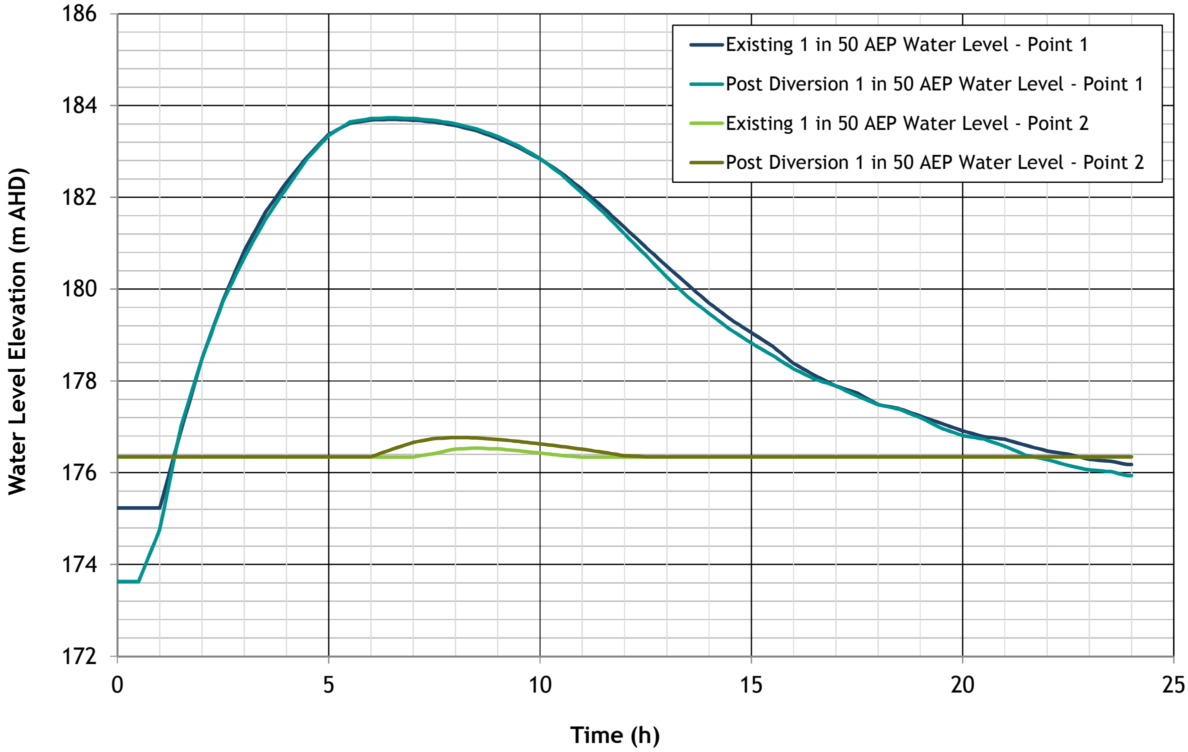


Figure 4.7 - Point Comparison of 1 in 50 AEP Water Levels

Figure 4.7 indicates that water levels are slightly lower in the Phillips Creek channel upstream of the proposed diversion and slightly higher for the 1 in 50 AEP design event under post-developed conditions. The decrease in water level can be attributed to the increase in channel conveyance in the proposed diversion. The slight increase in water level in the floodplain is due to a change in the distribution of flow across the floodplain area. The hydrographs show that the increased depth of inundation on the floodplain is likely to only increase the duration of flooding by a few hours.

4.2.1 Impact of Proposed Works on Isaac River Flood Levels

The impact of the proposed works on Isaac River flood levels was analysed by including both Phillips Creek and Isaac River inflows in the existing and post-developed condition 1 in 100 AEP design event models. A comparison of the model results indicates that the presence of the proposed satellite pit results in a slight reduction in water levels adjacent to the Isaac River floodplain. This is caused by a change in flow distribution across the floodplain. The presence of the satellite pit, proposed diversion and levee does not result in a significant impact on water levels in Isaac River or in the Isaac River floodplain. Plans showing the results of these model runs are found in Appendix A, Appendix B and Appendix C.

4.2.2 Impact of Proposed Works on Lake Vermont Flooding

Lake Vermont occasionally receives Phillips Creek floodwater inflows. Hydraulic modelling of Phillips Creek shows this occurs when the flow rate exceeds approximately 250m^3/s, which is less than the 1 in 5 Annual Exceedance Probability peak flood flow.

The figure below shows the overflow paths in the vicinity of Lake Vermont at a time close to the point of overtopping in the post-developed case. The figure shows that at this time (with the exception of inundation caused by local inflows), water is still contained within the channel in upstream locations (the upstream channel capacity is generally greater than 1 in 5 AEP). The levees proposed for the southern floodplain will therefore not impact on the frequency of Phillips Creek floodwater entering Lake Vermont.

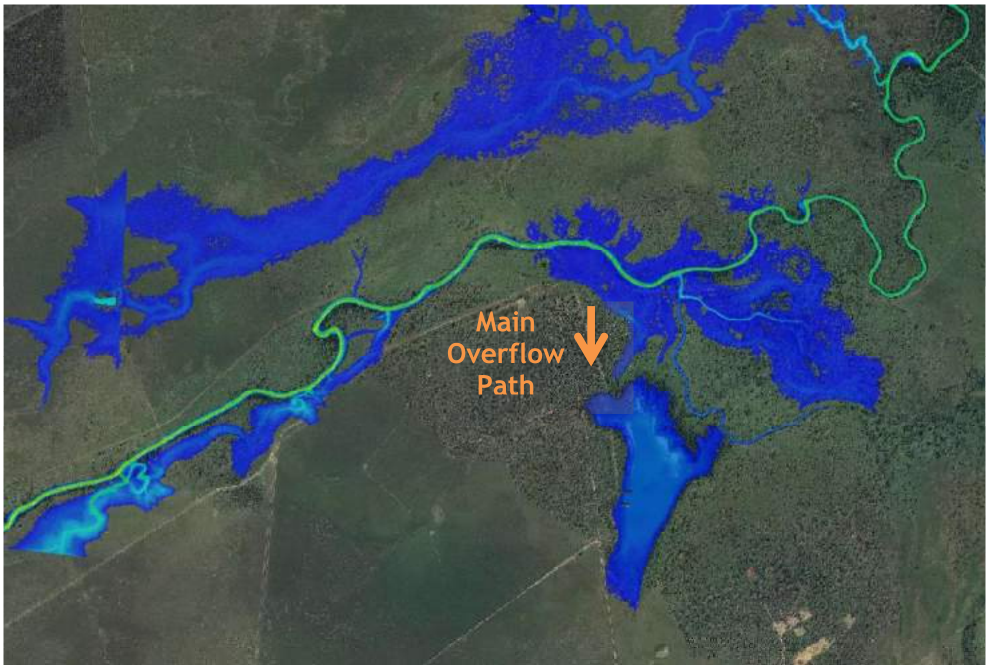


Figure 4.8 – Overflow paths to Lake Vermont

5 Conclusions

The impacts of the Lake Vermont Northern Extension Project on existing Phillips Creek flood levels was analysed by developing a TUFLOW hydraulic model of the proposed site.

Hydrographs extracted from a calibrated URBS hydrologic model of the catchment were used as inflow boundaries to the hydraulic model.

Simulations of the 1 in 2, 50, 100 and 1,000 AEP design events were undertaken for both the existing and post-development conditions. The post-development model was created by amending the existing conditions model to include the proposed diversion of Phillips Creek, levees to protect the proposed mine areas from inundation, and a preliminary design of a haul road embankment which will cross the Phillips Creek floodplain to the satellite pit.

The model results indicate that in large flood events, the presence of the diversion and levees results in redistribution of flow from the right (southern) to the left (northern) floodplain of Phillips Creek. As a consequence, downstream flood levels on the right floodplain are decreased, and flood levels on the left floodplain are increased. The flood level increase does not propagate upstream of the mine lease.

In the 1 in 50 and 1 in 100 AEP design events, the flood level increase is generally less than 0.1 m, with the exception being nearby localised increases of between approximately 0.25 m and 0.6 m to the north of the project and 0.5 m and 1.0 m immediately adjacent to the proposed southern levee. Localised increases in water levels of between 0.2 m and 0.9 m are predicted adjacent to the satellite pit levee for the 1 in 50 and 1 in 100 AEP design events.

The proposed haul road would be overtopped along the majority of its length, resulting in a localised increase in water level immediately upstream of between 0.1 m and 0.6 m for the 1 in 50 and 100 AEP design events. These estimates are likely to be conservatively high, as the model does not include cross-drainage structures which will be installed along the haul road where it crosses low points in the floodplain.

The 1 in 2 AEP design event is contained within the proposed diversion channel and is not impacted by the proposed levee. A slight decrease in water level in the channel occurs during the 1 in 2 AEP design event, which can be attributed to the increased conveyance created by the diversion channel.

The levees proposed for the southern floodplain will not impact on the frequency of Phillips Creek floodwater entering Lake Vermont.

6 References

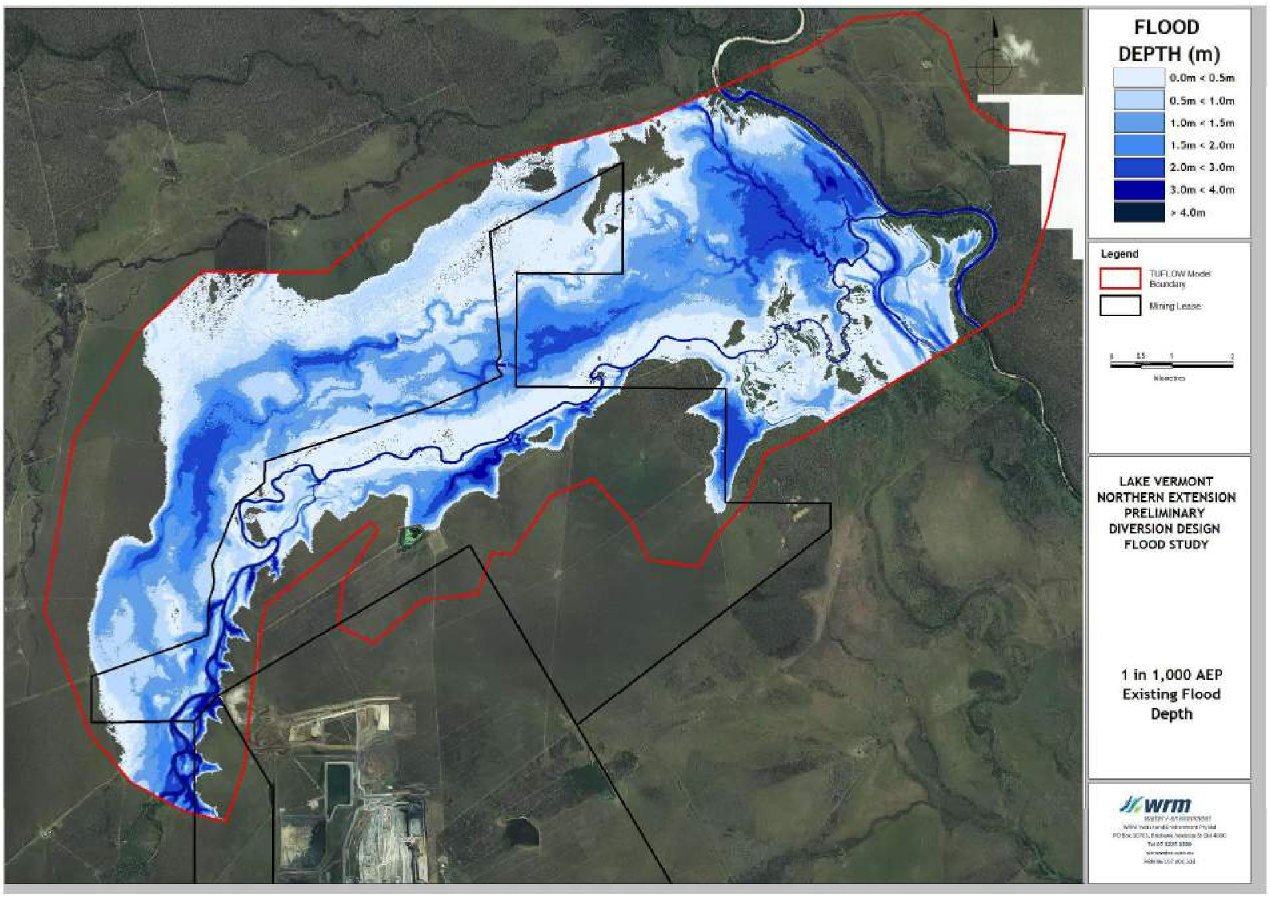
ARR (1998) ‘*Australian Rainfall and Runoff, A Guide to Flood Estimation*’, Revised Edition, Institution of Engineers, Australia, 1998.

Carroll (2004) ‘*URBS A Rainfall Runoff Routing Model for Flood Forecasting & Design*’, D.G. Carroll, Version 4.00, April 2004.

Hargraves (c.2004) ‘*Final Report, Extreme Rainfall Estimation Project, CRCFORGE and (CRC) ARF Techniques, Queensland and Border Locations, Development and Application*’, Report prepared by Gary Hargraves, Water Assessment Group, Water Assessment and Planning, Resource Sciences Centre, undated, circa 2004.

WRM (2014) ‘*Phillips Creek Diversion Functional Design Report*’, August 2014.

Appendix A - Existing Conditions Model Results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Mining Lease
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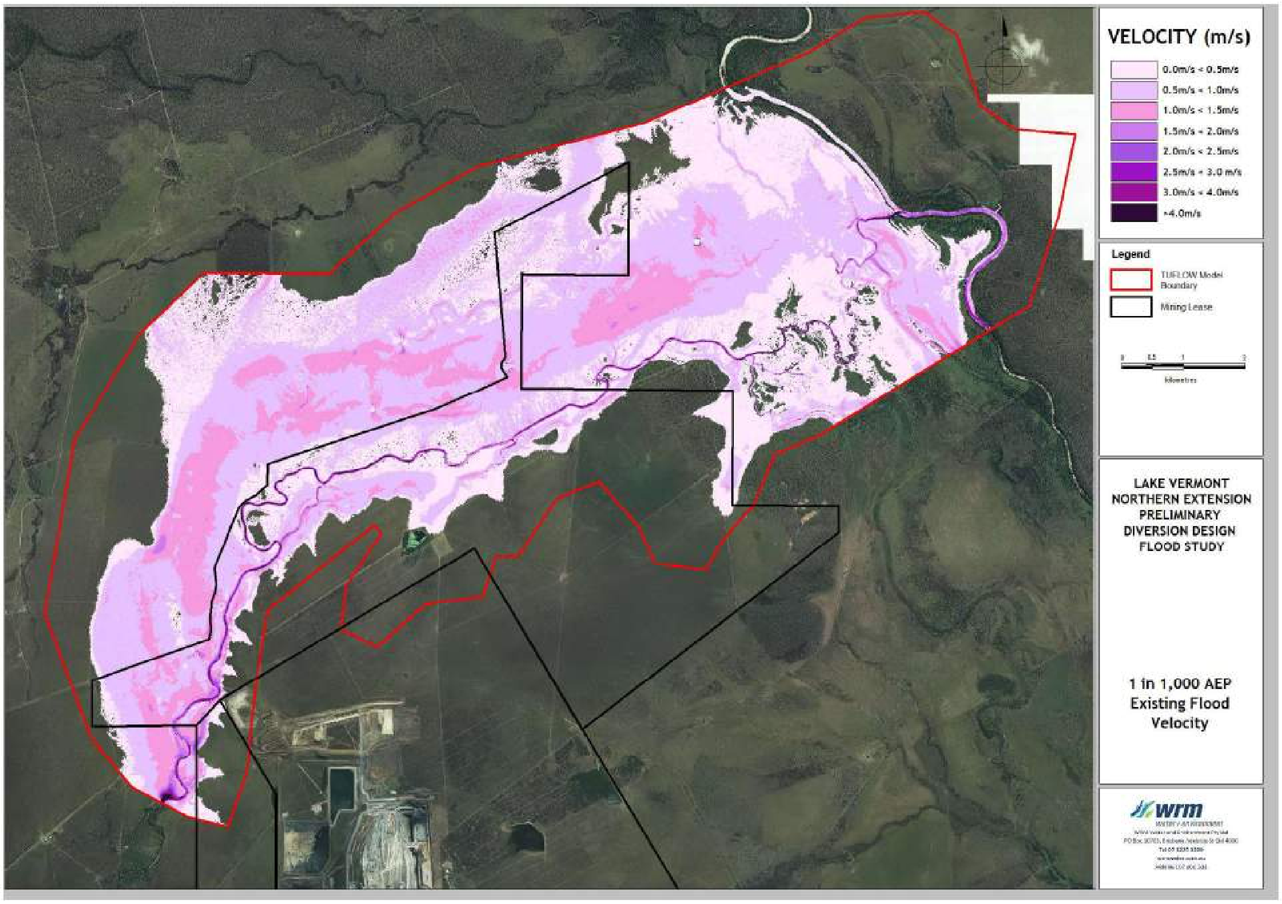
1 in 1,000 AEP Existing Flood Depth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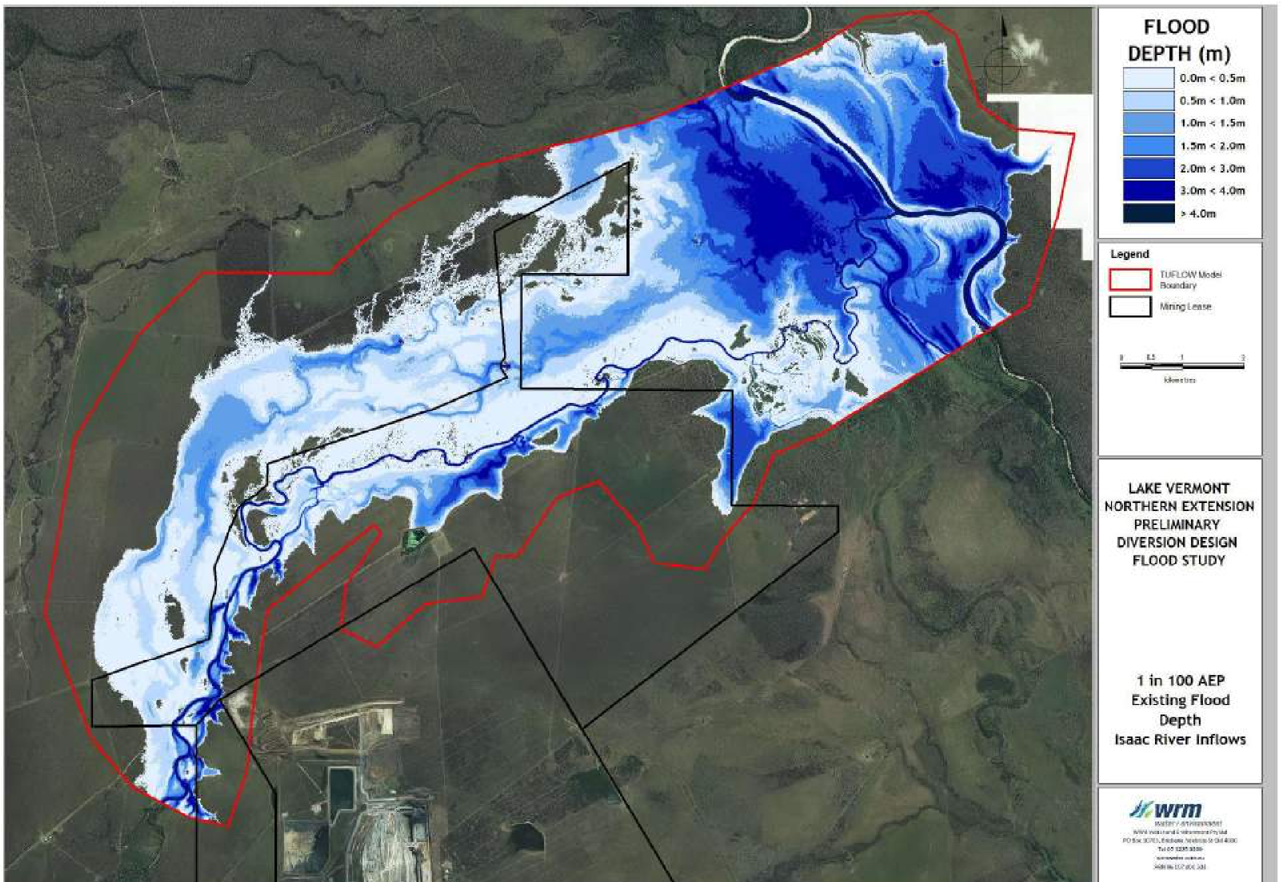
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Isaac River Inflows
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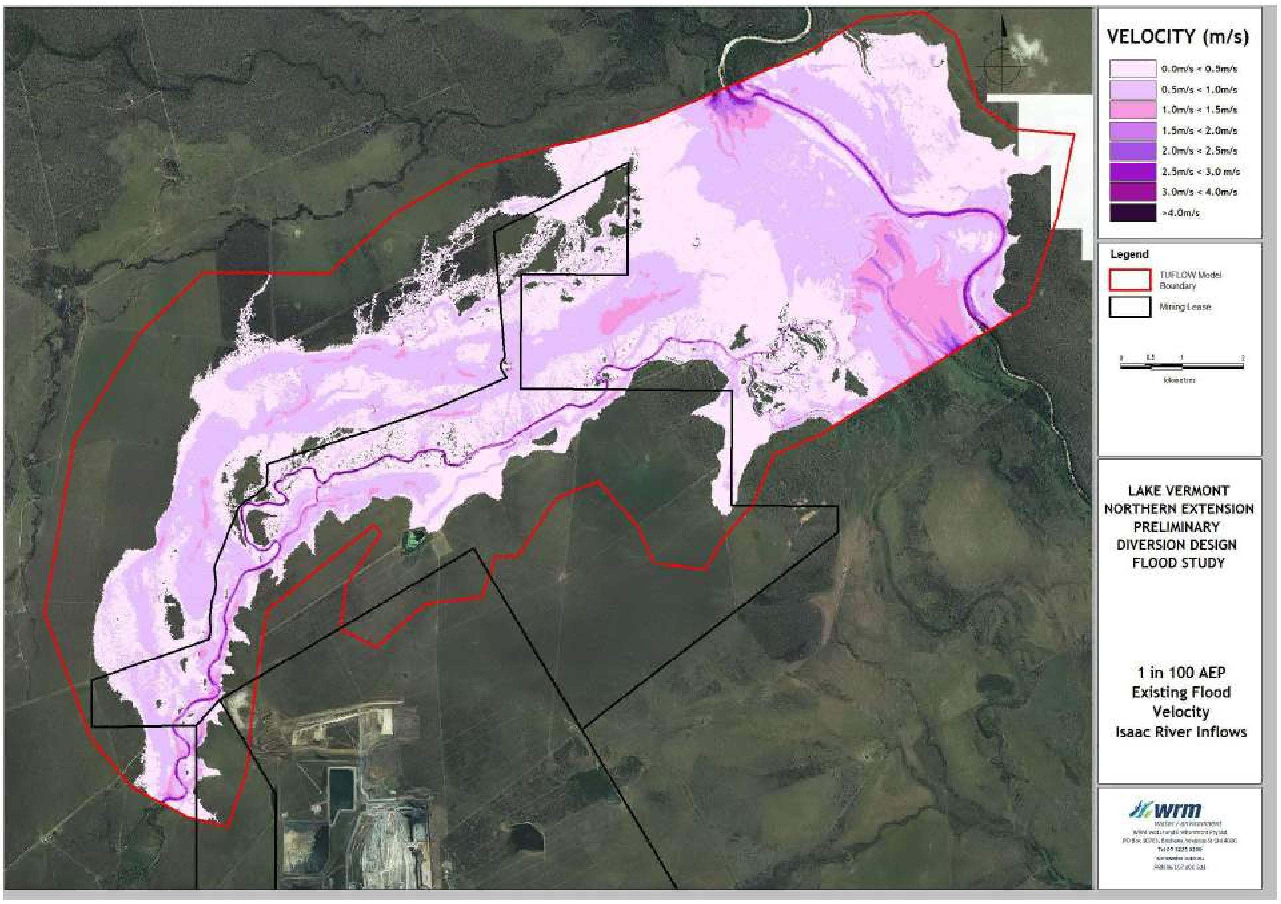
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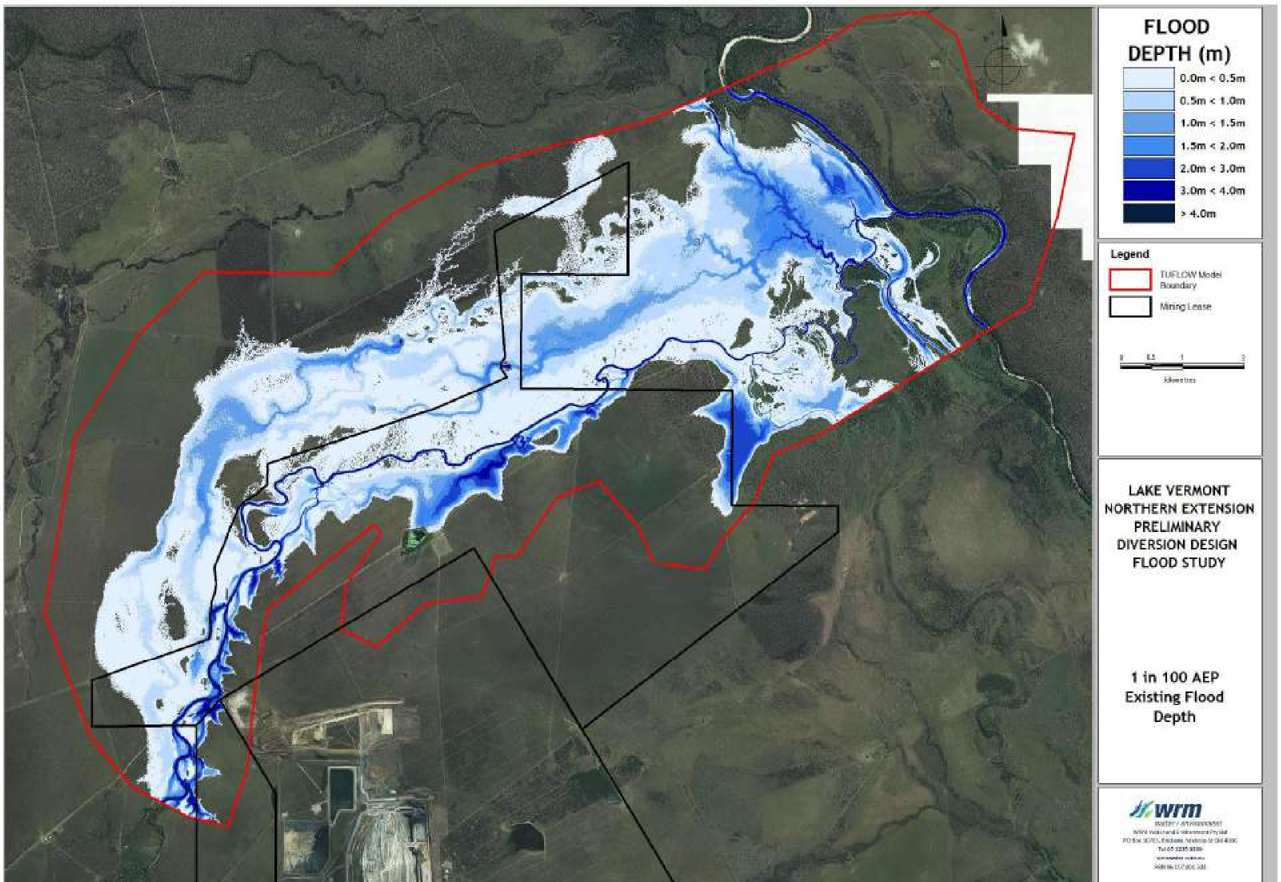
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1 in 100 AEP Existing Flood Depth
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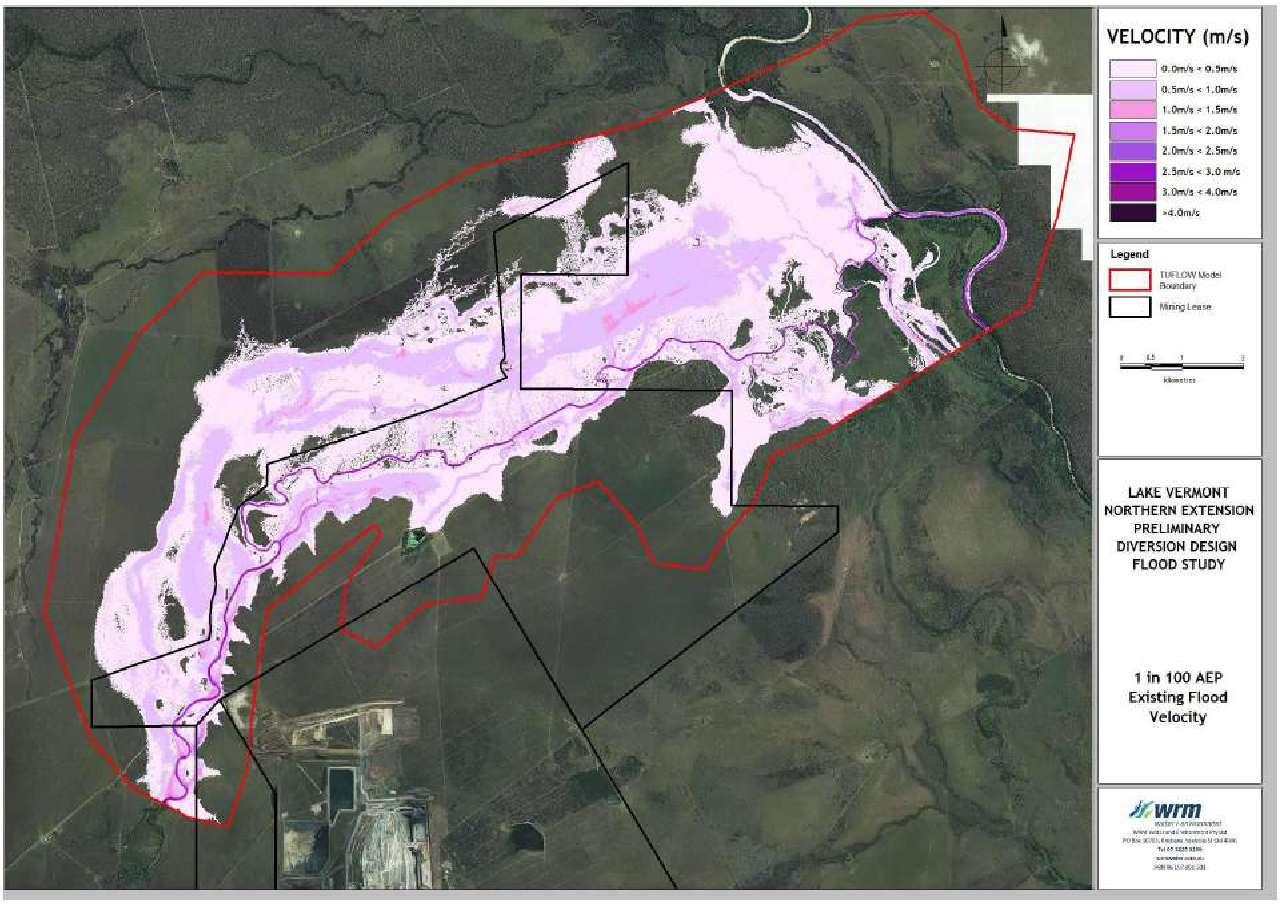
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FLOOD STUDY
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Existing Flood
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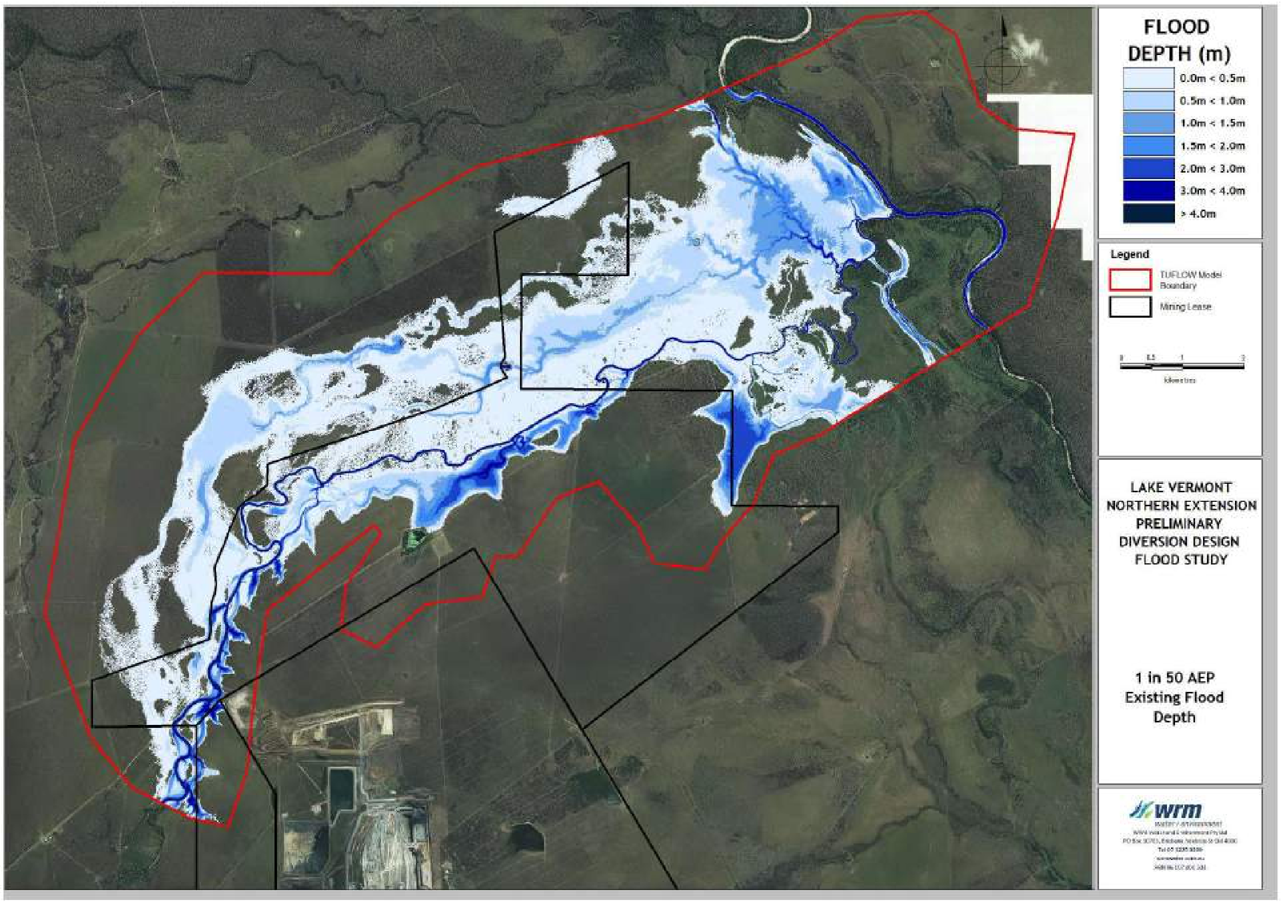
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1 in 50 AEP Existing Flood Depth
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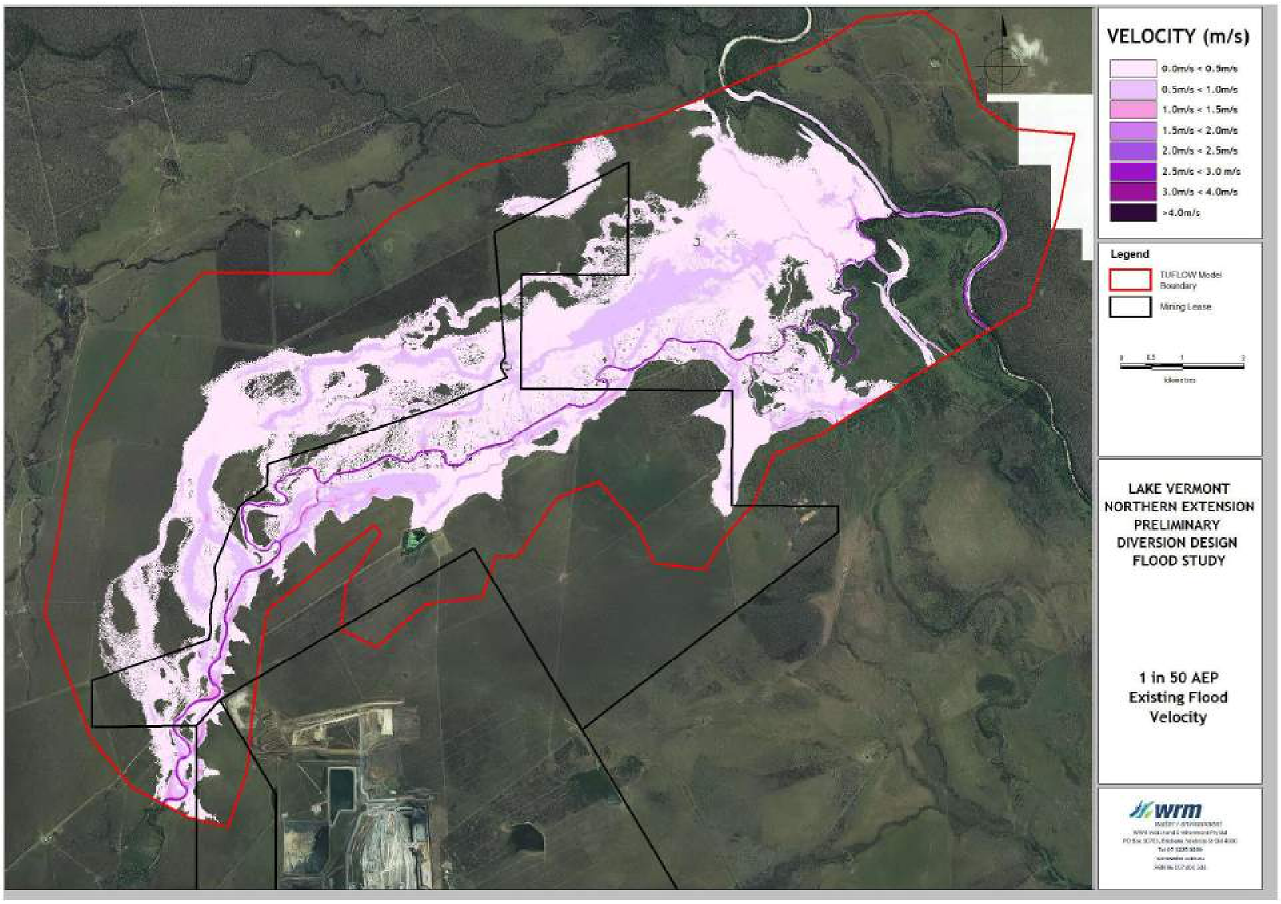

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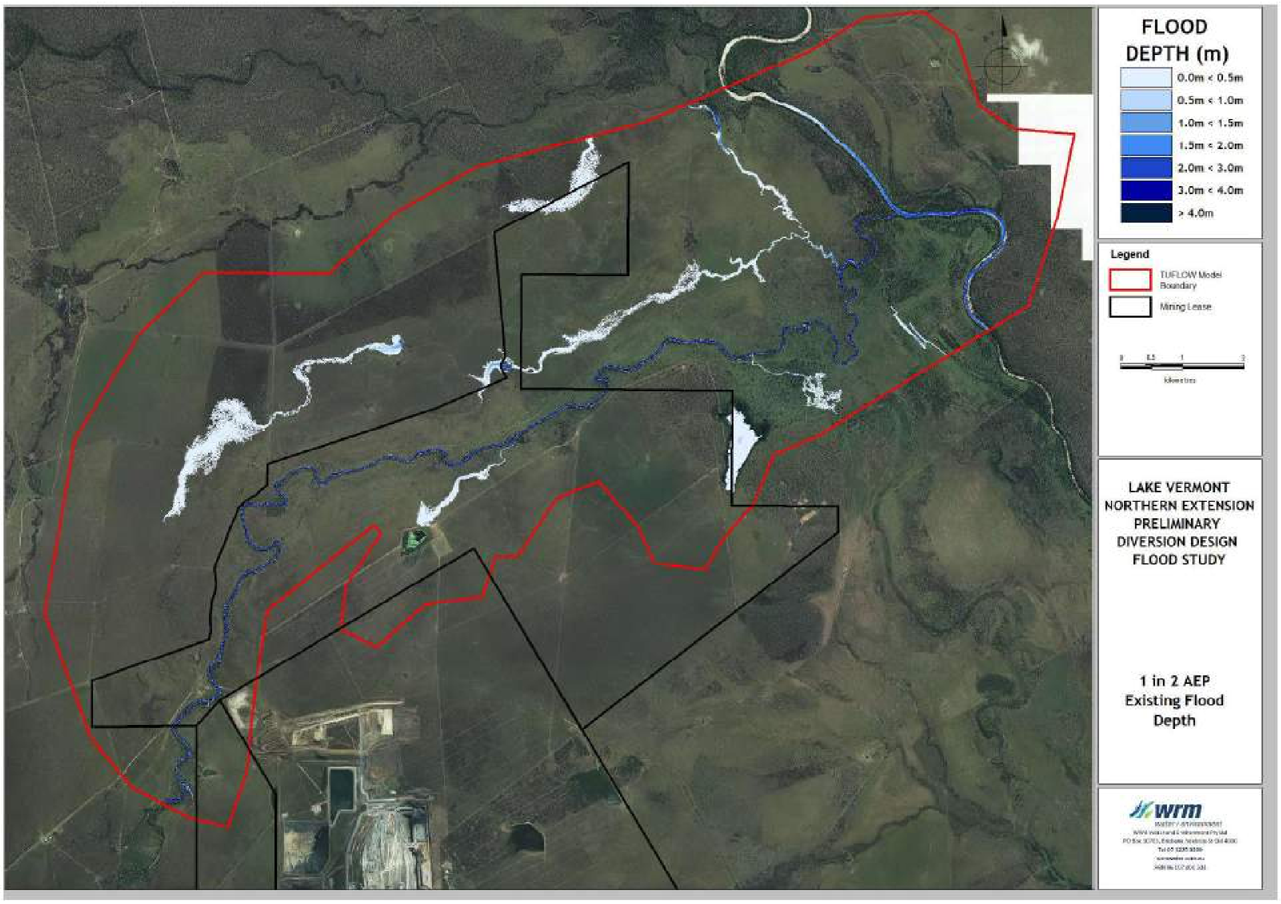
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1 in 2 AEP Existing Flood Depth
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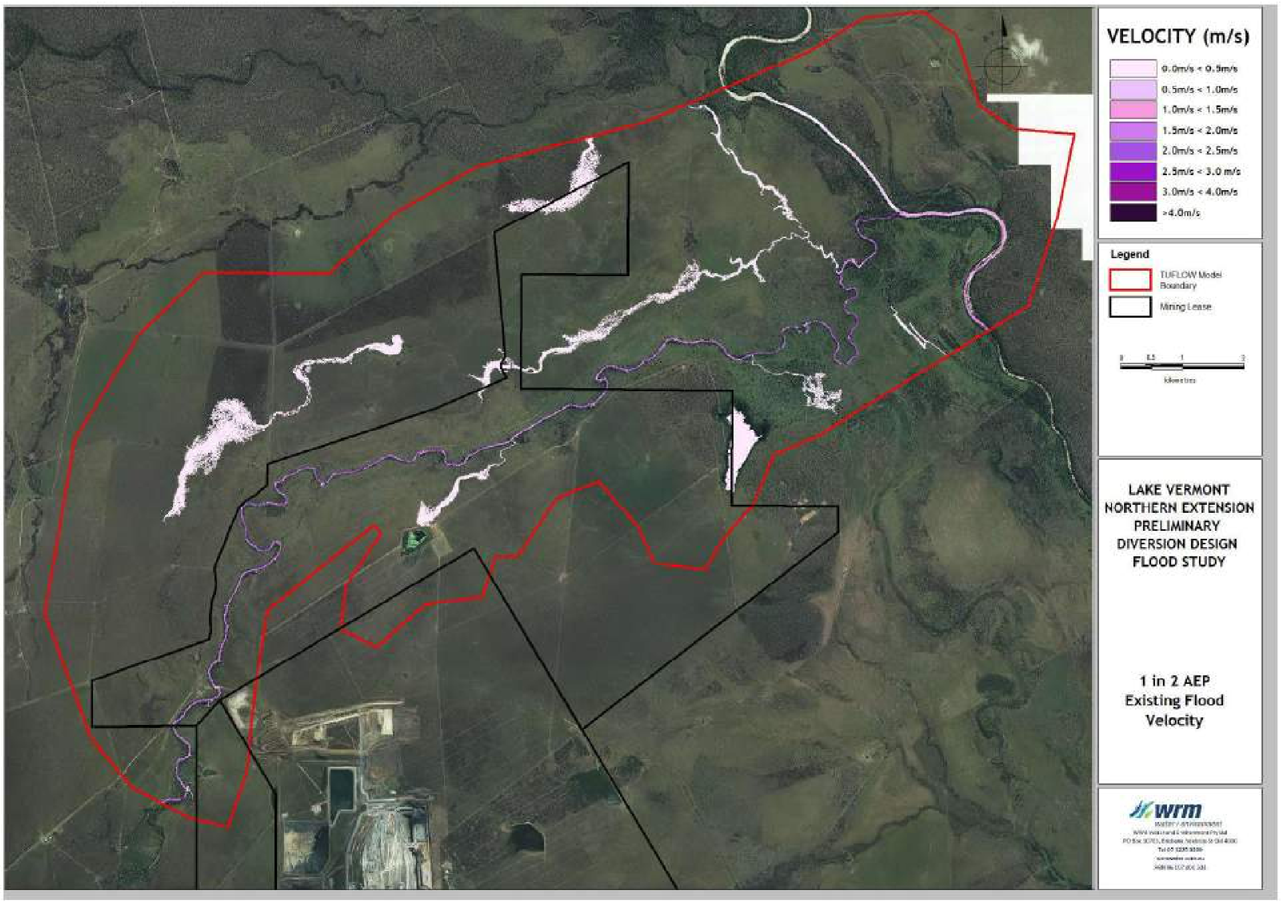
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TUFLOW Model Boundary
Mining Lease
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1 in 2 AEP Existing Flood Velocity
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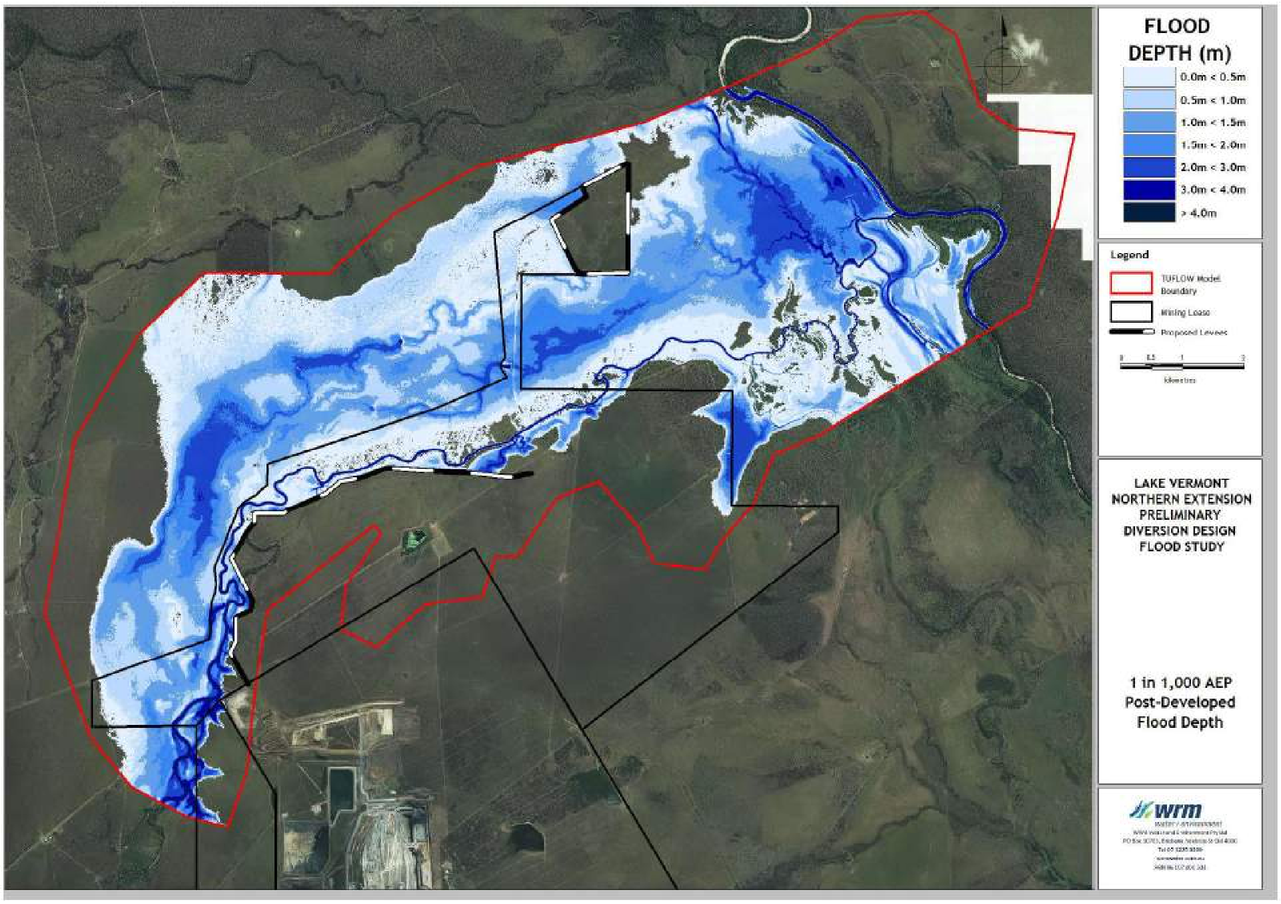
Appendix B - Post-Developed Conditions Model Results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Proposed Levees
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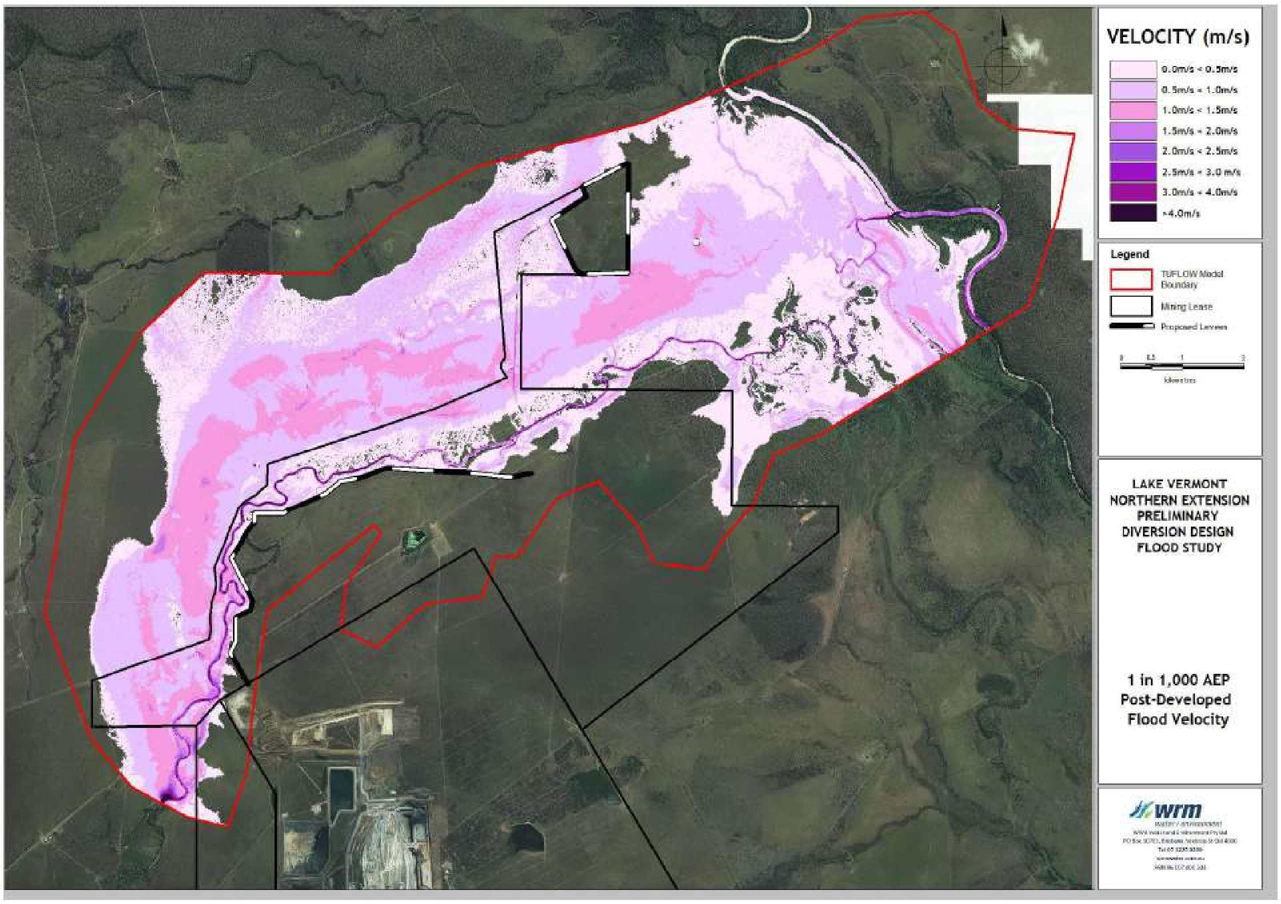
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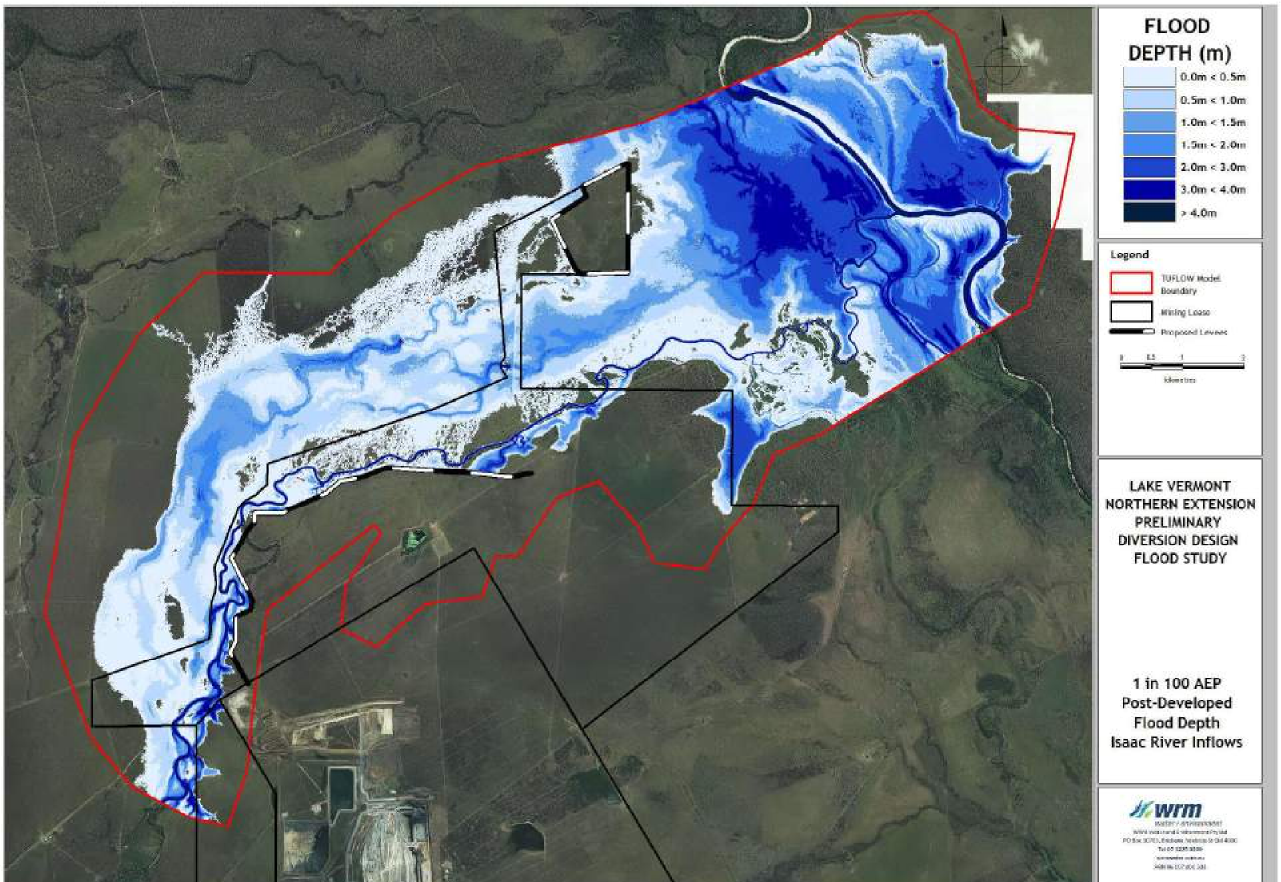
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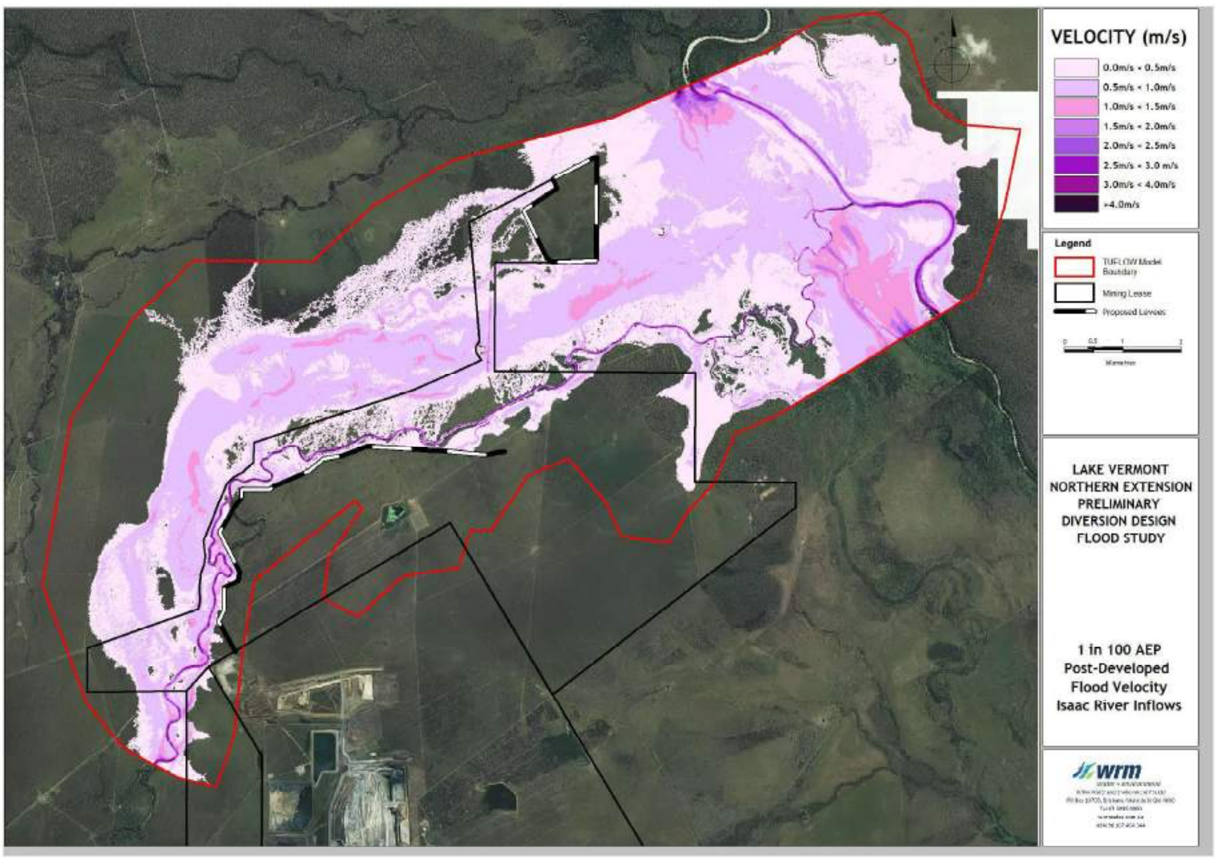
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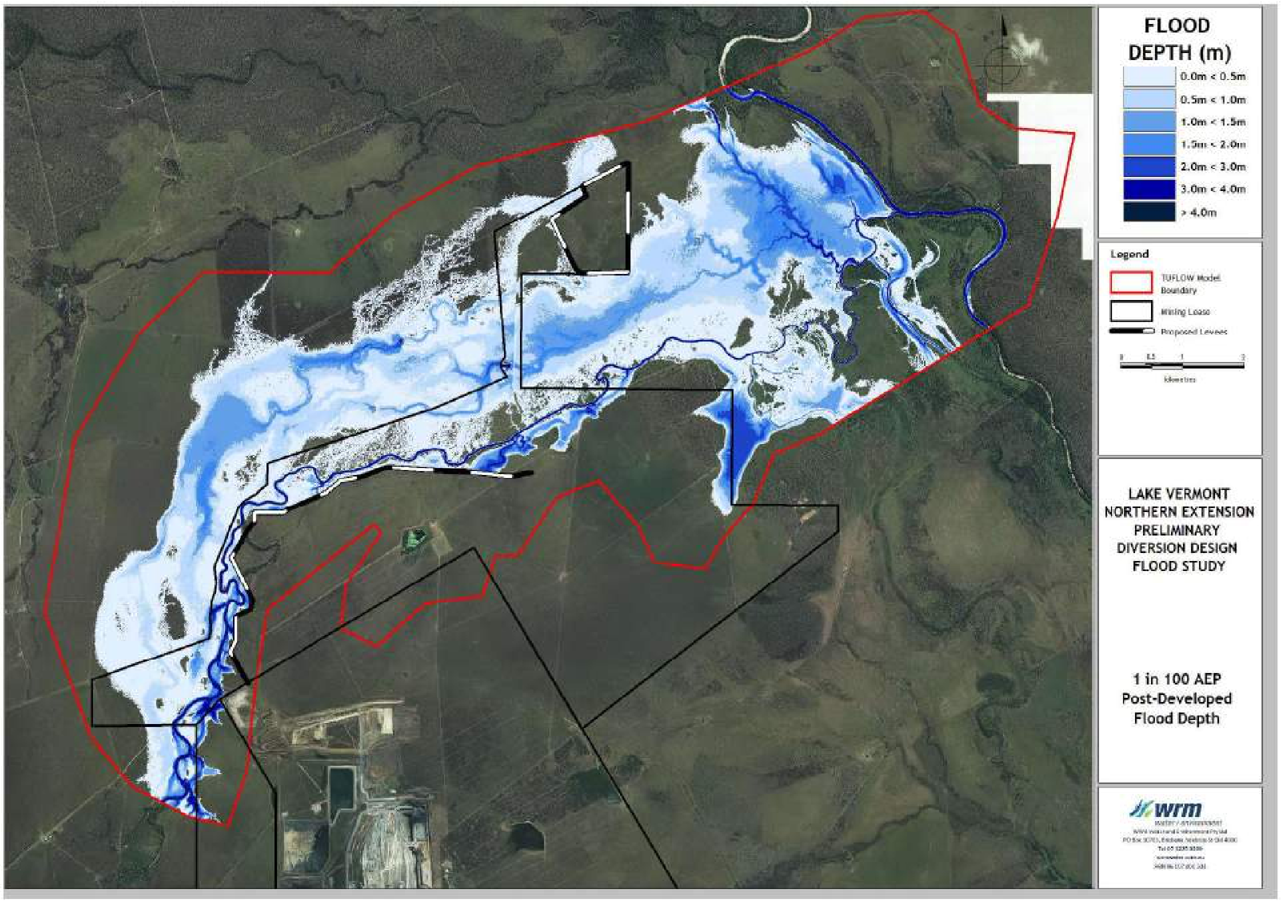
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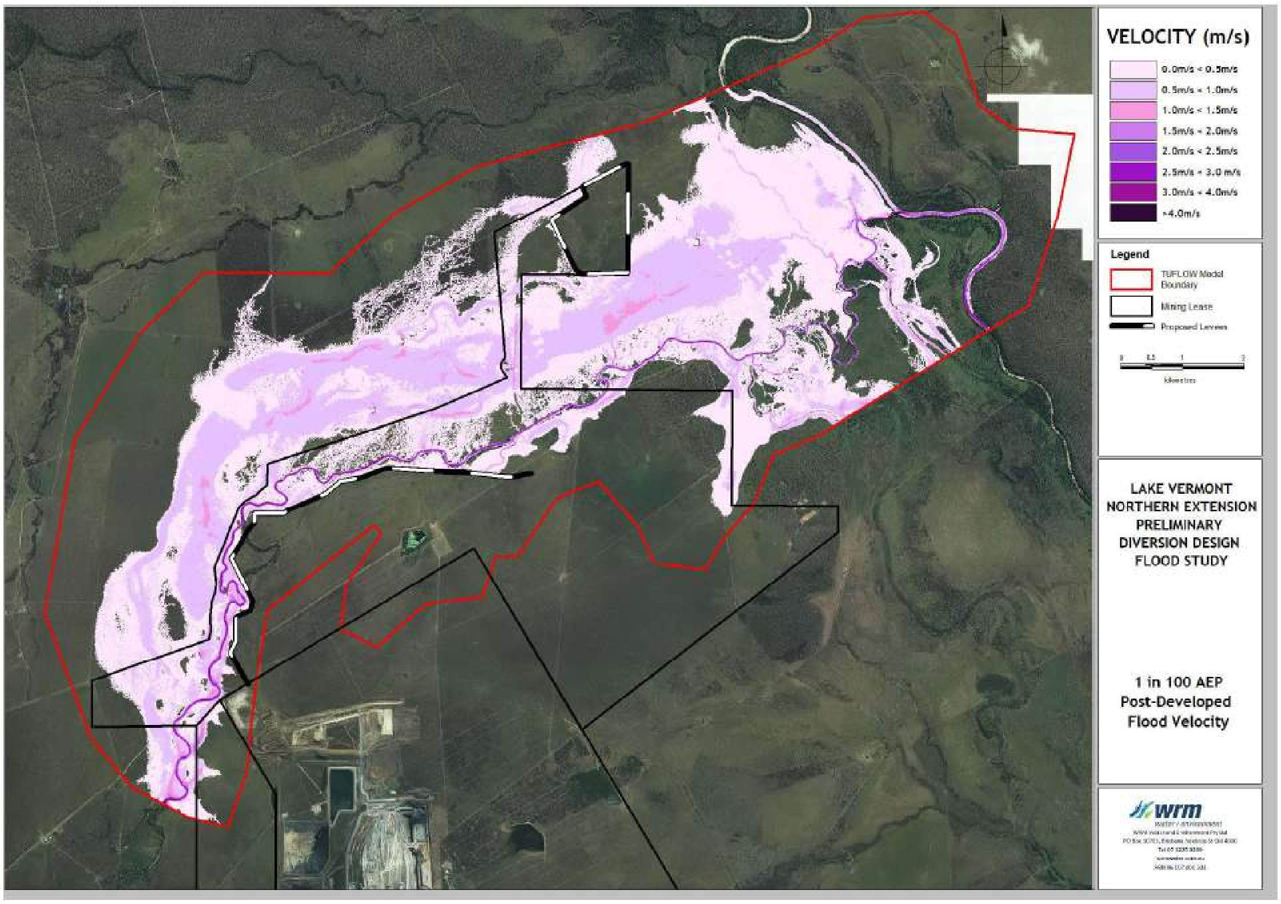
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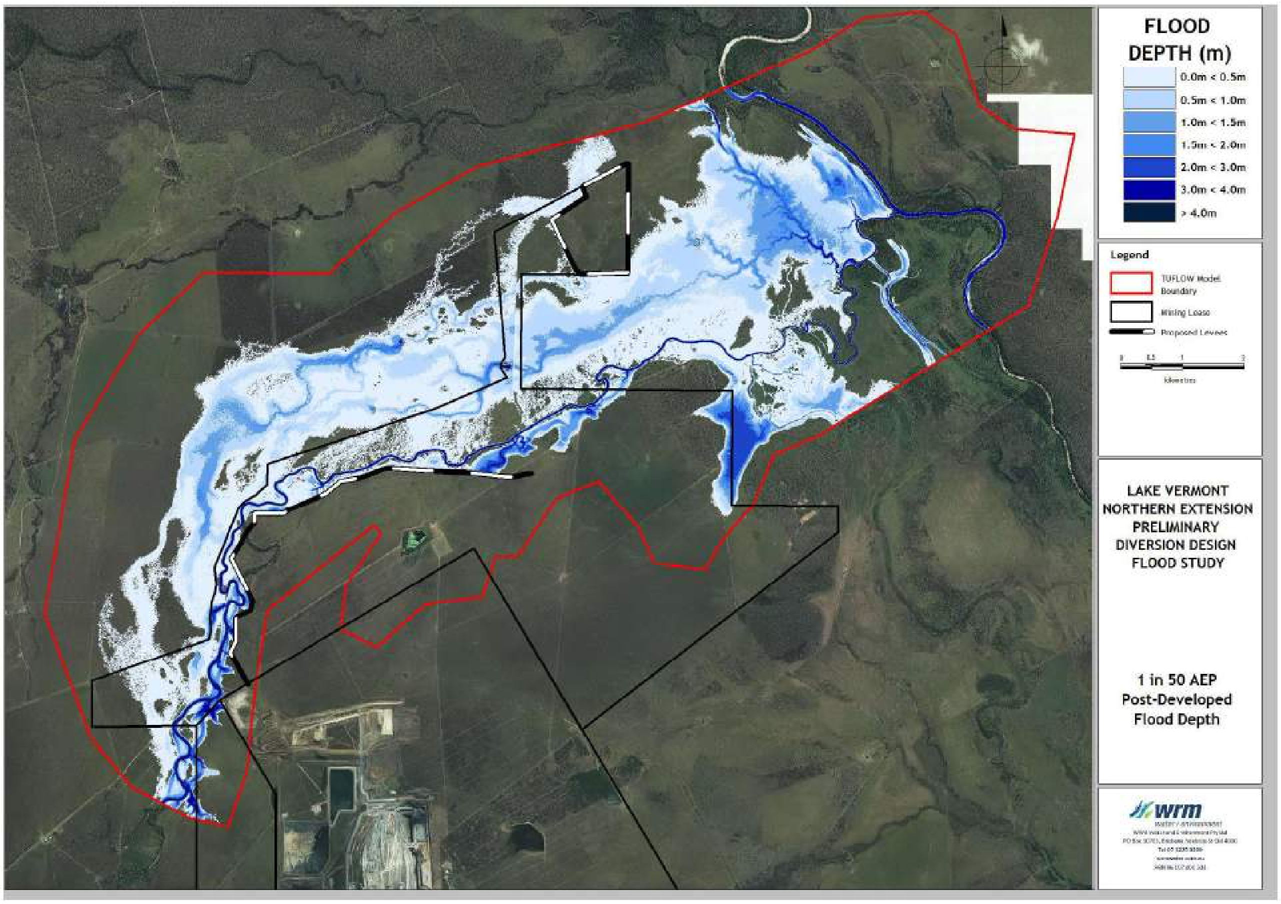
2.0m/s < 2.5m/s
2.5m/s < 3.0 m/s
3.0m/s < 4.0m/s
>4.0m/s
Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levees
LAKE VERMONT NORTHERN EXTENSION PRELIMINARY DIVERSION DESIGN FLOOD STUDY
1 in 100 AEP Post-Developed Flood Velocity
wrm


FLOOD DEPTH (m)
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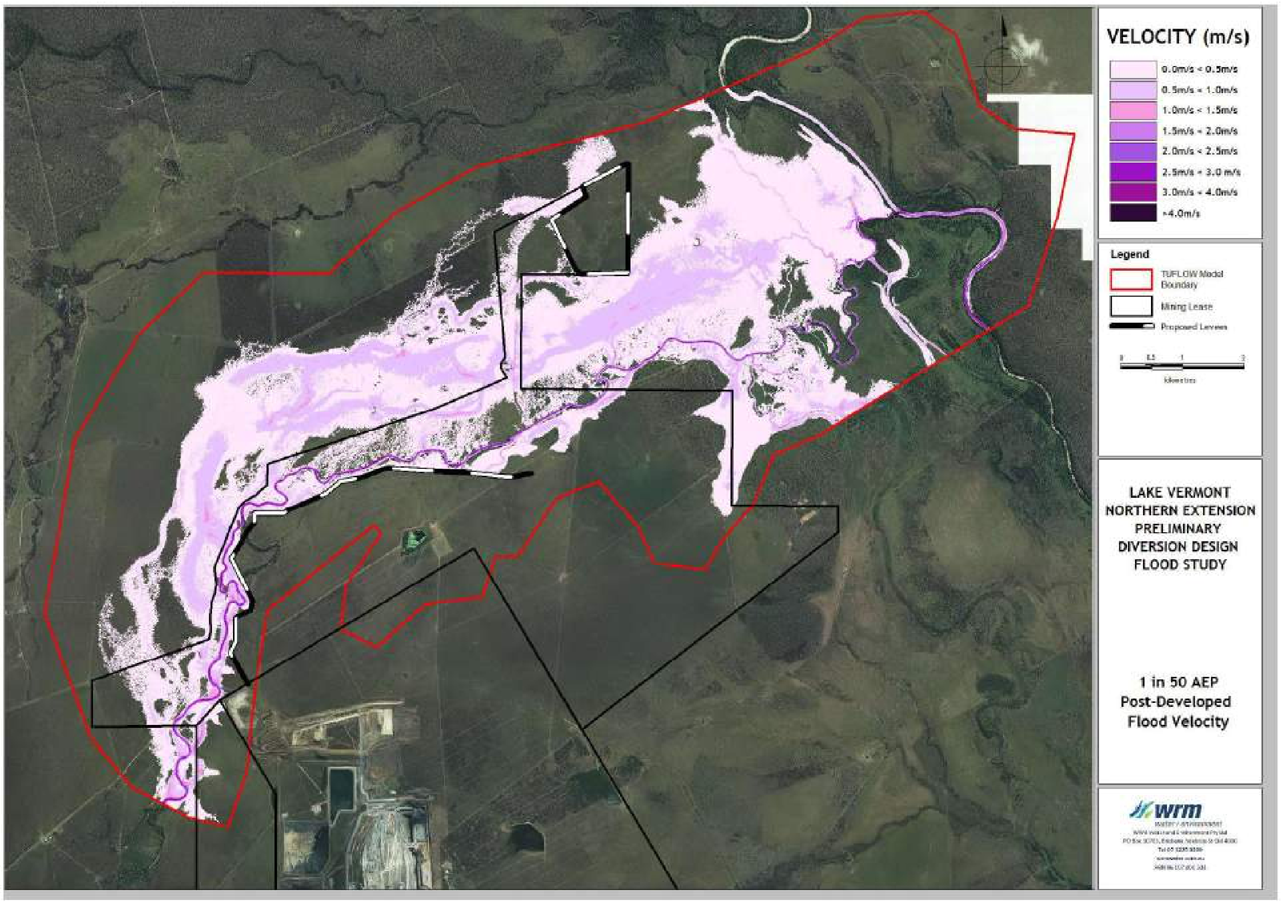
1.0m < 1.5m
1.5m < 2.0m
2.0m < 3.0m
3.0m < 4.0m
> 4.0m
Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levees
LAKE VERMONT NORTHERN EXTENSION PRELIMINARY DIVERSION DESIGN FLOOD STUDY
1 in 50 AEP Post-Developed Flood Depth
wrm


VELOCITY (m/s)
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1.0m/s < 1.5m/s
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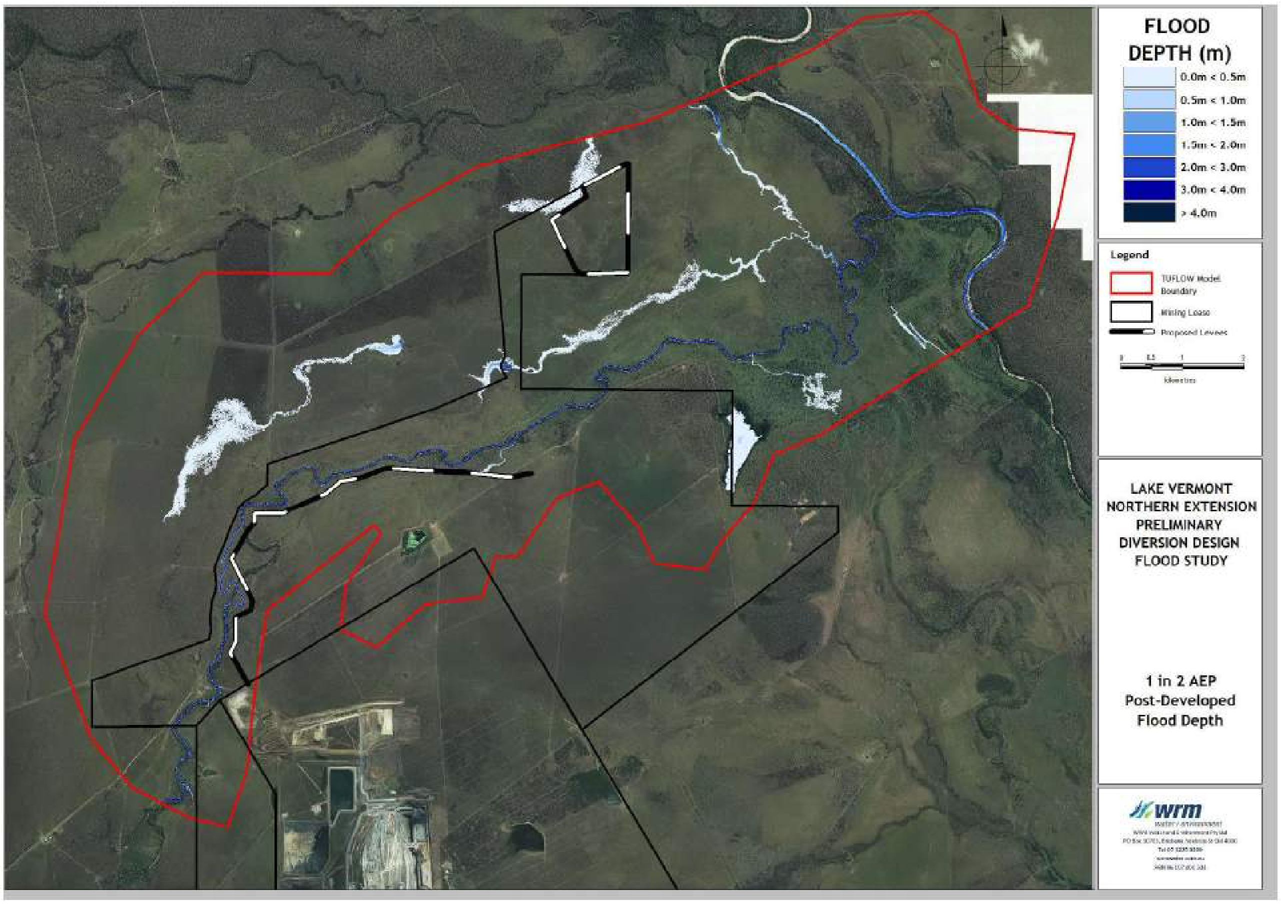
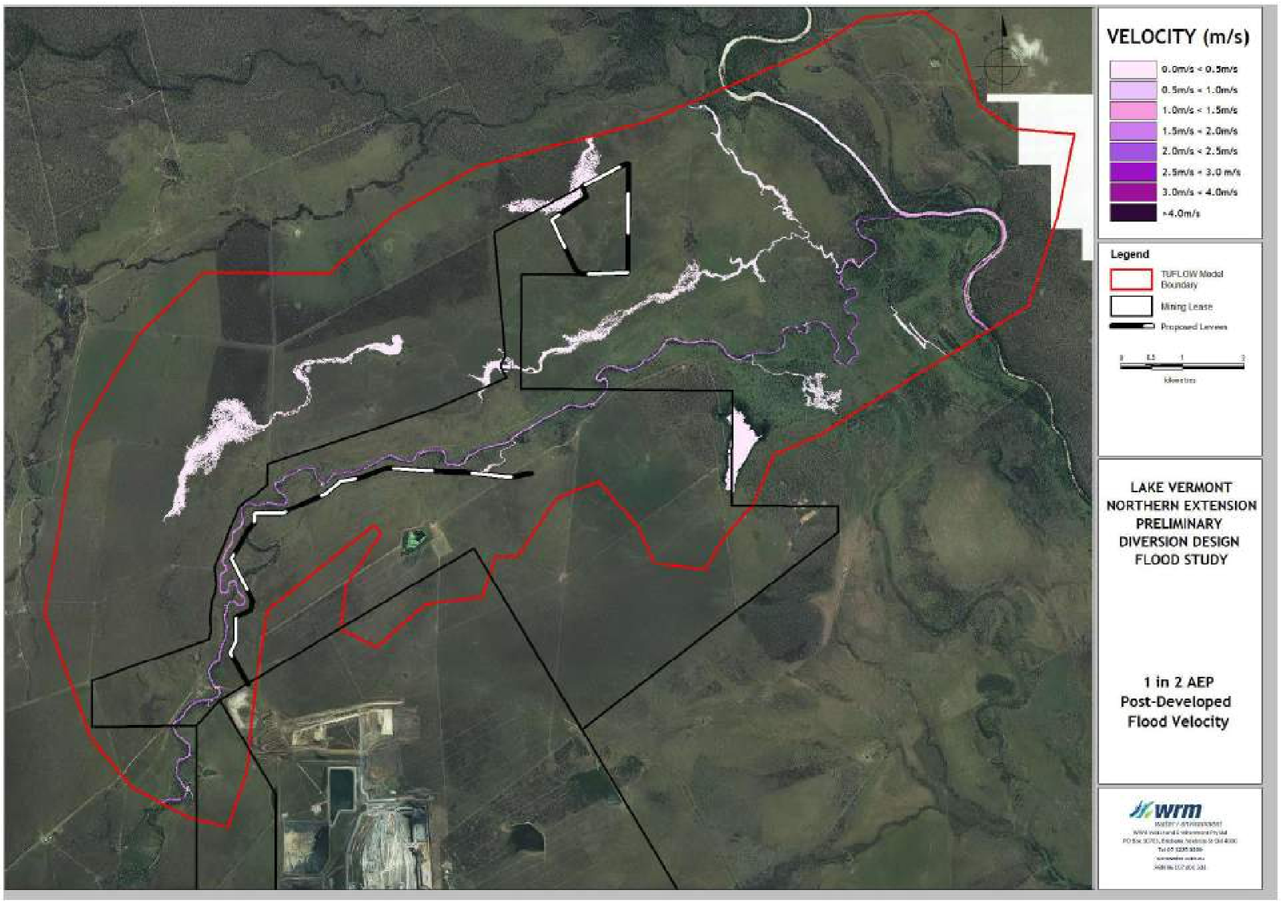
2.0m/s < 2.5m/s
2.5m/s < 3.0 m/s
3.0m/s < 4.0m/s
>4.0m/s
Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levees
LAKE VERMONT NORTHERN EXTENSION PRELIMINARY DIVERSION DESIGN FLOOD STUDY
1 in 50 AEP Post-Developed Flood Velocity
wrm


FLOOD DEPTH (m)
0.0m < 0.5m
0.5m < 1.0m
1.0m < 1.5m
1.5m < 2.0m
2.0m < 3.0m
3.0m < 4.0m
> 4.0m
Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levees
LAKE VERMONT NORTHERN EXTENSION PRELIMINARY DIVERSION DESIGN FLOOD STUDY
1 in 2 AEP Post-Developed Flood Depth
wrm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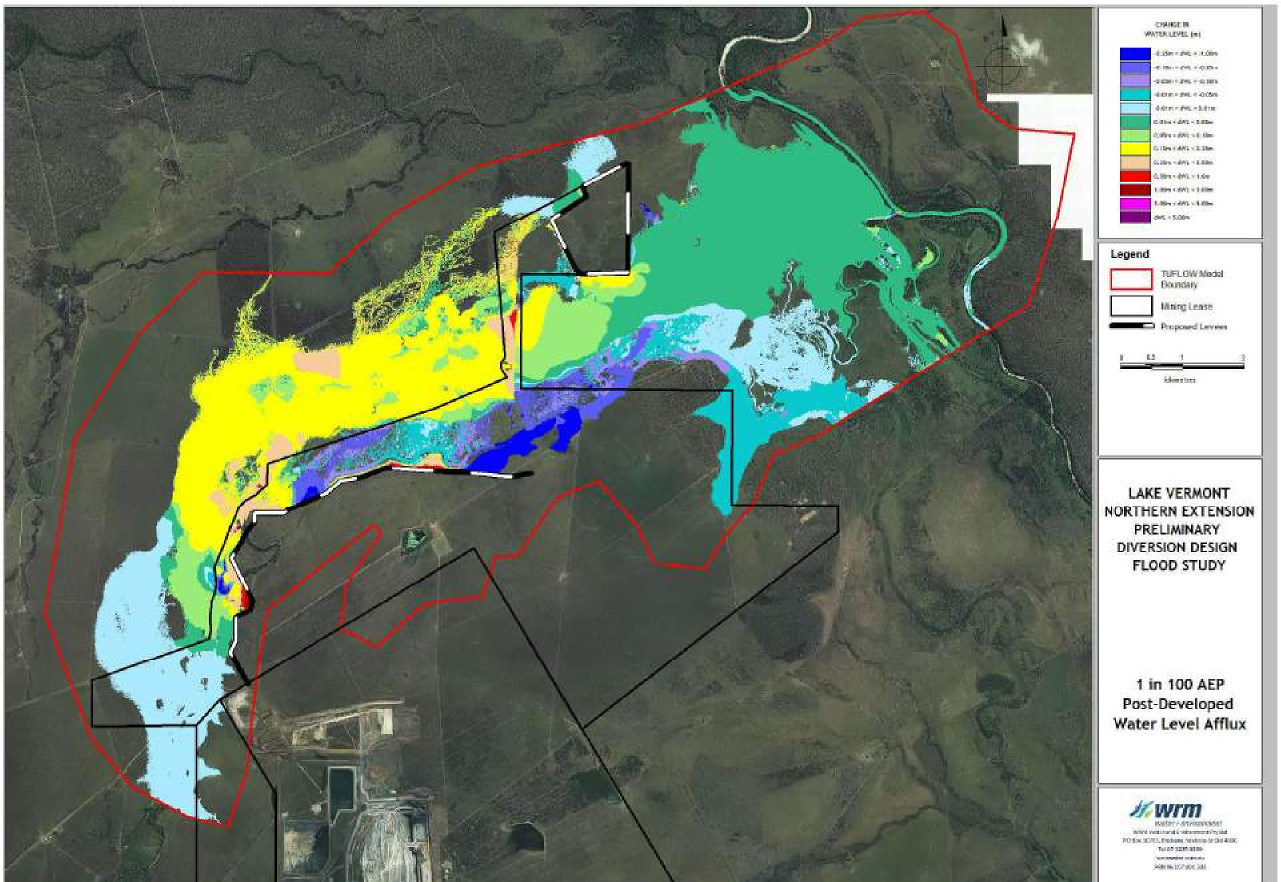
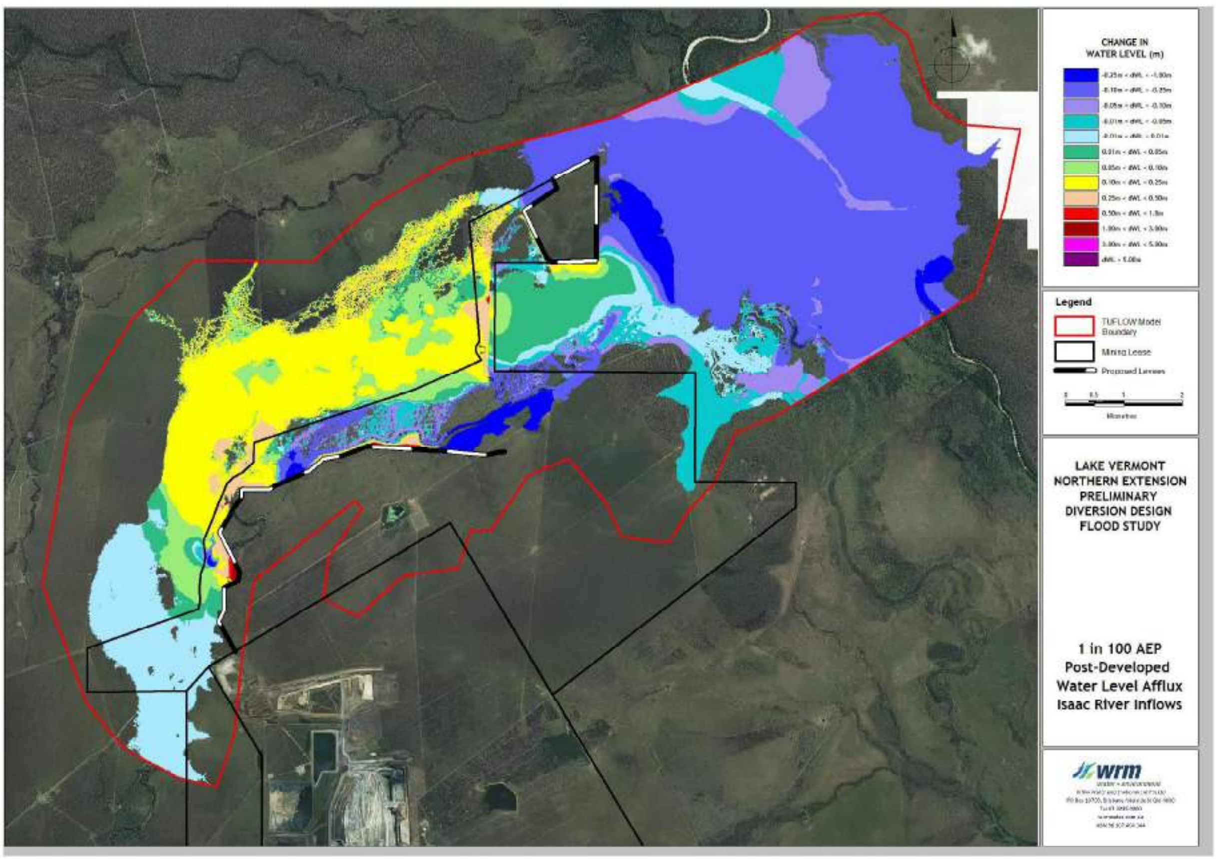
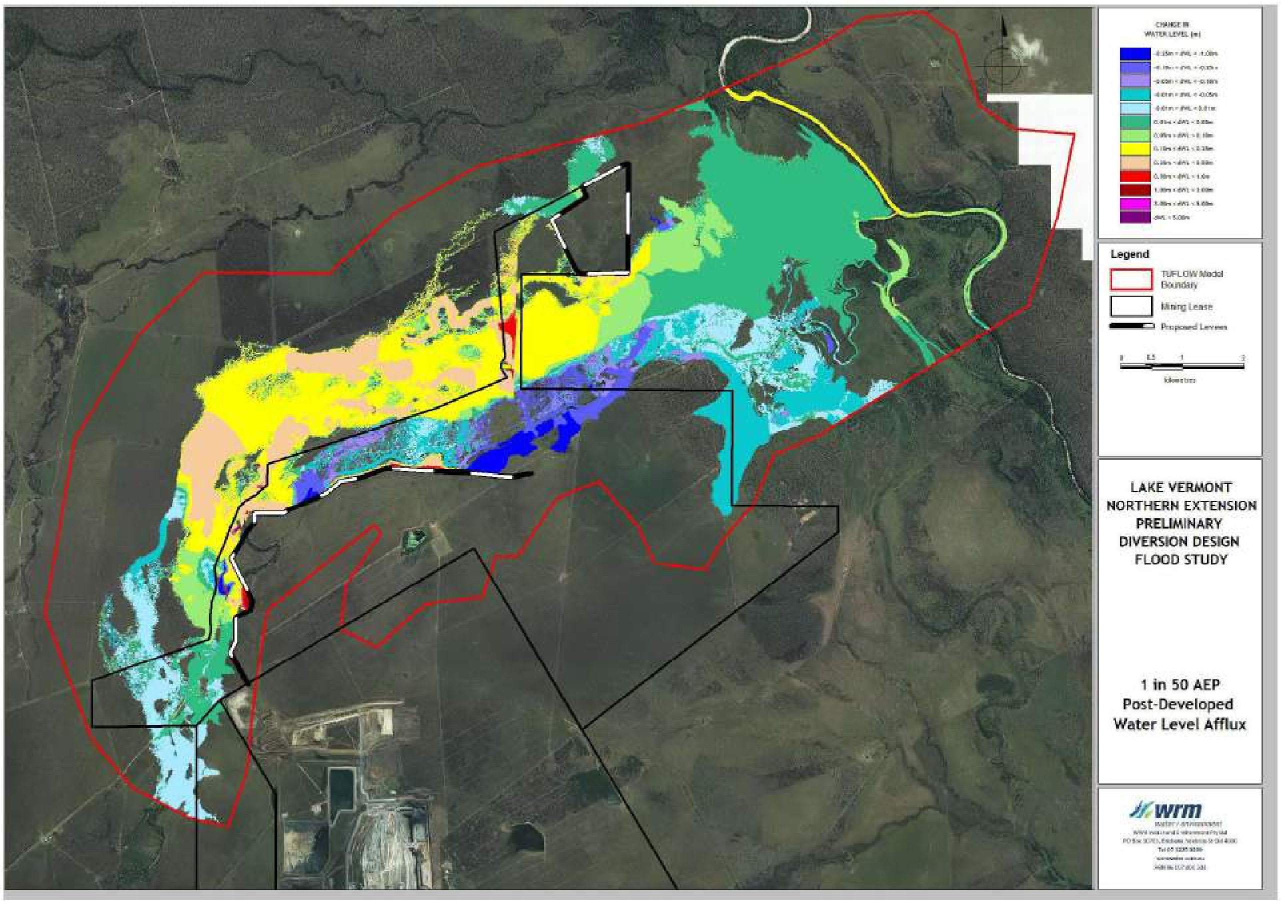
2.0m/s < 2.5m/s
2.5m/s < 3.0 m/s
3.0m/s < 4.0m/s
>4.0m/s
Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levees
LAKE VERMONT NORTHERN EXTENSION PRELIMINARY DIVERSION DESIGN FLOOD STUDY
1 in 2 AEP Post-Developed Flood Velocity
wrm

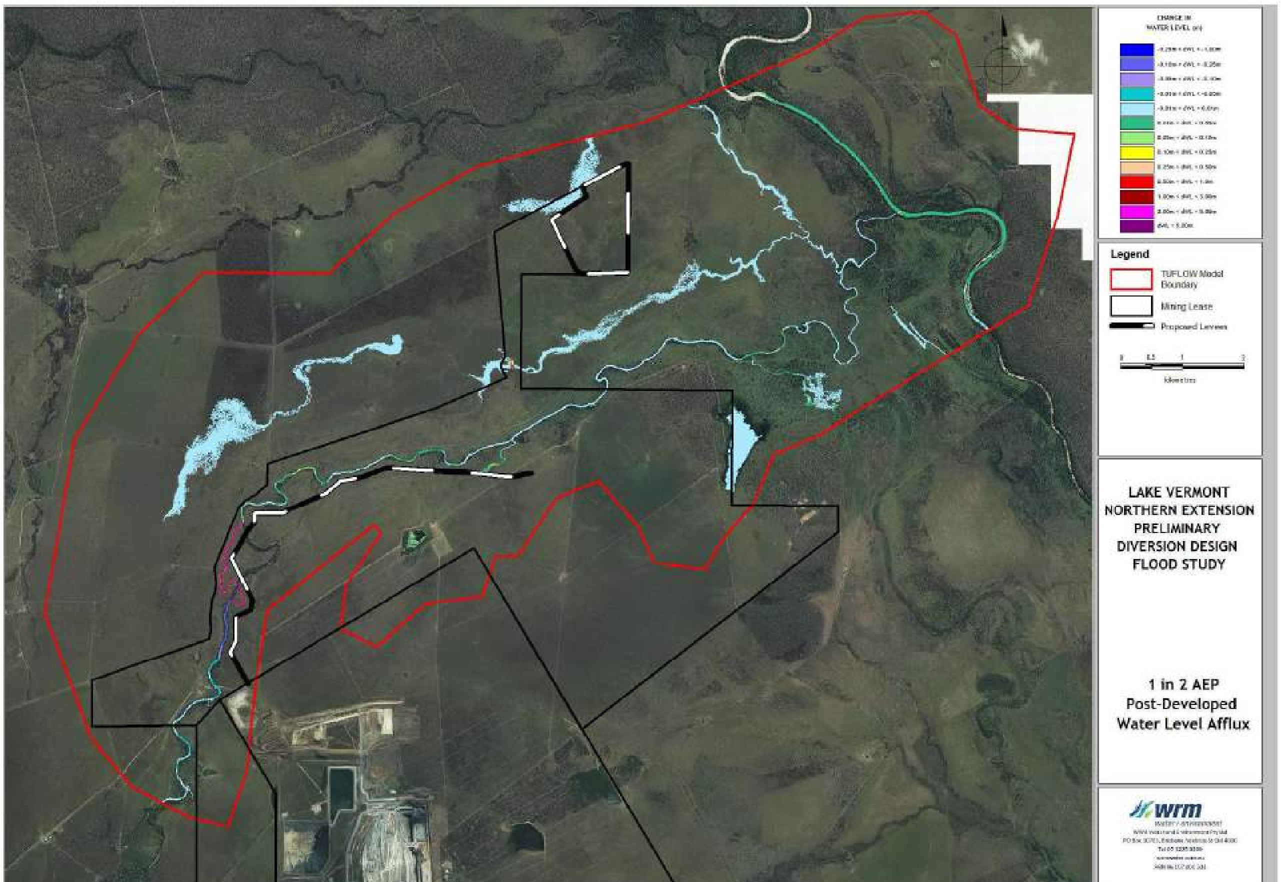
Appendix C - Increase in Water Level


CHANGE IN
WATER LEVEL (m)
Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levees
kilometres
LAKE VERMONT
NORTHERN EXTENSION
PRELIMINARY
DIVERSION DESIGN
FLOOD STUDY
1 in 100 AEP
Post-Developed
Water Level Afflux
wrm

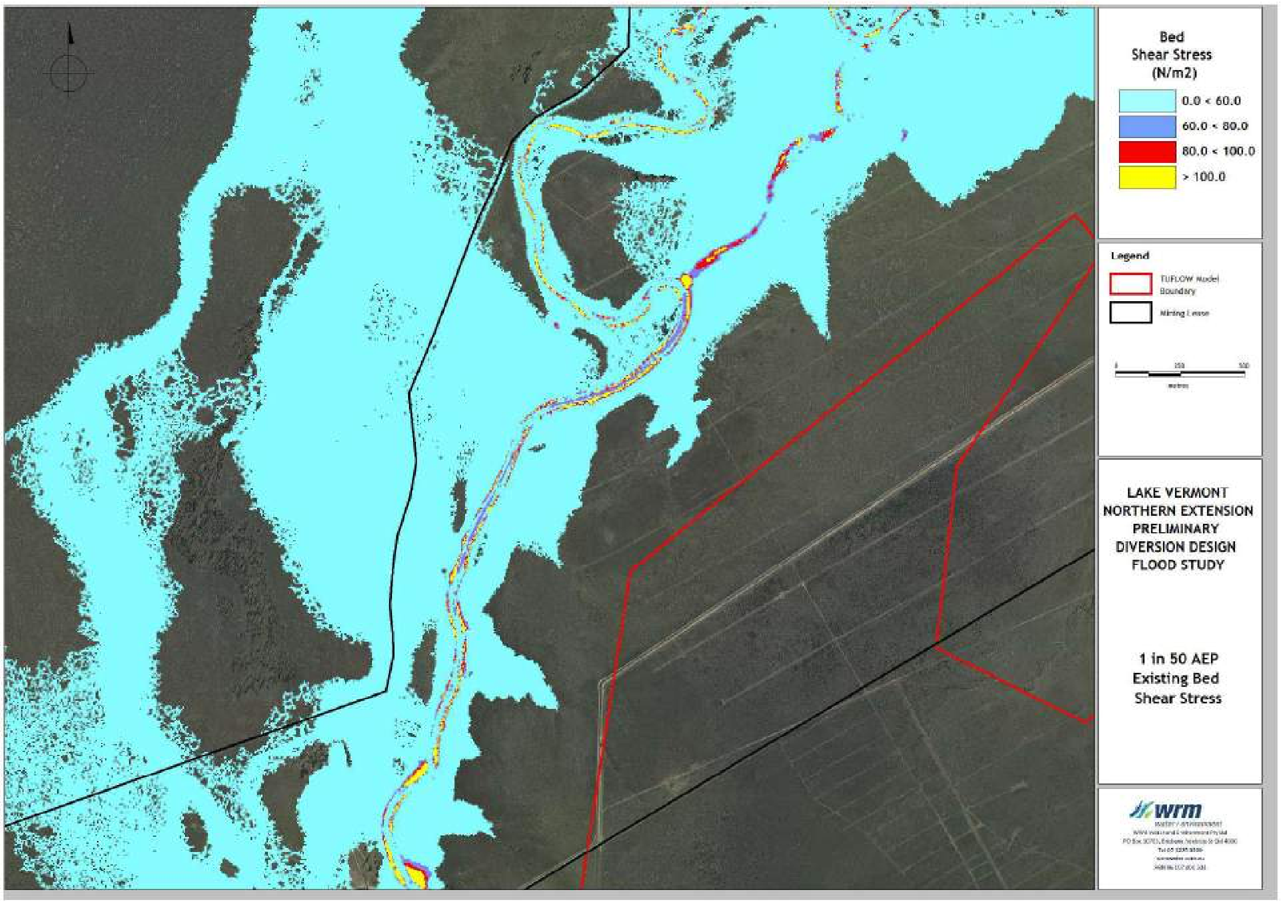


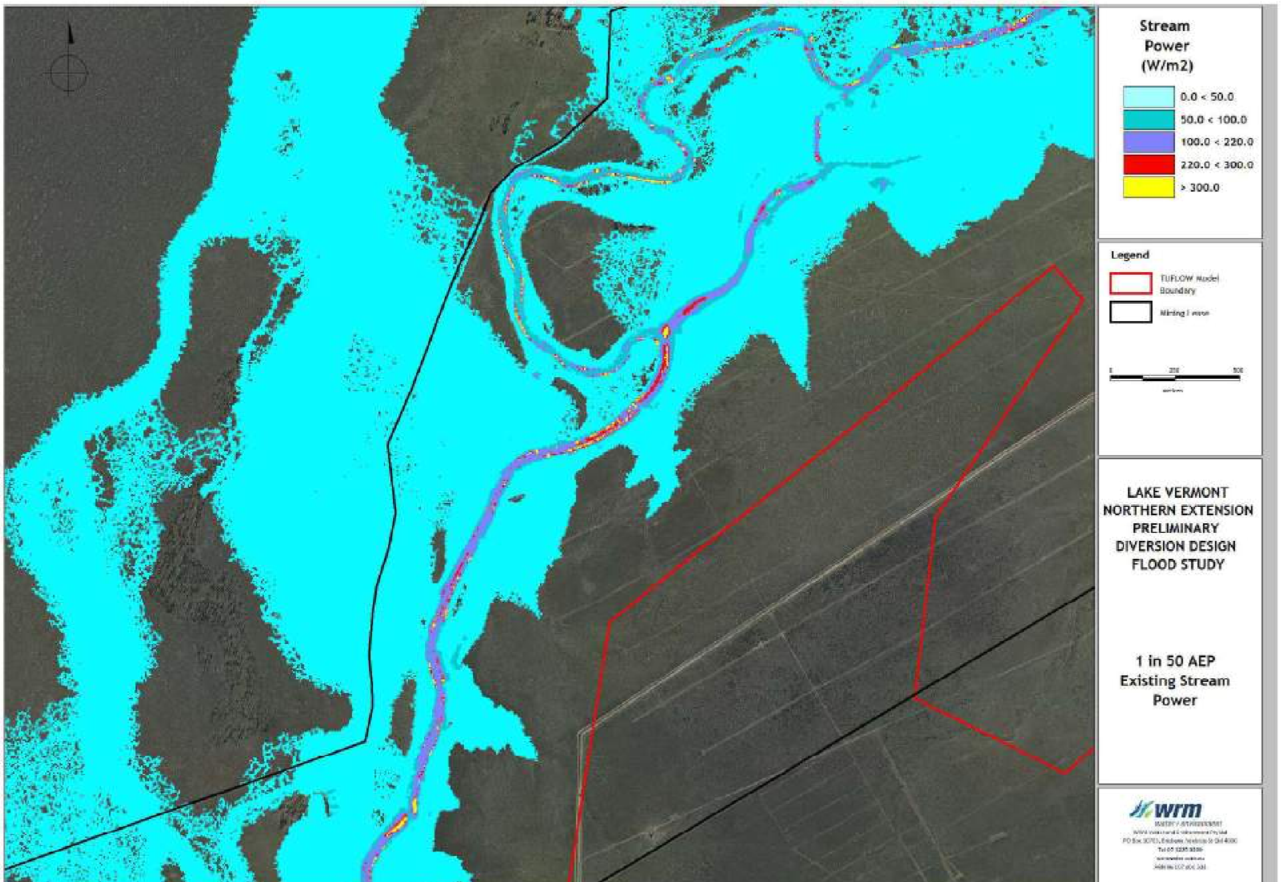
CHANGE IN
WATER LEVEL (m)
0.01m < dWL < 0.05m
0.05m < dWL < 0.10m
0.10m < dWL < 0.25m
0.25m < dWL < 0.50m
0.50m < dWL < 1.0m
1.00m < dWL < 3.00m
3.00m < dWL < 5.00m
dWL > 5.00m
Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levees
0 0.5 1 2
LAKE VERMONT
NORTHERN EXTENSION
PRELIMINARY
DIVERSION DESIGN
FLOOD STUDY
1 in 100 AEP
Post-Developed
Water Level Afflux
Isaac River Inflows
wrm


Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levees
LAKE VERMONT NORTHERN EXTENSION PRELIMINARY DIVERSION DESIGN FLOOD STUDY
1 in 50 AEP
Post-Developed
Water Level Afflux
wrm

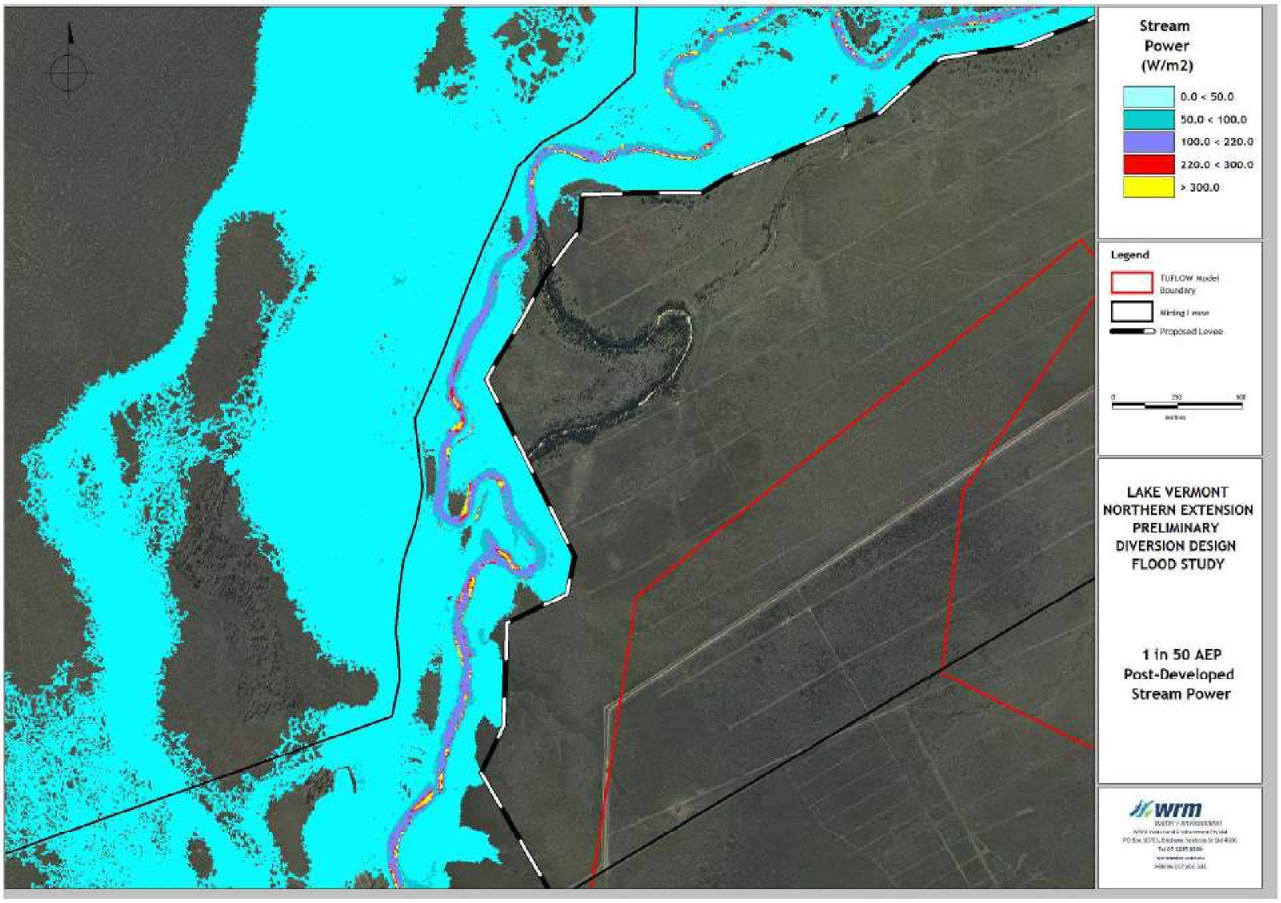

Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levees
LAKE VERMONT
NORTHERN EXTENSION
PRELIMINARY
DIVERSION DESIGN
FLOOD STUDY
1 in 2 AEP
Post-Developed
Water Level Afflux
wrm

Appendix D - Bed Shear Stress and Stream Power Near Diversion


Bed
Shear Stress
(N/m2)
0.0 < 60.0
60.0 < 80.0
80.0 < 100.0
> 100.0
Legend
TUFLOW Model Boundary
Mining Lease
LAKE VERMONT
NORTHERN EXTENSION
PRELIMINARY
DIVERSION DESIGN
FLOOD STUDY
1 in 50 AEP
Existing Bed
Shear Stress
wrm


Stream Power (W/m2)
0.0 < 50.0
50.0 < 100.0
100.0 < 220.0
220.0 < 300.0
> 300.0
Legend
TUFLOW Model Boundary
LAKE VERMONT NORTHERN EXTENSION PRELIMINARY DIVERSION DESIGN FLOOD STUDY
1 in 50 AEP Existing Stream Power
wrm

Bed
Shear Stress
(N/m2)
0.0 < 60.0
60.0 < 80.0
80.0 < 100.0
> 100.0
Legend
TUFLOW Model Boundary
Mining Lease
Proposed Levee
LAKE VERMONT
NORTHERN EXTENSION
PRELIMINARY
DIVERSION DESIGN
FLOOD STUDY
1 in 50 AEP
Post-Developed
Bed Shear Stress
wrm


Stream
Power
(W/m2)
0.0 < 50.0
50.0 < 100.0
100.0 < 220.0
220.0 < 300.0
> 300.0
Legend
TUFLOW Model
Boundary
Proposed Levee
0
250
LAKE VERMONT
NORTHERN EXTENSION
PRELIMINARY
DIVERSION DESIGN
FLOOD STUDY
1 in 50 AEP
Post-Developed
Stream Power
wrm

Appendix 2 – Phillips Creek Geomorphology Field Assessment (AARC, 2016)




Lake Vermont Northern Extension

Aquatic Ecology and Stream Morphology Assessment

Prepared for:
Lake Vermont Resources Pty Ltd

AustralAsian Resource Consultants

April 2016

Document History and Status

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Author: Hollie Dick
Project Manager: Gareth Bramston
Name of Client : Lake Vermont Resources Pty Ltd
Name of Project: Lake Vermont Northern Extension
Title of Document: Aquatic Ecology Assessment
Document Version: Final

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LIST OF ABBREVIATIONS

%	-	percent
ºC	-	degrees Celsius
AARC	-	AustralAsian Resource Consultants Pty Ltd
ACA	-	Aquatic Conservation Assessments
ANZECC	-	Australia and New Zealand Environment and Conservation Council
AquaBAMM	-	Aquatic Biodiversity Assessment Mapping Method
AUSRIVAS	-	Australian River Assessment System
cm	-	centimetre
DAFF	-	Queensland Department of Agriculture, Fisheries and Forestry
DO	-	Dissolved oxygen
EA	-	Environmental Authority
EC	-	Electrical conductivity
EHP	-	Queensland Department of Environment and Heritage Protection
EPBC Act	-	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPP (Water)	-	*Environmental Protection (Water) Policy 2009* (Queensland)
EPT	-	Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies)
GES	-	General Ecological Significance
ha	-	hectare
HES	-	High Ecological Significance
ISQG	-	Interim Sediment Quality Guidelines
km	-	kilometre(s)
LOR	-	Limit of Reporting
LP Act	-	*Land Protection (Pest and Stock Route Management) Act 2002* (Queensland)
m	-	metre(s)

mg/kg	-	milligrams per kilogram
mg/L	-	milligrams per Litre
mm	-	millimetre
ML	-	Mining Lease
μS	-	microSiemens
n/a	-	not applicable
NATA	-	National Association of Testing Authorities
NC Act	-	*Nature Conservation Act 1992* (Queensland)
NCWR	-	*Nature Conservation (Wildlife) Regulation 2006*
RE	-	Regional Ecosystem
REMP	-	Receiving Environment Monitoring Program
SIGNAL	-	Stream Invertebrate Grade Number – Average Level
VM Act	-	*Vegetation Management Act 1999* (Queensland)
WONS	-	Weeds of National Significance
WPA	-	Wetland Protection Area

EXECUTIVE SUMMARY

AustralAsian Resource Consultants Pty Ltd was commissioned by Lake Vermont Resources Pty Ltd to complete an aquatic ecology and stream morphology assessment over the site of the Lake Vermont Northern Extension Project.

The Project is located immediately north of the existing Lake Vermont Coal Project, approximately 170 km south-west of Mackay in Central Queensland. The Project is an extension to the existing Lake Vermont Coal Project, which would involve open-cut mining of coal resources identified in parts of the Project site.

This report has been re-issued for submission with the *Environment Protection and Biodiversity Conservation Act 1999* Referral for the Northern Extension Project. Updates to the original document include figures, references to project staging, and references to MLs to reflect the approval of the Northern Extension ML.

An aquatic ecology and stream morphology survey was conducted on the Project site from the 13th to 16th May 2013. The survey included an assessment of stream habitat, ecology, macro-invertebrates (as biological indicators), stream sediment quality, surface water quality and stream morphology in Phillips Creek, the Isaac River and wetland areas on the site. The assessment aimed to describe the baseline aquatic ecology values of the site, identify potential impacts resulting from the proposed development and provide recommendations for environmental management.

To determine the overall condition of the aquatic ecosystems occurring within the Project site, a total of eight aquatic sites were assessed during the survey period. Aquatic sites were assessed using the following methods, where possible:

- Secondary vegetation transects were surveyed to identify the suite of aquatic and riparian flora present;
- Aquatic habitat value was assessed using the Australian River Assessment System;
- Macro-invertebrate sampling was undertaken and Stream Invertebrate Grade Number – Average Level bi-plots were constructed (based on the identification results), giving a broad scale measure of stream health based on the 'waterbug' pollution sensitivities;
- Aquatic vertebrates were assessed, with trapping and spotlighting, as well as incidental fauna observations;
- Surface water samples were collected where surface water was present; and
- Stream sediment samples were collected and analysed for total metals and particle size distribution.

Within the Project site, aquatic sampling sites were located in one lacustrine wetland (i.e. pastoral dam), two palustrine wetlands, and the ephemeral watercourse known as Phillips Creek. Aquatic sites were also sampled upstream (on Phillips Creek) and downstream (on the Isaac River) of the Project site.

Stream morphology assessments were completed at eighteen sites on Phillips Creek to provide a description of the morphological features of the waterway.

The aquatic ecology assessment described the whole Project area as containing aquatic ecosystem values typical of a slightly to moderately disturbed ecosystem. Physico-chemical and biological properties of aquatic ecosystems on the Project were generally found to be consistent with the Water Quality Objectives for moderately disturbed aquatic ecosystems in the Isaac River Sub-basin, as defined in the *Environmental Protection (Water) Policy 2009*. Phillips creek was found to be moderately disturbed as a result of upstream mining activities, surrounding agricultural land use (i.e. cattle grazing) and associated creek crossings. While the wetland environments are currently utilised by stock as watering points, the grazing impact is less severe than that observed on Phillips Creek.

A narrow strip of remnant vegetation, described as River Red Gum riparian woodland, occurs in association with Phillips Creek. The palustrine wetlands (i.e. Lake Vermont wetland and the wetland on Phillips Creek) typically support a sparse canopy of remnant vegetation (Regional Ecosystem 11.3.27) with an abundance of macrophytes in the ground layer. Lake Vermont wetland supports a diversity and abundance of aquatic bird species. The lacustrine wetland (i.e. pastoral dam) occurs in a cleared paddock and lacks riparian vegetation. While the suite of aquatic flora species present was limited to aquatic emergents, the dam was found to support a diversity of aquatic birds.

The Project site was found to support a total of sixty-one aquatic fauna species, including five fish species, one crustacean, one mammal, two reptiles, five amphibians and forty-seven bird species. Three of the aquatic bird species recorded on the Project site were listed as Near Threatened under the *Nature Conservation Act 1992*. These species include the Black-necked Stork (*Ephippiorhynchus asiaticus*), Cotton Pygmy-goose (*Nettapus coromandelianus*) and Freckled Duck (*Strictonetta naevosa*).

The Australian River Assessment surveys revealed moderate habitat variety throughout the Phillips Creek. The assessment returned classifications of moderate bank stability for most sites along the watercourse. Erosion and bank slumping was recorded frequently and while most areas of impact were small, some areas were extensive. Impacts of stock access in riverine and wetland areas were observed on stream beds and banks at most aquatic sites.

Macro-invertebrate sampling in the Isaac River (downstream of the Project site) recorded macro-invertebrate diversity and abundance consistent with the Water Quality Objectives for the catchment. Surface water was only available at the Isaac River aquatic site at the time of macro-invertebrate sampling.

The results of the stream sediment sample analysis showed that particle size consisted predominantly of sand (95% or greater) at most sites. Metal levels in sediment were below the Australian and New Zealand Environment and Conservation Council Sediment Quality Guidelines, with the exception of nickel. Nickel levels were above the low Sediment Quality Guideline at one site. This may be due to the local geology or adjacent land uses.

The analysis of surface water collected from the palustrine wetlands revealed the suite of parameters typically fell within the Water Quality Objectives for the region. Phillips Creek exhibited trends in elevated levels of electrical conductivity and sulphate (above water quality objectives). These exceedances may be due to the fact that the Project area received heavy rainfall during the survey period, which resulted in surface flows within the previously dry creek. Concentrations of suspended solids and turbidity also exceeded Water Quality Objectives at one sampling site on Phillips Creek (AQ3). It is likely that these exceedances were the result of high surface flows at the time of sampling, which resulted in the transportation of introduced substrate materials from the creek crossing located within 10 meters upstream. Total and dissolved metal levels in surface waters were generally low and below guideline values. Upstream mining activities and runoff from agricultural land are thought to be contributing to water quality in Phillips creek.

Potential impacts of the proposed Project on aquatic ecosystems include vegetation removal, changes to landform and hydrology, increased sedimentation, releases of contaminants to waterways, changes to flood frequency and extent, increased weed and pest species and the diversion of Phillips Creek.

Mitigation measures recommended for the Project include:

- Clearing of the mine site should be limited to the approved footprint to minimise impacts and where possible, should be conducted using a staged approach to minimise the area of active land disturbance at any one time;

- Impacts on aquatic values which comprise matters of state environmental significance should be considered for offset in accordance with the relevant state policy;

- To minimise erosion and create a safe and stable landform, rehabilitation should be completed progressively as suitable land becomes available;

- Rehabilitation works should aim to reinstate riparian vegetation on the Phillips Creek diversion. Rehabilitation should aim to prevent erosion of the channel and restore vegetation and habitat values of the waterway. Details of the proposed diversion rehabilitation strategy are provided in the Function Design Report (WRM 2014);

- The creek diversion should be designed in accordance with the Department of Natural Resources and Mines current guidelines and should aim to replicate existing conditions, including stream length, flow rates and habitat values;

- To protect aquatic values of the Project site, pest species should be monitored and actively controlled;

- Weed species should be monitored for local abundance and the presence of new species occurring on the Project site. Weed controls should be implemented as required to protect aquatic values;

- Appropriate erosion and sediment controls should be implemented during construction and operational stages to protect the receiving waterways;

- The current EA conditions for managing releases from the mine should continue to be implemented for the extended Project; and

- The receiving environment monitoring program in place at the existing Lake Vermont Mine should be extended to accommodate the receiving environment of the Lake Vermont Northern Extension Project and updated to include monitoring of the Lake Vermont Wetland. Where feasible, design of the program should incorporate monitoring locations used in this report to enable direct comparison during and post mining.

1.0 INTRODUCTION

AustralAsian Resource Consultants Pty Ltd (AARC) was commissioned by Lake Vermont Resources Pty Ltd to conduct an Aquatic Ecology and Stream Morphology Assessment of the proposed Lake Vermont Northern Extension Project (the Project).

The Lake Vermont Northern Extension Project proposes an extension to the existing Lake Vermont Coal Project, and is located on Mining Lease (ML) 70528, immediately north of the existing Lake Vermont Mine. The existing Mine encompasses ML 70331 and ML 70477 (Western Extension). The Lake Vermont Mine, including the Northern Extension area, is authorised by Environmental Authority (EA) EPML00659513, issued on the 28th September 2015.

To provide a comprehensive description of the aquatic values, a field survey was conducted between the 13th and 16th May 2013.

This report has been re-issued for submission with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Referral for the Northern Extension Project. Updates to the original document include figures, references to project staging, and references to MLs to reflect the approval of the Northern Extension ML.

1.1 OBJECTIVES

The main objectives of the Aquatic Ecology and Stream Morphology Assessment were as follows:

- Assess the aquatic ecology values currently present on site;
- Conduct a comprehensive assessment of the morphology of watercourses on the Project site;
- Identify potential Project impacts upon the aquatic environment; and
- Develop suitable impact mitigation strategies in order to protect the aquatic environment.

2.0 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

The Project site is located in the Bowen Basin in Central Queensland, approximately 170 km south-west of Mackay. The closest residential area to the Project is the township of Dysart, located approximately 15 km south-west of the Project site. The regional location of the Project site is shown in Figure 1.

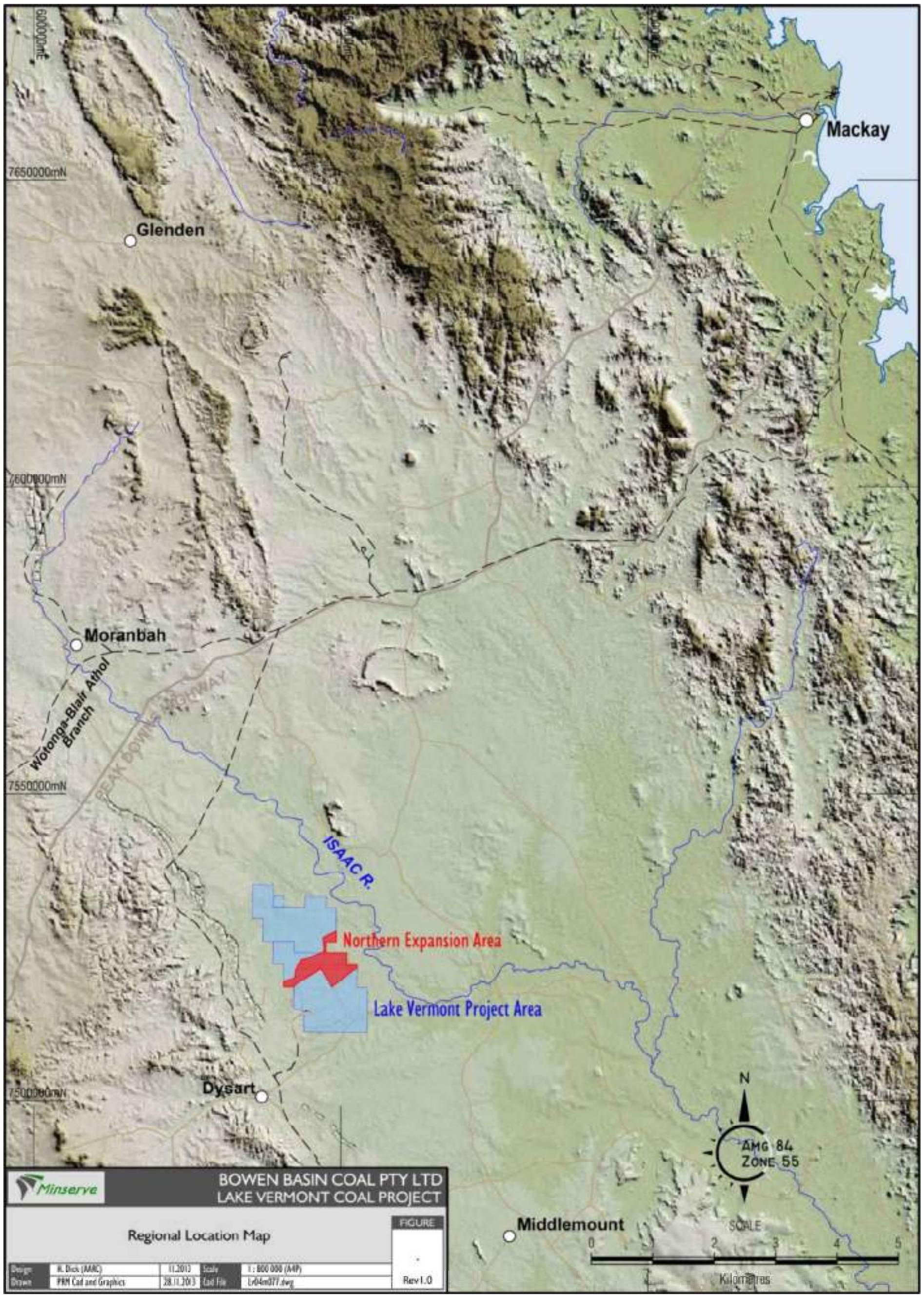

Figure 1 Regional Location of the Project Site

The Project site encompasses an area immediately to the north of the existing Lake Vermont Coal Project which is situated on ML 70331. The Project is essentially designed as an extension to the operational Lake Vermont mine site. The proposed extension will involve open-cut mining of coal resources identified in parts of the Project site. To gain access to some of the target resource, part of Phillips Creek will need to be diverted. The Project site encompasses ML 70528 shown in Figure 2.

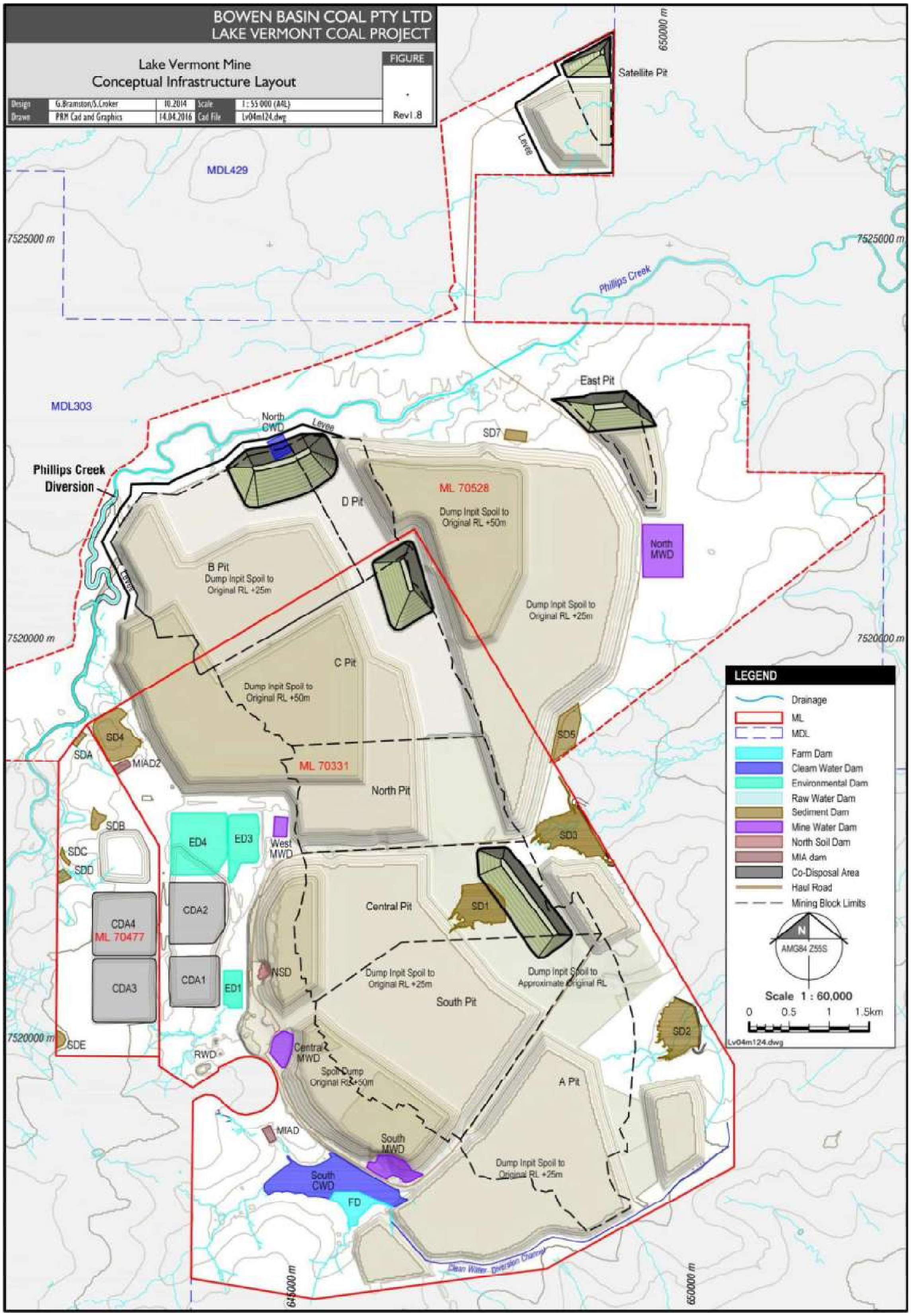

Figure 2 Lake Vermont North Conceptual Infrastructure Layout

2.2 LOCAL TOPOGRAPHY AND WATERWAYS

The Project site lies within the Fitzroy Basin catchment. The Project area contains two wetlands, two pastoral dams, and an ephemeral watercourse known as Phillips Creek (Figure 3). Phillips Creek forms the main drainage channel on the Project site. This highly ephemeral stream flows only following heavy rainfall events and drains in a north-easterly direction into the Isaac River. The topography of the area can be described as gently undulating downs country with low ridge lines generally trending southwest to northeast. The nearby Isaac River is the major northern tributary of the Fitzroy River.

Watercourses occurring on the Project site are shown in Figure 3.

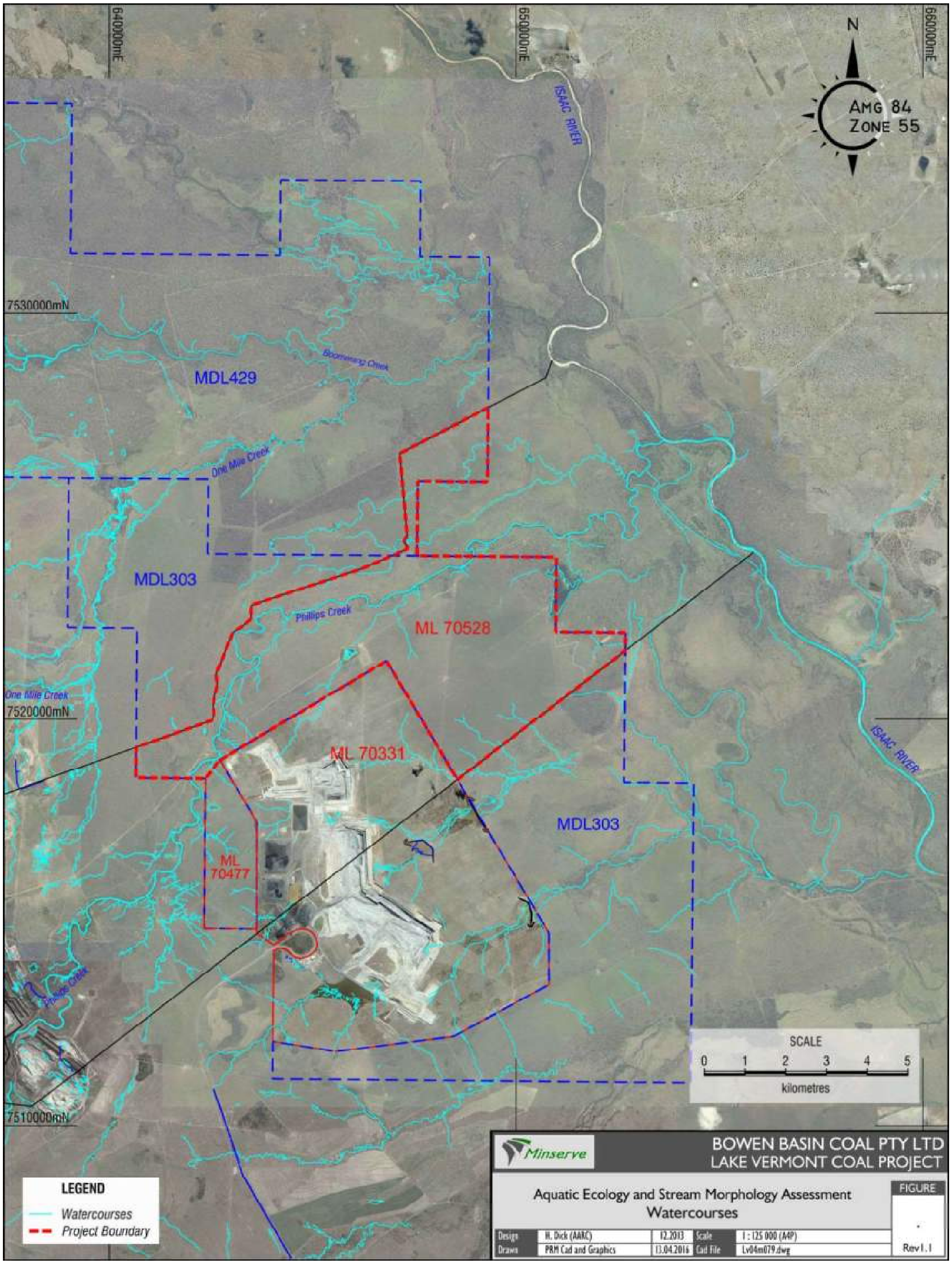

Figure 3 Watercourses on the Project Site

2.3 REGIONAL CLIMATE

The climatic description for the region in which the Project site is located has been compiled using the regional data collected by the Australian Bureau of Meteorology. Temperature and Rainfall data was sourced from the Clermont Post Office station (Station 035019), located approximately 95 km south-west of the Project site. The rainfall and temperature data for the region is presented in Figure 4.

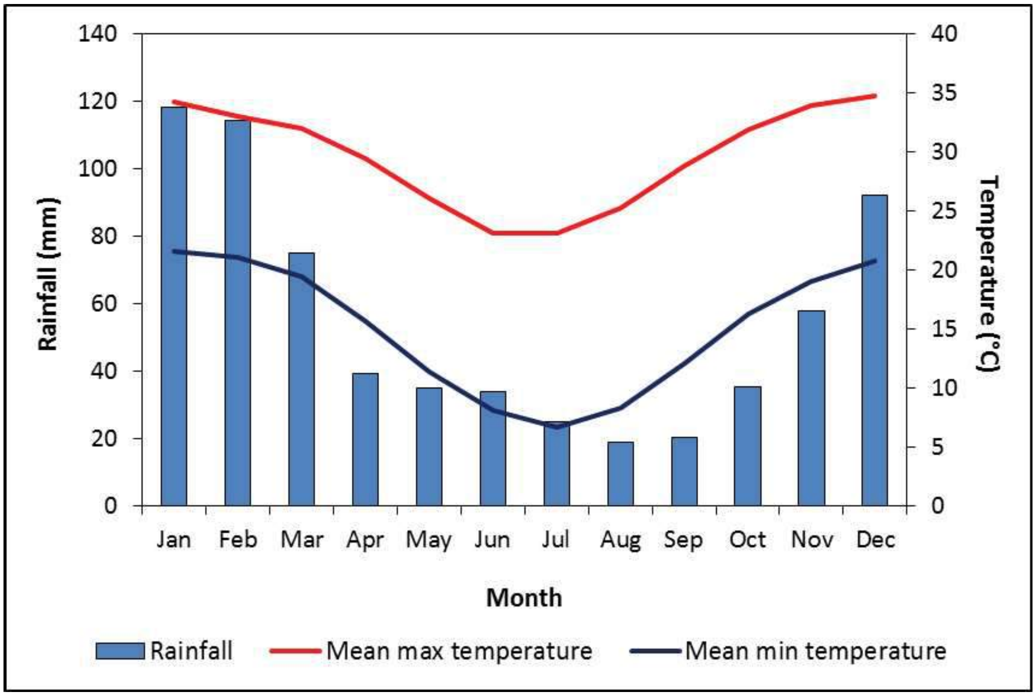

Figure 4 Regional Rainfall and Mean Maximum and Minimum Daily Temperatures

Data trends indicate that rainfall for the region is seasonal with the wet season peaking between December and February and the dry season peaking from July to September.

July is the coolest month with the mean minimum temperature of 6.7°C and a mean maximum temperature of 23.1°C. The months of December through to February are typically the warmest months with mean maximum temperature reaching 34.8°C in December and a mean minimum temperature of 21.6°C in January.

2.4 CONDITIONS PRIOR TO AND DURING THE SURVEY

Weather conditions leading up to the survey were typical of the autumn months, being warm and wet. Prior to the survey, a total of 12.4 mm rainfall was recorded in May, whilst 133.4 mm rainfall was recorded in April 2013.

During the survey, conditions were generally overcast with a total of 7.4 mm of rainfall and temperatures in the range of 5.2°C to 24.2°C. On the 15th May 2013, the Isaac River contained shallow (to 30 cm deep), slow flowing water. At this time, Phillips Creek was completely dry with the exception of a very small, stagnant pool of water actively utilised by stock. Surface water flows within Phillips Creek commenced on the morning of May 16th following heavy rainfall. The wetlands and pastoral dams all contained standing water throughout the survey period.

2.5 CURRENT LAND USE

Low intensity cattle grazing is the predominant land use activity on the Project site. Surrounding land uses included low intensity cattle grazing and open cut mining.

An open cut coal mine known as Saraji Mine is situated approximately 6.5 km upstream of the Project site. Impacts from Saraji Mine include discharges to Phillips Creek and a diversion of the creek. The existing Lake Vermont mine also has approval to discharge to Phillips Creek.

The catchment to the Isaac River is harvested for a range of uses, including irrigation, urban, industrial and domestic water supplies. Drinking water supplies for nearby towns are obtained from Burton Gorge Dam, located upstream of the Project, on the Isaac River.

3.0 RELEVANT LEGISLATION, POLICY & GUIDELINES

Legislation relevant to the assessment of aquatic values of the site is discussed below.

3.1 QUEENSLAND NATURE CONSERVATION ACT 1992

The most relevant portions of the *Nature Conservation Act 1992* (NC Act) to the Project are the sections which pertain to Wildlife and Habitat Conservation. The classes of wildlife[1] to which the NC Act apply include protected wildlife, which is defined as:

- Extinct wildlife;
- Endangered wildlife;
- Vulnerable wildlife;
- Near Threatened; and
- Least Concern wildlife.

Species listed under the above classes are published in the associated *Nature Conservation (Wildlife) Regulation 2006* (NCWR).

The NC Act defines 'threatening processes' as:

a) Threatening the survival of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat; or

b) Affecting the capacity of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat to sustain natural processes.

The NC Act is relevant to the Project should any flora or fauna species of conservation significance (as detailed in the NCWR) be found on the Project site.

3.2 COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Under the EPBC Act, an action will require approval from the Federal Environment Minister if the action has, will have, or is likely to have a significant impact on a matter of National Environmental Significance. Matters of National Environmental Significance include:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Nationally threatened species and ecological communities;

[1] Under the *Nature Conservation Act 1992*, Wildlife is defined to be any taxon of an animal, plant, protista, procaryote or virus.

- Migratory species;
- Commonwealth marine areas;
- Great Barrier Reef Marine Park;
- The environment where nuclear actions are involved (including uranium mines); and
- A water resource, in relation to coal seam gas development and large coal mining development.

Of the above matters of National Environmental Significance, three are applicable to the Project site:

- Listed Threatened species and communities;
- Migratory species protected under international agreements; and
- Water resources, including wetlands and waterways.

The EPBC Act is relevant where an action has the potential to impact on Matters of National Environmental Significance. In which case, a referral will be made to the Commonwealth.

In addition, the EPBC Act provides for the identification and listing of key threatening processes.

3.3 QUEENSLAND LAND PROTECTION (PEST AND STOCK ROUTE MANAGEMENT) ACT 2002

The objectives of *the Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) are to consolidate, amend and provide laws for the management, control, prohibition, and regulation of the introduction, spread and keeping of certain plants and animals declared under the Act. The LP Act is relevant to the Project with regard to the control and management of declared pest plant (weed) and animal species.

3.4 QUEENSLAND ENVIRONMENTAL PROTECTION (WATER) POLICY 2009

The *Environmental Protection (Water) Policy 2009* (EPP (Water)) is subordinate legislation under the *Environmental Protection Act 1994*. The EPP (Water) provides a framework for:

1. Identifying environmental values (EVs) for Queensland waters, and deciding water quality objectives (WQOs) to protect or enhance those EVs
2. Including the identified EVs and WQOs under schedule 1 of the EPP (Water).

The EPP (Water) is relevant to the Project with regard to the protection of EVs occurring on Phillips Creek and downstream of the Project site.

The EVs and WQOs for waters occurring on or surrounding the Project site are provided in the document titled *Environmental Protection (Water) Policy 2009; Isaac River Sub-basin Environmental Values and Water Quality Objectives*.

3.5 AQUATIC CONSERVATION ASSESSMENTS (ACA)

Aquatic Conservation Assessments (ACAs) are non-social and non-economic and designed with the sole intent of identifying conservation values of wetlands at a user-defined scale. ACAs are developed using the Aquatic Biodiversity Assessment Mapping Method (AquaBAMM). AquaBAMM identifies relative wetland conservation values within a specified area (usually a catchment) using criteria, indicators and measures (CIM) that are based on a large body of national and international literature. ACAs have now been undertaken for a number of areas within Queensland. The Project occurs within the Fitzroy Catchment of the Great Barrier Reef study area. The following ACAs apply to the Project area:

- Aquatic Conservation Assessments (ACA), using AquaBAMM, for the riverine wetlands of the Great Barrier Reef catchment; and

- Aquatic Conservation Assessments (ACA), using AquaBAMM, for the non-riverine wetlands of the Great Barrier Reef catchment.

3.6 REFERABLE WETLANDS

The Queensland Government is committed to the statutory protection of wetlands in catchments and adjoining Great Barrier Reef lagoon. The State Development Assessment Provisions seeks to ensure that development is planned, designed, constructed and operated so as to not cause harm to the hydrology of wetlands in wetland protection areas (WPA) that protect matters of national and state environmental significance including the outstanding universal values of the Great Barrier Reef. Protection of WPA wetlands is designed to maintain the ecological processes of these wetlands which reduce nutrient, pesticide and sediment loads in the reef catchments and importantly protect them from the impacts of high impact earthworks. Wetland Protection Areas are shown on the map of referable wetlands and are represented by a wetland surrounded by a 100 m trigger area within urban areas or a 500 m trigger area within rural areas. WPAs are protected under the *State Planning Policy 4/11: Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments*.

4.0 DATABASE SEARCH AND LITERATURE REVIEW

Database searches collate information on known environmental values of the region from previous surveys, community records and other sources. A review of such databases identifies known aquatic values of the Project site and facilitates the formulation of specific field survey techniques to target certain flora and fauna species, vegetation communities and habitat types known from the region.

The following databases were searched for historical records of flora and fauna within the vicinity of the Project site that have habitat requirements intrinsically linked to aquatic habitats:

- EPBC Act Online Database: This database provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act for a nominated area. The search contained a 100 km buffer surrounding the Project site boundary; and

- Wildlife Online Database (Department of Environment and Heritage Protection (EHP)): This database uses records collected from previous surveys, including the Queensland Museum surveys as well as records from the public. This search contained a 100 km buffer surrounding a central coordinate within the Project site.

- EHP Regional Ecosystem mapping and Regional Ecosystem Description Database (REDD): Regional ecosystems (REs) are vegetation communities in a bioregion that are consistently associated with a particular combination of soil, geology and landform. The REDD provides detailed descriptions for each RE.

The results of these database searches revealed that several flora and fauna species of conservation significance that have habitat requirements intrinsically linked to aquatic systems, are known from the region, as discussed in sub-sections below. Database search results are included in Appendix A.

The following waterway and wetland protection policies have been reviewed in order to identify any wetlands of ecological significance on the Project site and relevant water quality objectives:

- the EPP (Water) and Isaac River Sub-basin Environmental Values and Water Quality Objectives;

- the EHP interactive WetlandMaps database and referable wetlands mapping; and

- the ACAs for the riverine and non-riverine wetlands of the Great Barrier Reef catchment.

Additional aquatic ecosystem studies which have been conducted in the vicinity of the Project site include:

- Lake Vermont Western Extension Aquatic Ecology Report (AARC 2012); and

- Lake Vermont Receiving Environment Monitoring Program, conducted annually for the existing Lake Vermont mine.

The Western Extension Aquatic Ecology report (AARC 2012) presents the findings of an aquatic ecology survey that was conducted in January 2012. This survey involved aquatic ecology and stream morphology assessments along a small section of Phillips Creek and a pastoral dam located immediately to the west of the Project site. A review of this report was conducted prior to field surveys in order to identify any flora or fauna species of concern previously recorded in the vicinity of the Project site.

The Receiving Environment Monitoring Program for the Lake Vermont Coal Project provides regular monitoring data with regard to riparian vegetation, surface water and stream sediment quality along Phillips Creek. This data has been reviewed and where possible has been used in comparative evaluations of the aquatic values assessed in this report.

4.1 FLORA

A review of the RE mapping indicates that aquatic environments within the Project area comprise three vegetation communities including:

- *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines (RE 11.3.25);
- *Eucalyptus populnea* woodland on alluvial plains (RE 11.3.2); and
- Freshwater wetlands (RE 11.3.27).

The *Eucalyptus tereticornis* or *E. camaldulensis* woodland community (RE 11.3.25) is mapped as occurring in association with Phillips Creek, while the freshwater wetland area (RE 11.3.27) occupies a small area of land adjacent to Phillips Creek. The *Eucalyptus populnea* woodland community (RE 11.3.2) occurs in association with the Lake Vermont wetland.

Seven flora species of conservation significance with habitat requirements linked to aquatic or riparian areas were identified by the desktop searches. These species are presented in Table 1.

Table 1 Threatened Riparian Flora Species Identified in Database Searches

Scientific Name	Common Name	EPBC Act Status	NC Act Status
Daviesia discolor	-	V	V
Eleocharis blakeana	-	NL	NT
Eucalyptus raveretiana	Black Ironbox	V	V
Omphalea celata	-	V	V
Phaius australis	Lesser Swamp-orchid	E	E
Samadera bidwillii	-	V	V
Taeniophyllum muelleri	Minute Orchid	V	LC

Key: E = Endangered; V = Vulnerable ; NT = Near Threatened; NL = Not Listed; Ma = Marine species; Mi = Migratory species

4.2 FAUNA

The database searches indicated that seven fauna species of conservation significance that are dependent on aquatic habitats have been identified in the greater region. Aquatic fauna species with potential to inhabit or utilise the Project site are listed in Table 2.

To ensure the survey team were familiar with these species of conservation significance, research into their habitat preferences and appearance was undertaken prior to field surveys. While many terrestrial fauna species are known to utilise riparian and wetlands habitats, most are not strictly dependant on these habitats. Any species falling into this category have been covered by the Lake Vermont Northern Extension Project; Flora and Fauna Report (AARC 2013) and such results have not been duplicated in this report.

Table 2 Threatened Aquatic Fauna Species Identified in Database Searches

Scientific Name	Common Name	EPBC Act Status	NCWR* Status
Birds			
Ephippiorhynchus asiaticus	Black-necked Stork	NL	NT
Nettapus coromandelianus	Cotton Pygmy-goose	NL	NT
Rostratula australis	Australian Painted Snipe	E, Mi, Ma	V
Tadorna radjah	Radjah Shelduck	Ma	NT
Reptiles			
Rheodytes leukops	Fitzroy River Turtle	V	V
Crocodylus porosus	Estuarine Crocodile	Mi, Ma	V
Amphibians			
Cyclorana verrucosa	Rough Collared Frog	NL	NT

Key: E = Endangered; V = Vulnerable ; NT = Near Threatened; NL = Not Listed; Ma = Marine species; Mi = Migratory species

The EPBC Act Protected Matters search tool identifies all migratory wetland species considered likely to occur or likely to have habitat, within the broader region. This search detected the likely presence of the following four migratory wetland species:

- Great Egret (*Ardea alba*);
- Cattle Egret (*Ardea ibis*);
- Latham's Snipe (*Gallinago hardwickii);* and
- Painted Snipe (*Rostratula benghalensis).*

4.3 ENVIRONMENTAL VALUES & WATER QUALITY OBJECTIVES

Environmental values are defined as the qualities of water that make it suitable for supporting aquatic ecosystems and human water uses (EHP 2009). The following documents were consulted to assist in identification of the environmental values of the waterways and wetlands potentially affected by the Project:

- The EPP (Water);
- The Isaac River Sub-basin Environmental Values and Water Quality Objectives 2011; and
- The Water Resource (Fitzroy Basin) Plan 2011.

The waterways of the Project area fall with the Isaac Western Upland Tributaries of the Dysart area in the Isaac River Sub-basin of the Fitzroy Basin. The EPP (Water) specifies that the environmental values for this catchment are those set out in the Isaac River Sub-basin Environmental Values and Water Quality Objectives document. The environmental values identified in the Isaac River Sub-basin Environmental Values and Water Quality Objectives are:

- Protection of aquatic ecosystem values;

- Suitability for crop irrigation;
- Suitability for drinking water supplies;
- Suitability for aquaculture (e.g. red claw, barramundi)
- Suitability for primary contact recreation;
- Suitability for secondary contact recreation;
- Suitability for visual recreation;
- Suitability for human consumers of wild or stocked fish, shellfish or crustaceans;
- Protection of cultural and spiritual values;
- Suitability for industrial use;
- Suitability for stock watering; and
- Suitability for farm supply use.

The EVs and WQOs for the protection of aquatic ecosystem values, suitability for stock watering and crop irrigation are of the greatest importance with regard to the land uses surrounding the Project and the potential impacts of the Project. In assessing the aquatic values of watercourses and waterbodies on the Project site, dissolved solids and metal levels have been compared to the WQOs for the protection of aquatic ecosystem values (moderately disturbed) (refer to Table 2 of the *Isaac River Sub-basin Environmental Values and Water Quality Objectives 2011*), while total solids and metal levels have been compared to the WQOs for stock watering.

The EPP (Water) Central Queensland Mapping (WQ1301 – Isaac River Sub-basin) identifies one watercourse (rivers / creeks), three wetlands (palustrine) and one lake / reservoir on the Project site.

The Water Resource (Fitzroy Basin) Plan 2011 sets out the allocation and sustainable management of water resources in the Fitzroy Basin. The Water Resource (Fitzroy Basin) Plan 2011 identifies surface water outcomes for the Isaac Connors sub-catchment as:

- To make water available to support:
    I. Water supplies for mining; and
    II. Growth in the population of towns and communities, industry and agriculture.

4.4 WETLAND HABITATS

A review of the EHP interactive WetlandMaps database showed that the Project site contains three areas of mapped palustrine wetlands (i.e. Lake Vermont wetland located on the eastern Project boundary, the wetland located adjacent to Phillips Creek and a small portion of a wetland occurring on the north-western boundary) and one lacustrine wetland (i.e. the pastoral dam near the south-west boundary). Phillips Creek is mapped as a riverine system. Wetlands and watercourses on the Project site are shown in Figure 5.

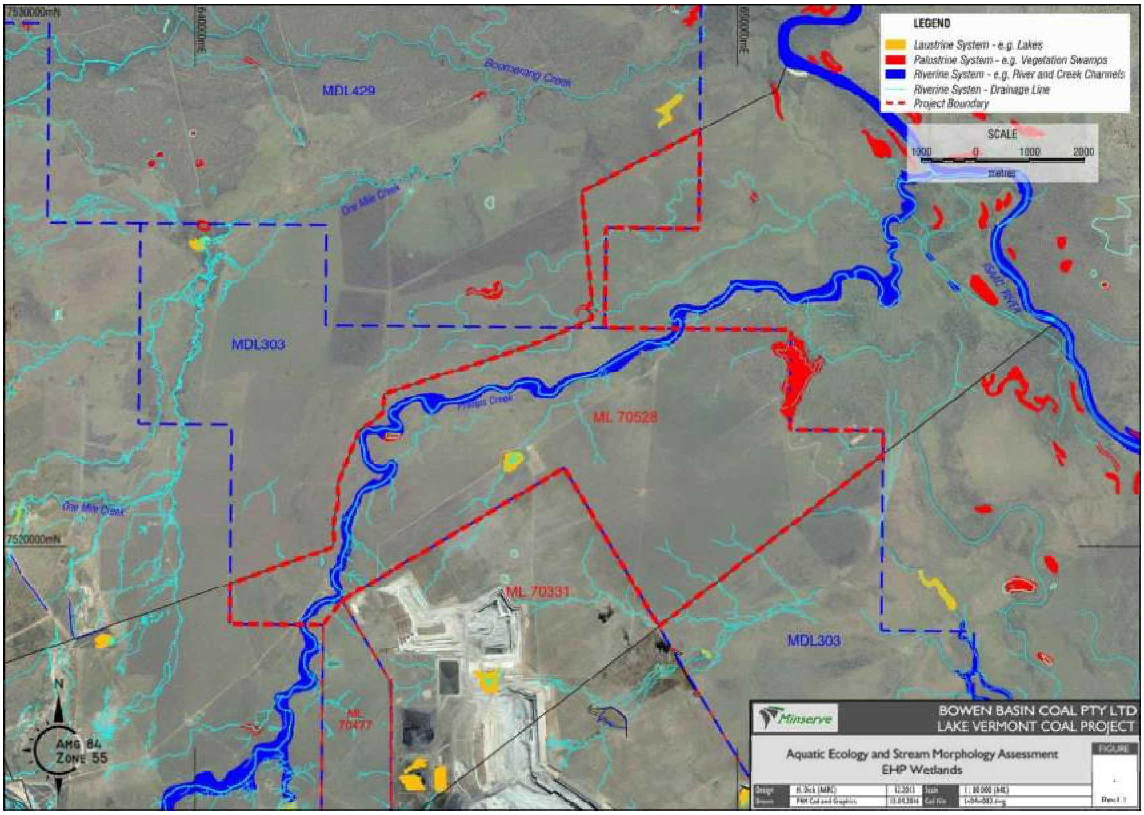

Figure 5 EHP Wetlands Mapping

The EHP mapping of palustrine and lacustrine wetlands is consistent with the EPP (Water) mapping of palustrine wetlands and the lake / reservoir respectively.

A review of the referable wetland mapping revealed that Lake Vermont wetland is mapped as a Wetland Protection Area (WPA). This WPA is classified as a Great Barrier Reef Catchment wetland of High Ecological Significance (HES).

Phillips Creek and its riparian vegetation are mapped as a wetland of General Ecological Significance (GES).

A review of the Aquatic Conservation Assessments (ACA) revealed the presence of both riverine and non-riverine wetlands on the project site. Phillips Creek is mapped as a riverine wetland, while the palustrine wetlands are mapped as non-riverine wetland areas. The ACAs riverine and non-riverine wetland mapping over the Project site is also shown in Figure 6.

No wetlands of international importance as nominated under the Ramsar Convention have been recorded on or near the Project site.

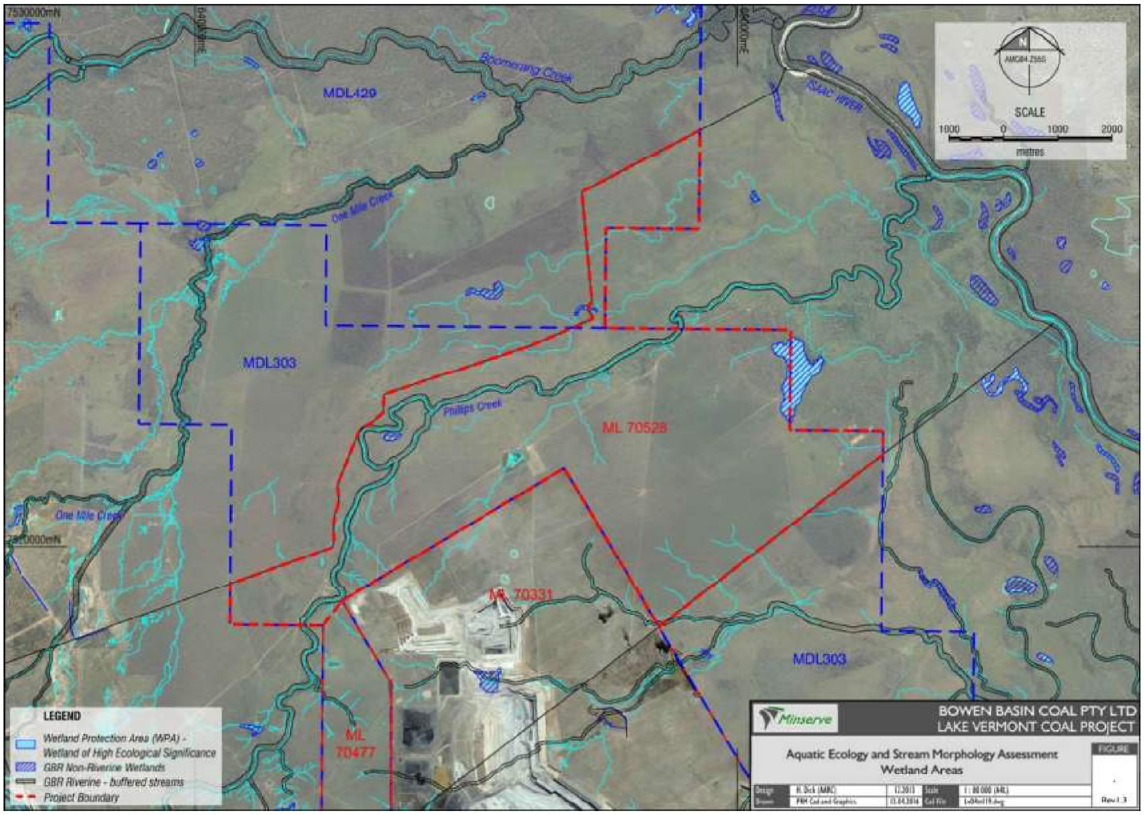

Figure 6 Wetland Areas Mapping

5.0 METHODOLOGY

An aquatic ecology and stream morphology study was undertaken using a combination of desktop and field investigations. A field survey was conducted across the Project site from the 13th and 16th of May 2013.

The field survey involved an assessment of aquatic ecology, stream morphology, stream sediment and surface water quality at various locations along Phillips Creek and the adjoining wetland, the junction of Phillips Creek and the Isaac River, Lake Vermont wetland and the pastoral dam. The methods used to assess the aquatic values of the study area are detailed below.

A total of eight sites located within, upstream and downstream of the Project site were assessed with regards to aquatic ecology values. Surface water samples were collected at five sites where water was available. Survey sites were selected to incorporate all watercourses and wetlands within the Project site and provide background data for upstream and downstream of the proposed mining area. The aquatic and riparian flora survey sites are shown in Figure 7.

Stream morphology assessments were completed at nineteen sites along Phillips Creek to provide a comprehensive assessment of the landform and channel characteristics (e.g. depth, width, composition, bank stability, etc.), riparian vegetation and aquatic habitat features. This assessment was restricted to the Project site. Locations of all stream morphology survey sites are shown in Figure 8.

Certain sampling methods such as macro-invertebrate sampling, aquatic trapping and surface water collection could not be completed at every site due to the limited availability of surface water prior to rainfall events and limited site access following heavy rainfall. Throughout the duration of the survey, only two sites (i.e. Lake Vermont wetland and the pastoral dam) contained sufficient water for trapping aquatic vertebrates. Following heavy rainfall on the 15th and 16th of May, it was possible to collect surface water samples from several locations in Phillips Creek. The level of assessment undertaken at each site is summarised in Table 3.

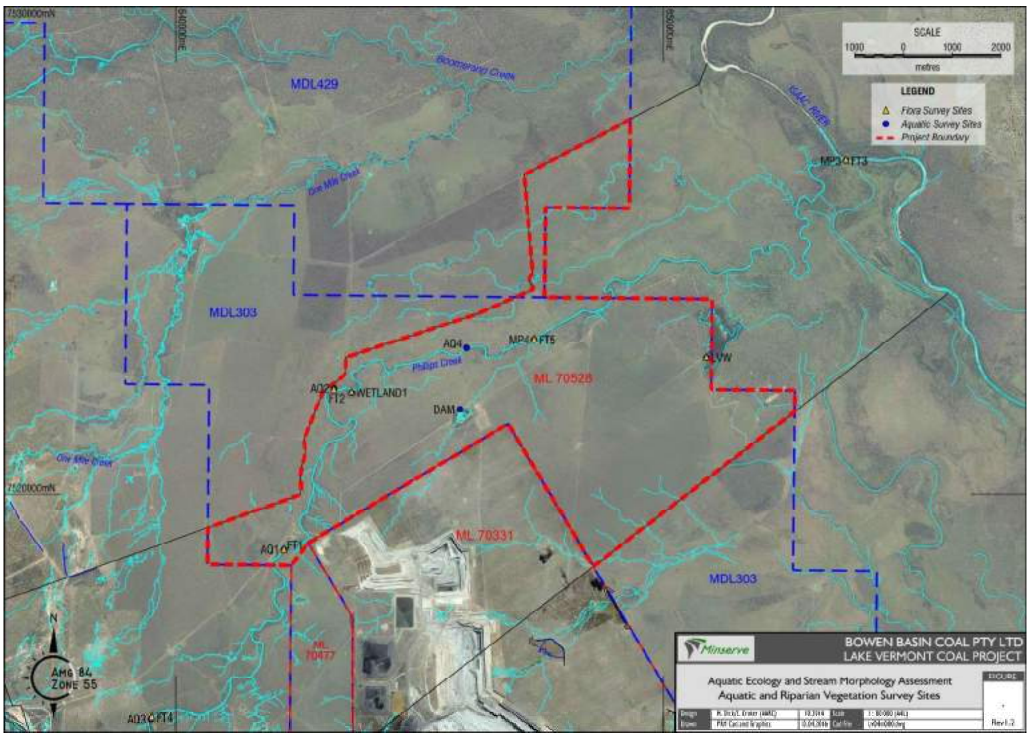

Figure 7 Aquatic and Riparian Vegetation Survey Sites

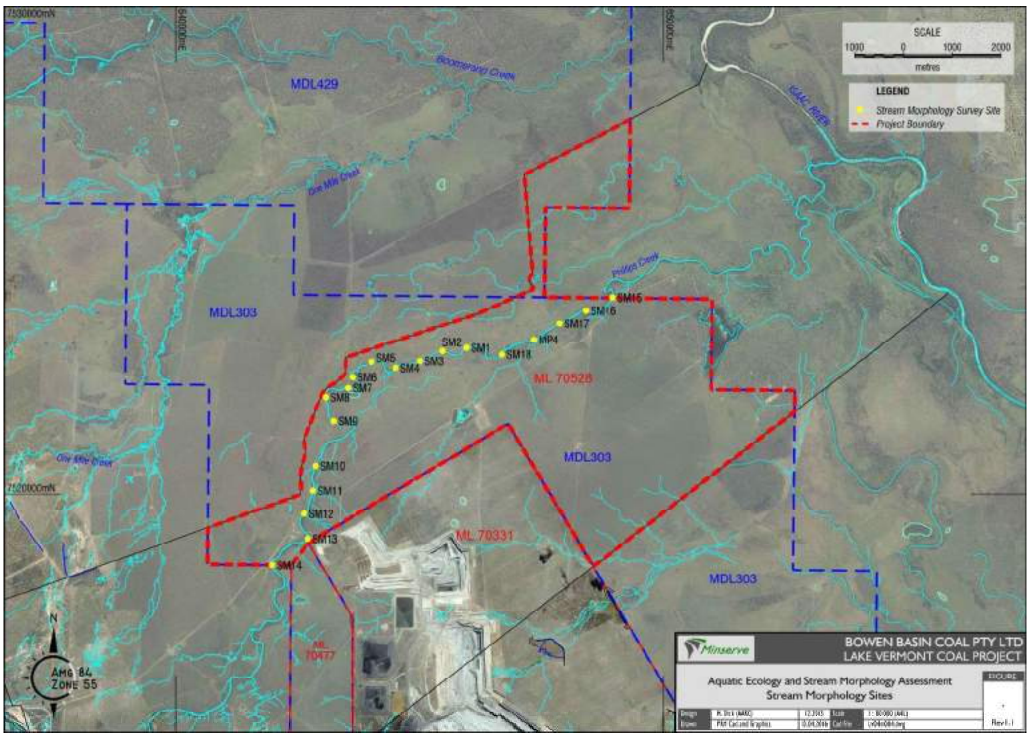

Figure 8 **Stream Morphology Survey Sites**

Table 3 Level of Assessment at each Survey Site

Survey Site	Riparian Vegetation Transect	GPS Co-ordinates	Water Quality Sampling & In-situ Water Reading	Stream Sediment Sampling	Macro-invertebrate Sampling	Aquatic Vertebrate Trapping	AUSRIVAS Habitat Assessment	Riparian Vegetation Assessment	Stream Morphology
AQ1 (MP2)	FT1	-22.42960 S 148.38271 E	×	✓	×	×	✓	✓	✓
AQ2	FT2	-22.39892 S 148.39265 E	×	✓	×	×	✓	✓	✓
AQ3	FT4	-22.46051 S 148.35674 E	✓	✓	×	×	✓	✓	✓
AQ4	n/a	-22.39121 S 148.41896 E	✓	✓	×	×	×	×	×
Wetland 1	Wetland 1	-22.39967 S 148.39613 E	✓	✓	×	×	×	✓	×
Dam	n/a	-22.40263 S 148.41772 E	×	×	×	✓	×	×	×
LVW	n/a	-22.39268 S 148.46671 E	✓	✓	×	✓	×	×	×
MP3	FT3	-22.35590 S 148.49409 E	✓	✓	✓	×	✓	✓	✓
MP4	FT5	-22.38890 S 148.43230 E	×	✓	×	×	✓	✓	✓
SM15	n/a	-22.38172 S 148.44792 E	×	✓	×	×	×	×	✓

5.1 FIELD SURVEY METHODS

Site selection was based upon database searches, location of Project resource areas, diversity in aquatic habitats and accessibility. Site selection aimed to ensure that the sites sampled were representative of all aquatic habitat types present in the Lake Vermont Northern Extension Project area. The level of assessment undertaken at each site is described in Sections 5.1.1 to 5.1.7.

5.1.1 Surface Water Quality Sampling

Surface water sampling was conducted at various survey sites to determine water quality and aid in the interpretation of biological data. At each site where surface water was available, in situ recordings of pH, temperature, Electrical Conductivity (EC), Dissolved Oxygen (DO) and Oxygen Reduction Potential (ORP) within the water body were taken. Surface water samples were collected from each site where sufficient water was available, immediately refrigerated and sent to a National Association of Testing Authorities (NATA) accredited lab for analysis of the following parameters:

- Total Suspended Solids (TSS)
- Sulphate
- Fluoride
- Aluminium
- Arsenic
- Boron
- Cadmium
- Calcium
- Chromium
- Cobalt
- Copper
- Lead
- Manganese
- Mercury
- Molybdenum
- Magnesium
- Nickel
- Potassium
- Selenium
- Sodium
- Zinc
- Uranium

Surface water sampling was conducted in accordance with the methods and standards outlined in the *Monitoring and Sampling Manual 2009* prepared by EHP. Care was taken when obtaining samples that the sediment within the water body was not disturbed.

A total of five sites contained sufficient surface water during the survey period to allow for samples to be obtained and analysed

Results of the analysis conducted on surface water samples were compared to trigger values provided in the following water quality guidelines, where relevant:

- The Isaac River Sub-basin (Upper Isaac River catchment waters) Water Quality Objectives to protect aquatic ecosystems (moderately disturbed);
- ANZECC (2000) Aquatic Ecosystems Guidelines for 95% species protection (for metals concentrations);
- ANZECC (2000) Aquatic Ecosystems Guidelines for lowland river systems in South-east Australia (for physicochemical parameters); and

- ANZECC (2000) Livestock Drinking Water Guidelines for beef cattle.

The EPP (Water) WQOs for dissolved solids and metals are based on the ANZECC Water Quality Guidelines for Aquatic Ecosystem protection. The WQOs for total solids and metals are based on the ANZECC Water Quality Guidelines for Livestock Drinking Water as reflected in Table 4. Trigger limits defined under the Lake Vermont Coal Mine's EA (EPML00659513) are also provided in Table 4.

Table 4 Surface Water Quality Guidelines

Parameter	Units	ANZECC (2000) Livestock Drinking Water	ANZECC (2000) Aquatic Ecosystems	EPP (Water) 2009 WQOs for Aquatic Ecosystems	EA Trigger Limits
pH	pH units	n/a	6.5 – 8.0	6.5 – 8.5	6.5 – 8.0
Conductivity (EC)	µs/cm	n/a	125 – 2200	<720 (baseflow) <250 (high flow)	1000
Dissolved oxygen (DO)	%	n/a	85 – 110	85 – 110	n/a
Turbidity	NTU	n/a	6 – 50	<50	n/a
Dissolved SO_4^{2-}	mg/L	1000	n/a	<25	300
Suspended solids	mg/L	n/a	n/a	<55	1500
Total dissolved solids	mg/L	4000	n/a	n/a	n/a
Ammonia	mg/L	n/a	0.02	0.02	n/a
Total nitrogen	mg/L	n/a	0.5	0.5	n/a
Total phosphorus	mg/L	n/a	0.05	0.05	n/a
Oxidised N	mg/L	n/a	0.04	0.06	n/a
Dissolved Metals					
Iron	mg/L	n/a	n/a	n/a	n/a
Aluminium	mg/L	n/a	0.055	0.055	0.055
Antimony	mg/L	n/a	n/a	n/a	n/a
Arsenic	mg/L	n/a	0.024	0.024	0.013
Beryllium	mg/L	n/a	n/a	n/a	n/a
Barium	mg/L	n/a	n/a	n/a	n/a
Cadmium	mg/L	n/a	0.0002	0.0002	0.0002
Chromium	mg/L	n/a	0.001	0.001	0.001
Cobalt	mg/L	n/a	n/a	n/a	0.09
Copper	mg/L	n/a	0.0014	0.0014	0.002
Lead	mg/L	n/a	0.0034	0.0034	0.004
Manganese	mg/L	n/a	1.9	1.9	1.9
Mercury	mg/L	n/a	0.0006	0.0006	0.0002
Molybdenum	mg/L	n/a	n/a	n/a	0.034
Nickel	mg/L	n/a	0.011	0.011	0.011
Selenium	mg/L	n/a	0.011	0.011	0.010
Silver	mg/L	n/a	0.00005	0.00005	0.001
Vanadium	mg/L	n/a	n/a	n/a	0.010
Zinc	mg/L	n/a	0.008	0.008	0.008
Total Metals					
Iron	mg/L	n/a	n/a	n/a	n/a
Aluminium	mg/L	5.0	n/a	5.0	n/a

Parameter	Units	ANZECC (2000) Livestock Drinking Water	ANZECC (2000) Aquatic Ecosystems	EPP (Water) 2009 WQOs for Aquatic Ecosystems	EA Trigger Limits
Antimony	mg/L	n/a	n/a	n/a	n/a
Arsenic	mg/L	0.5	n/a	0.5	n/a
Beryllium	mg/L	n/a	n/a	n/a	n/a
Barium	mg/L	n/a	n/a	n/a	n/a
Cadmium	mg/L	0.01	n/a	0.01	n/a
Chromium	mg/L	1.0	n/a	1.0	n/a
Cobalt	mg/L	1.0	n/a	1.0	n/a
Copper	mg/L	1.0	n/a	1.0	n/a
Lead	mg/L	0.1	n/a	0.1	n/a
Manganese	mg/L	n/a	n/a	n/a	n/a
Mercury	mg/L	0.002	n/a	0.002	n/a
Molybdenum	mg/L	0.15	n/a	0.15	n/a
Nickel	mg/L	1.0	n/a	1.0	n/a
Selenium	mg/L	0.02	n/a	0.02	n/a
Silver	mg/L	n/a	n/a	n/a	n/a
Vanadium	mg/L	n/a	n/a	n/a	n/a
Zinc	mg/L	20	n/a	20	n/a

Key: n/a - indicates there is no data available for this parameter.

5.1.2 Stream Sediment Sampling

Background stream sediment monitoring was undertaken in watercourses potentially affected by the Project. Five sub-samples of the stream–bed substrate were taken at each sediment sampling site along a 50 m stretch of a watercourse or wetland. The sub-samples were then mixed to obtain a composite sample, sealed in sterilised glass jars and sent to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of trace metals and particle size.

Results of the stream sediment analysis were compared to the Australia and New Zealand Environment and Conservation Council (ANZECC) Interim Sediment Quality Guidelines (ISQG) as detailed below in Table 5.

Table 5 ANZECC (2000) Stream Sediment Trigger Values

Parameter	Units	Low ISQG	High ISQG
Aluminium (Al)	mg/kg	n/a	n/a
Arsenic (As)	mg/kg	20	70
Silver (Ag)	mg/kg	1.0	3.7
Barium (Ba)	mg/kg	n/a	n/a
Beryllium (Be)	mg/kg	n/a	n/a
Boron (B)	mg/kg	n/a	n/a
Cadmium (Cd)	mg/kg	1.5	10
Cobalt (Co)	mg/kg	n/a	n/a
Chromium (Cr)	mg/kg	80	370

Parameter	Units	Low ISQG	High ISQG
Copper (Cu)	mg/kg	65	270
Iron (Fe)	mg/kg	n/a	n/a
Mercury (Hg)	mg/kg	0.15	1.0
Manganese (Mn)	mg/kg	n/a	n/a
Molybdenum (Mo)	mg/kg	n/a	n/a
Nickel (Ni)	mg/kg	21	52
Lead (Pb)	mg/kg	50	220
Antimony (Sb)	mg/kg	2.0	25
Selenium (Se)	mg/kg	n/a	n/a
Vanadium (V)	mg/kg	n/a	n/a
Zinc (Zn)	mg/kg	200	410

Key: n/a – Indicates there is no ISQG value applicable to this parameter

5.1.3 Aquatic and Riparian Flora Sampling

Flora surveys were conducted in association with the various aquatic and riparian habitats occurring throughout the Project site. These surveys provide an indication of the health and environmental values of the waterways as well as providing a baseline dataset for future comparison.

Riparian flora surveys were completed at five sites including the palustrine wetlands (i.e. Lake Vermont wetland and the wetland on Phillips Creek) and several sites along Phillips Creek. A description of the dominant vegetation at each site was recorded. Where in-stream flora was observed, it was also identified, and dominance recorded. Vegetation communities across the Project site are described in detail in the Terrestrial Flora and Fauna Report for the Project produced by AARC.

5.1.4 Macro-invertebrate Sampling

Macro-invertebrates are invertebrates that can be seen with the naked eye. The macro-invertebrate assemblage of an aquatic environment can be used as a biological indicator of the health of that environment, as macro-invertebrates are:

1. generally sensitive to the cumulative impacts of a wide range of disturbances and pollutants;
2. abundant in freshwater systems;
3. relatively easy to identify; and
4. easy to collect (Chessman, 2003).

Macroinvertebrates were collected using a D-frame pond net (350 mm x 250 mm with 250 micrometer (μm) mesh) and employing a kick-sampling method (the substrate in the waterbody was disturbed and the net passed through the resulting plume to obtain benthos- and water column-dwelling macroinvertebrates) along 5-10 m sections of the water body. Various microhabitats within the stream were targeted (where possible).

Macroinvertebrates were placed in a white sorting tub and 'live-picked' using a pipette and tweezers for a period of 20 minutes. Macroinvertebrates were placed in a vial containing 70% ethanol and sent to a NATA accredited laboratory (i.e. the Centre for Tropical Water & Aquatic Ecosystem Research at the James Cook University) for identification to family or sub-family level. This data was then plotted on a Stream Invertebrate Grade Number – Average Level (SIGNAL) bi-plot for interpretation of the health of the waterbody.

The SIGNAL Index was developed by the National River Health Program as a tool for the bioassessment of water pollution and looks at the taxonomic composition of the invertebrate assemblage to determine river 'health'. Each macro-invertebrate is given a grade number between 1 and 10 based on their sensitivity to various pollutants (Chessman, 2003), with a lower number indicating a higher tolerance to a range of conditions. Consequently, sites with numerous families of high sensitivity scores are interpreted as having better water quality than those with only families of low sensitivity scores. The SIGNAL Index value is calculated by averaging the pollution sensitivity grade numbers of the families present at each site, and plotting them. Crustaceans captured in the baited traps do not contribute to the SIGNAL scoring process. This is due to the catch-release nature of the trapping methodology, which allows for individuals to be recaptured, thereby preventing the accurate calculation of catch numbers over a given timeframe.

Once plotted on a bi-plot, the SIGNAL Index and the number of invertebrate families found in a stream used together can provide an indication of the types of pollution and other physical and chemical factors that affect macro-invertebrate communities (Chessman, 2003), depending on their position within the graph (refer to Figure 9 below for bi-plot interpretation).

Quadrant 3 Often indicating toxic pollution or harsh physical environments	**Quadrant 1** Indicates favourable habitat or chemically dilute water
Quadrant 4 Usually indicating urban, industrial, or agricultural pollution	**Quadrant 2** Often indicating high salinity or nutrient levels (may be natural)

Figure 9 SIGNAL 2 Bi-plot Interpretation

The list of macro-invertebrate species identified from the Project site was also analysed for the presence / absence of 'EPT' taxa. The EPT group of macro-invertebrates; Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddis flies) are three orders of insects that are especially sensitive to disturbance. Generally there are more EPT species in areas of higher water quality and available habitat than in degraded water bodies. When this information is looked at in conjunction with other data such as Stream Invertebrate Grade Number – Average Level (SIGNAL) Scores, water quality, etc., a basic estimate of river health can be determined.

5.1.5 Aquatic Vertebrate Fauna Sampling

The composition of aquatic fauna species inhabiting each waterbody provides an indication of the health, habitat suitability and ecological value of the waterbody. The aquatic vertebrate composition of each survey site was assessed using three methods: baited traps, spotlighting and opportunistic records, as explained below.

All fauna captured during the survey were identified, their abundances recorded and released back to the environment.

5.1.5.1 Baited Traps

To target carnivorous aquatic species, opera-house and box traps were used at two sites where sufficient water was available. Traps were baited with cured meats to lure fish and other vertebrates into the traps. At each site, four traps of each variety were left out for two consecutive nights, and emptied at first light each day. All animals captured were identified, their abundances recorded, and then released back into the water. A total of 32 trap nights were undertaken during the survey.

5.1.5.2 Spotlighting

Spotlighting was carried out at night along various sections of the water bodies in an attempt to observe nocturnal wildlife that are less likely to be detected by other survey methods, such as frogs and reptiles. Spotlighting was conducted over a total period of four person hours within the Project site.

5.1.5.3 Targeted Searches

Targeted searches were conducted in the various aquatic and riparian environments to identify the presence of any threatened fauna species identified in the database search results for the region.

5.1.5.4 Bird surveying

Targeted searches for diurnal birds were conducted visually and aurally on mornings and afternoons of the survey in the immediate vicinity of each aquatic survey site. In addition, opportunistic diurnal searches were also conducted on foot in areas considered likely to have high avian diversity (e.g. vegetated creek lines, dams), or to contain cryptic or threatened bird species.

5.1.5.5 Incidental Observations

Throughout the survey period, numerous wildlife species were observed or heard within the Project site during the course of routine activities, or driving between transects. Where required, a closer inspection of detected wildlife was carried out to ensure positive species identification. All incidental observations were recorded and appropriate notes made on the surrounding habitat.

5.1.6 Habitat Assessment

A habitat assessment was performed at selected sites using a modified version of the Australian River Assessment System (AUSRIVAS) protocols developed by the Department of Natural Resources and Mines (Conrick and Cockayne 2001). AUSRIVAS is a nationally standardised method for giving an assessment of the biological health of inland rivers within Australia. The assessment considers morphological characteristics of waterways only; including the broad habitat type, channel pattern, water level and flow, substrate character and cover, bed and bank stability, and riparian cover at each site. Each surveyed site was given a score out of 135, with higher numbers indicating favourable habitats normally associated with healthy waterways. Habitat assessments were completed at a total of five sites during the survey period.

Table 6 below provides a framework for interpreting habitat assessment scores.

Table 6 Key to AUSRIVAS Habitat Assessment Scores

Habitat Assessment Score	Interpretation
0 – 35	Habitat is poor. There is limited habitat availability for in-stream fauna. There is little variation in velocity and depth of water, and the creek bed consists of a single sediment type. The water body typically consists of a small, shallow pool. Streamside vegetation, if present, consists of grasses and sedges. There is moderate to significant erosion on the banks.
36 – 70	Habitat variety is moderate. This could be due to leaf litter and other vegetation or detritus in the water, or the presence of boulders and rocks. The streamside vegetation consists mainly of grasses and sedges. There is moderate evidence of bank erosion, and the percentage of vegetative cover on the banks is less than 50%.
71 – 100	Habitat is relatively good. The bank is stable, there is variety in depth and velocity within the water body and substrate type is variable and tending towards boulders and rocks. Streamside vegetation is of trees and shrubs, adding to the bank stability. The percentage of streamside cover by vegetation is relatively high.
101 – 135	Indicates a pristine and favourable habitat. There is no bank erosion and the dominant vegetation is trees. There is great variety in depth and velocity, and the habitat is quite complex, offering many types of protection for fauna. This is usually afforded by logs and branches, leaf litter, variety in substrate type, variety in water depth, and presence of vegetation living within the water body.

5.1.7 Stream Morphology

The hierarchical stream ordering system described by Conrick and Cockayne (2001) was adopted to ensure that waterways of various sizes (i.e. stream orders) were sampled, where possible. A second order stream is formed by the joining of two first order-streams, the junction of two second order streams forms a third order stream, and so on. This system is illustrated in Figure 10.

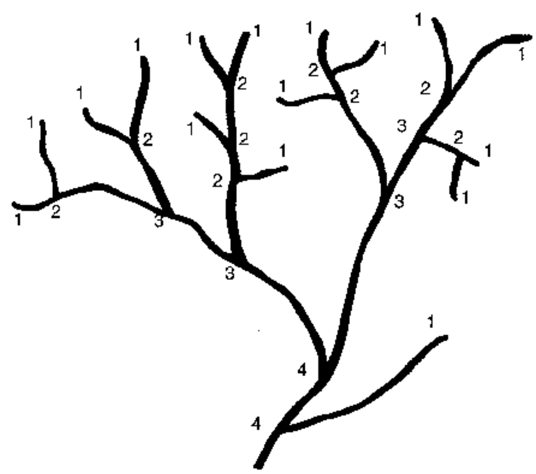

Figure 10 Method of Determining Stream Order

A single ephemeral watercourse (i.e. Phillips Creek) flows from the western boundary of the Project site through the centre of the Project to the eastern boundary. This watercourse is a third order stream.

A stream morphology assessment was completed along Phillips Creek to provide a comprehensive assessment of the landform and channel characteristics (e.g. depth, width, composition, bank stability, etc.), riparian vegetation and aquatic habitat features. Stream morphology data was collected by taking cross-sections of the watercourse at each site. At each cross-section, the following details were noted:

- Depth of channel;
- Width of channel;
- Slope of banks;
- Stability of banks;
- Stream substrate type including a sediment sample;
- Details of water (if present) including colour, depth and a sample;
- Overhangs;
- Debris and tree roots; and
- Vegetation either within the channel or on the banks (i.e. the surrounding vegetation).

In addition, photographs were taken of the water channel cross-section described. These locations were recorded using GPS data and this arrangement will allow for direct comparison between this survey and any future monitoring activities.

Data collected during the stream morphology assessment was analysed to provide a description of the morphology of each section of the watercourse.

6.0 RESULTS AND DISCUSSION

The aquatic values of the Project have been assessed and described in terms of the three aquatic ecosystem types present, including riverine areas (i.e. Phillips Creek), palustrine wetlands (i.e. Lake Vermont and the wetland on Phillips Creek) and lacustrine wetlands (i.e. pastoral dam). The results of each analysis type are provided in Sections 6.1 to 6.6 below.

The morphological characteristics of Phillips Creek have been assessed and described in Section 6.7

6.1 SURFACE WATER QUALITY

Surface water quality samples were analysed for physicochemical parameters, metals, nutrients, hydrocarbons and pesticides. The results of the analysis are shown in Table 7. The results of the hydrocarbon and pesticide analysis have been omitted from this table as all parameters at all sampling sites fell below the Limit of Reporting (LOR).

Table 7 Surface Water Quality Results

Parameter	Units	LOR	Trigger Limits				Historical Data	Aquatic Ecology Sampling				
							Riverine Systems				Palustrine Wetlands	
			ANZECC (2000) Livestock Drinking Water	ANZECC (2000) Aquatic Ecosystems	EPP (Water) 2009 Aquatic Ecosystems	EA Trigger Limits	Phillips Creek	Isaac River	Phillips Creek		LVW	Wetland 1
								MP3	AQ3	AQ4		
pH	pH units	n/a	n/a	6.5 – 8.0	6.5 – 8.5	6.5 – 8.0	8.24	8.1	8.01	**8.59**	7.51	7.71
EC	µs/cm	1	n/a	125 – 2200	<720 (baseflow) <250 (high flow)	1000	516	625	**723**	**1200**	194	133
DO	%	n/a	n/a	85 – 110	85 – 110	n/a	94.3	76.0	82.8	81.5	29.7	9.9
Total alkalinity	mg/L	1	n/a	n/a	n/a	n/a	n/a	107	138	266	88	68
Turbidity	NTU	0.1	n/a	6 – 50	<50	n/a	**240**	2.8	**1570**	2.2	3.5	8.3
Sulphate (SO_4^{2-})	mg/L	1	1000	n/a	<25	300	16.5	**29**	**35**	**66**	<1	<1
Suspended solids	mg/L	5	n/a	n/a	<55	1500	**104**	<5	**1230**	8	12	17
Sodium	mg/L	1	n/a	n/a	n/a	180	45.5	77	78	133	10	6
Total chloride	mg/L	1	n/a	n/a	n/a	n/a	n/a	103	117	207	5	1
Ammonia	mg/L	0.01	n/a	0.02	0.02	n/a	**0.025**	**0.06**	**0.1**	**0.03**	**0.13**	**0.04**
Total nitrogen	mg/L	0.1	n/a	0.5	0.5	n/a	n/a	0.1	**1.9**	**0.7**	**2.7**	**2.2**
Total phosphorus	mg/L	0.01	n/a	0.05	0.05	n/a	n/a	0.02	**0.72**	**0.11**	**0.28**	**1.38**
Oxidised N	mg/L	0.01	n/a	0.04	0.06	n/a	**0.08**	0.01	**0.67**	**0.1**	<0.01	<0.01
Dissolved Metals												
Aluminium	mg/L	0.01	n/a	0.055	0.055	0.055	n/a	<0.01	0.02	<0.01	<0.01	0.02
Arsenic	mg/L	0.001	n/a	0.024	0.024	0.013	n/a	<0.001	<0.001	0.001	<0.001	0.002
Boron	Mg/L	0.05	n/a	0.370	n/a	0.370	n/a	0.06	<0.05	<0.05	<0.05	<0.05
Cadmium	µg/L	0.0001	n/a	0.2	0.2	0.2	n/a	<0.05	<0.05	<0.05	<0.05	<0.05
Cobalt	mg/L	0.001	n/a	n/a	n/a	0.090	n/a	<0.001	<0.001	<0.001	<0.001	0.003
Chromium	µg/L	0.2	n/a	1	1	1	n/a	<0.2	<0.2	0.3	<0.2	<0.2
Copper	µg/L	0.5	n/a	1.4	1.4	2	n/a	0.5	0.9	**3.6**	0.6	<0.5

Parameter	Units	LOR	Trigger Limits				Historical Data	Aquatic Ecology Sampling				
							Riverine Systems				Palustrine Wetlands	
			ANZECC (2000) Livestock Drinking Water	ANZECC (2000) Aquatic Ecosystems	EPP (Water) 2009 Aquatic Ecosystems	EA Trigger Limits	Phillips Creek	Isaac River	Phillips Creek		LVW	Wetland 1
								MP3	AQ3	AQ4		
Manganese	mg/L	0.001	n/a	1.9	1.9	1.9	n/a	0.121	0.014	0.002	0.053	0.331
Nickel	mg/L	0.001	n/a	0.011	0.011	0.011	n/a	0.003	0.002	0.002	0.002	0.004
Lead	mg/L	0.001	n/a	0.0034	0.0034	0.004	n/a	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	mg/L	0.01	n/a	n/a	n/a	0.010	n/a	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.005	n/a	0.008	0.008	0.008	n/a	<0.005	<0.005	<0.005	<0.005	**0.009**
Molybdenum	mg/L	0.001	n/a	n/a	n/a	0.034	n/a	<0.001	<0.001	0.001	<0.001	<0.001
Selenium	µg/L	0.2	n/a	11	11	10	n/a	<0.2	0.2	0.4	<0.2	<0.2
Silver	µg/L	0.1	n/a	0.05	0.05	1	n/a	<0.1	<0.1	<0.1	<0.1	<0.1
Iron	mg/L	0.05	n/a	n/a	n/a	0.3	n/a	<0.05	<0.05	<0.05	0.23	0.66
Uranium	mg/L	0.001	n/a	n/a	n/a	0.001	n/a	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	mg/L	0.0001	n/a	0.0006	0.0006	0.0002	n/a	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Metals												
Aluminium	mg/L	0.01	5.0	n/a	5.0	n/a	3.47	0.08	33	0.07	0.03	0.64
Arsenic	mg/L	0.001	0.5	n/a	0.5	n/a	0.002	<0.001	0.004	<0.001	0.001	0.002
Boron	mg/L	0.05	5.0	n/a	5.0	n/a	0.07	0.07	0.07	0.05	<0.05	<0.05
Cadmium	µg/L	0.05	10	n/a	10	n/a	<0.1	<0.05	<0.26	<0.05	<0.05	<0.05
Cobalt	mg/L	0.001	1.0	n/a	1.0	n/a	0.0025	<0.001	0.028	<0.001	<0.001	0.004
Chromium	µg/L	0.2	1000	n/a	1000	n/a	4.5	<0.2	73.1	0.3	<0.2	1.6
Copper	µg/L	0.5	1000	n/a	1000	n/a	4.5	0.7	40.4	1.4	1.9	1.2
Manganese	mg/L	0.001	n/a	n/a	n/a	n/a	0.0875	0.118	0.799	0.01	0.109	0.468
Nickel	mg/L	0.001	1.0	n/a	1.0	n/a	0.007	0.001	0.072	0.002	0.001	0.006
Lead	mg/L	0.001	0.1	n/a	0.1	n/a	0.005	<0.001	0.032	<0.001	<0.001	0.001
Vanadium	mg/L	0.01	n/a	n/a	n/a	n/a	0.02	<0.01	0.06	<0.01	<0.01	<0.01

Parameter	Units	LOR	Trigger Limits				Historical Data	Aquatic Ecology Sampling				
							Riverine Systems				Palustrine Wetlands	
			ANZECC (2000) Livestock Drinking Water	ANZECC (2000) Aquatic Ecosystems	EPP (Water) 2009 Aquatic Ecosystems	EA Trigger Limits	Phillips Creek	Isaac River	Phillips Creek		LVW	Wetland 1
								MP3	AQ3	AQ4		
Zinc	mg/L	0.005	20	n/a	20	n/a	0.0135	<0.005	0.066	<0.005	0.012	0.016
Molybdenum	mg/L	0.001	0.15	n/a	0.15	n/a	<0.001	0.001	<0.001	0.001	<0.001	<0.001
Selenium	µg/L	0.2	20	n/a	20	n/a	<10.0	<0.2	1.7	0.4	<0.2	<0.2
Silver	µg/L	0.1	n/a	n/a	n/a	n/a	<1.0	<0.1	<0.5	<0.1	<0.1	<0.1
Iron	mg/L	0.05	n/a	n/a	n/a	n/a	7.69	0.08	47	<0.05	0.68	4.02
Uranium	mg/L	0.001	0.2	n/a	0.2	n/a	<0.001	<0.001	0.001	0.001	<0.001	<0.001
Mercury	mg/L	0.0001	0.002	n/a	0.002	n/a	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001

Key: n/a Indicates no data is available for this parameter

* Values are presented as the median of all surface water sampling data collected from Phillips Creek during two sampling events (January and February 2012) conducted in conjunction with Western Extension aquatic survey and the Receiving Environment Monitoring Program for the Lake Vermont Project. Surface water samples were collected from two sites during each sampling event.

XX The limit of reporting (LOR) for this parameter exceeds the relevant trigger value.

This parameter exceeds EPP (Water) Water Quality Objectives (WQOs) for physico-chemical parameters

This parameter exceeds EPP (Water) Water Quality Objectives (WQOs) for dissolved metals

This parameter exceeds EPP (Water) Water Quality Objectives (WQOs) for total metals pH levels recorded at all sampling sites are displayed in Figure 11 below. The red and green lines represent the EPP (Water) WQO pH trigger values of 6.5 and 8.5 respectively. With the exception of one sampling site (AQ4 – Phillips Creek), all sites recorded a pH reading within the WQO range. Water quality testing at AQ4 recorded a pH value of 8.59, a slight exceedance of the WQO upper trigger limit of 8.5. pH at AQ4 may have been influenced by the significant rainfall and resulting surface flows experienced during the survey period. The pH values recorded at sampling sites on Phillips Creek (i.e. MP3, AQ3 and AQ4) were generally consistent with the median pH value (8.43) previously recorded in Phillips Creek (refer to Figure 11). The palustrine wetlands (i.e. the wetland adjacent to Phillips Creek (Wetland 1) and Lake Vermont Wetland (LVW)) recorded lower pH values of 7.71 and 7.51 respectively.

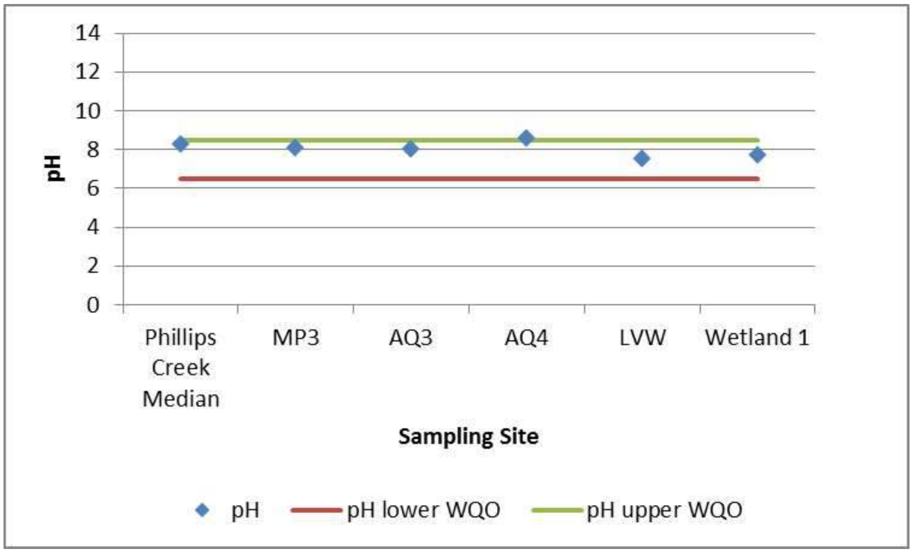

Figure 11 pH Levels

Electrical Conductivity (EC) levels recorded at all sampling sites are shown in Figure 12. The green line represents the EPP (Water) WQO for EC levels during base flow (<720 microsiemens per centimetre (µS/cm)) while the red line represents the WQO for high flow events (<250 µS/cm).

Two sampling sites on Phillips Creek (i.e. AQ3 and AQ4) were found to exhibit EC levels in exceedance of the baseflow WQO. Sampling site AQ3 recorded an EC level of 723 µS/cm while AQ4 recorded an EC reading of 1200 µS/cm. These elevated levels are likely the result of high sediment loads in Phillips Creek caused by surface water flows in the previously dry creek. All sampling sites on Phillips Creek recorded EC levels greater than the median previously recorded for Phillips Creek (516 µS/cm). EC levels recorded at the wetland sampling sites were much lower than the creek sites.

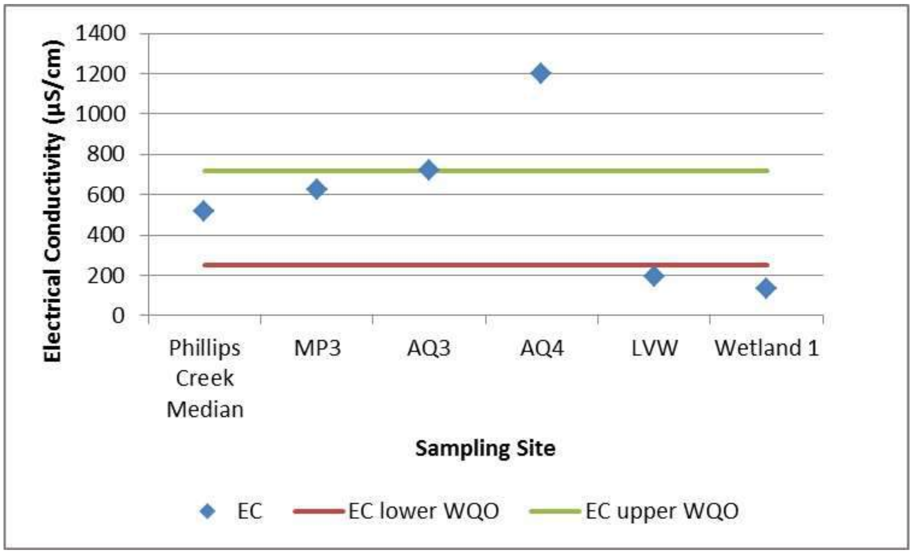

Figure 12 Electrical Conductivity Concentrations

Sulphate concentrations recorded at all sampling sites are shown in Figure 13. The WQO for sulphate concentration is represented in Figure 13 as a red line. The median sulphate concentration previously recorded for Phillips Creek is represented in the figure below as a red line.

All sites on Phillips Creek (i.e. AQ3 and AQ4) and the Isaac River (MP3), were found to contain sulphate concentrations that exceeded the median sulphate concentration recorded for Phillips Creek (16.5 mg/L) as well as the WQO value of <25 mg/L. The trend in sulphate concentrations throughout Phillips creek reflects the trends observed for electrical conductivity, supporting the theory that the first flow event contained elevated sediment loads, which may be natural or elevated as a result of upstream or adjacent agricultural land use or upstream mining activities.

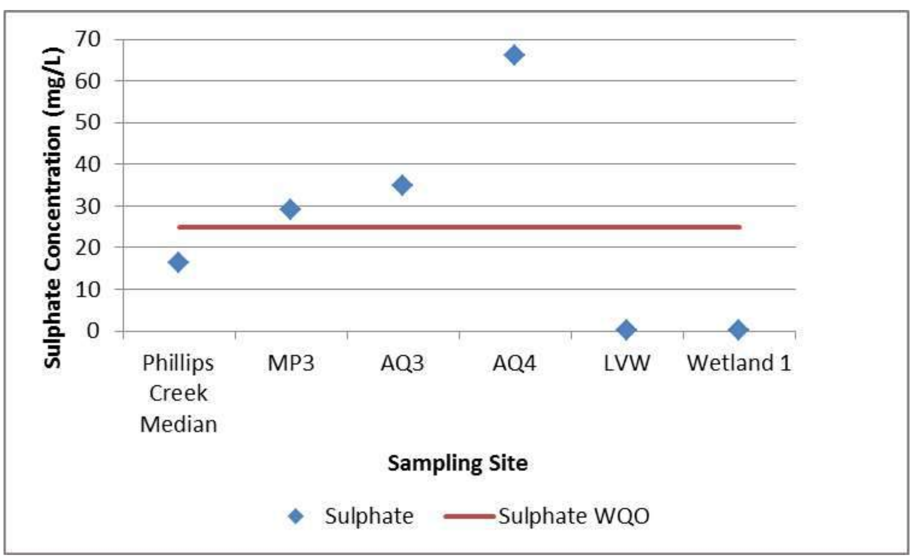

Figure 13 Sulphate Concentration

Dissolved oxygen (DO) concentrations recorded at all sampling sites are shown in Figure 14. The EPP (Water) WQO upper and lower limits are represented in Figure 14 as green and red lines respectively.

All sites sampled during the Aquatic ecology survey recorded DO concentrations below the WQO lower limit and the Phillips Creek median. Standing water in wetlands recorded particularly low DO.

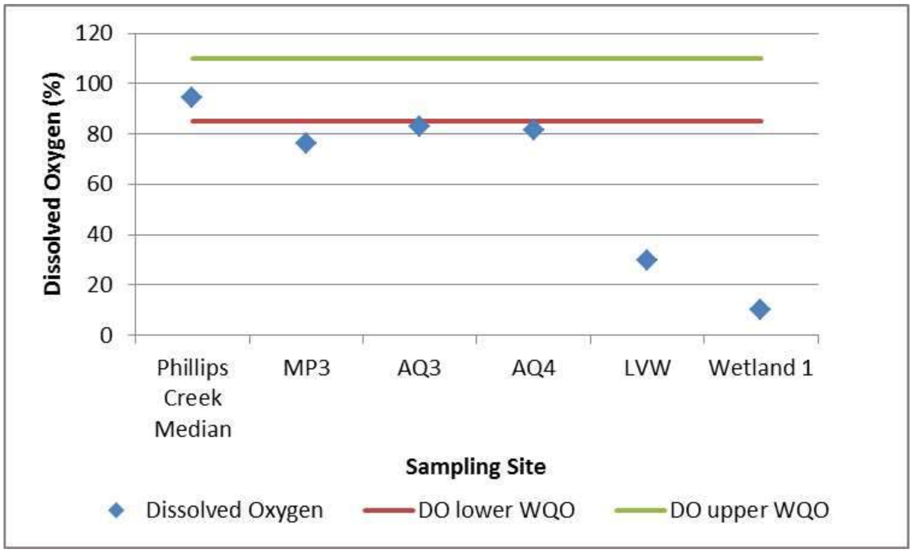

Figure 14 Dissolved Oxygen Concentrations

Concentrations of suspended solids recorded at all sampling sites are displayed in Figure 15. The red line shown in Figure 15 indicates the EPP (Water) WQO for suspended solids.

Of all sites sampled during the aquatic ecology survey, AQ3 (Phillips Creek) was the only site that contained a suspended solid concentration in exceedance of the WQO. Surface water was collected from AQ3 during a heavy rainfall event while the creek was flowing rapidly. Other sampling sites on Phillips creek were sampled after rainfall but while surface waters were either standing or slow flowing. It should be noted that sampling site AQ3 was also located immediately downstream of a creek crossing and contained road base materials that had been flushed with the surface water flows.

While the median suspended solids concentration previously recorded for Phillips Creek exceeds the WQO, those concentrations recorded at all sites, with the exception of AQ3, were recorded well below the WQO for suspended solids.

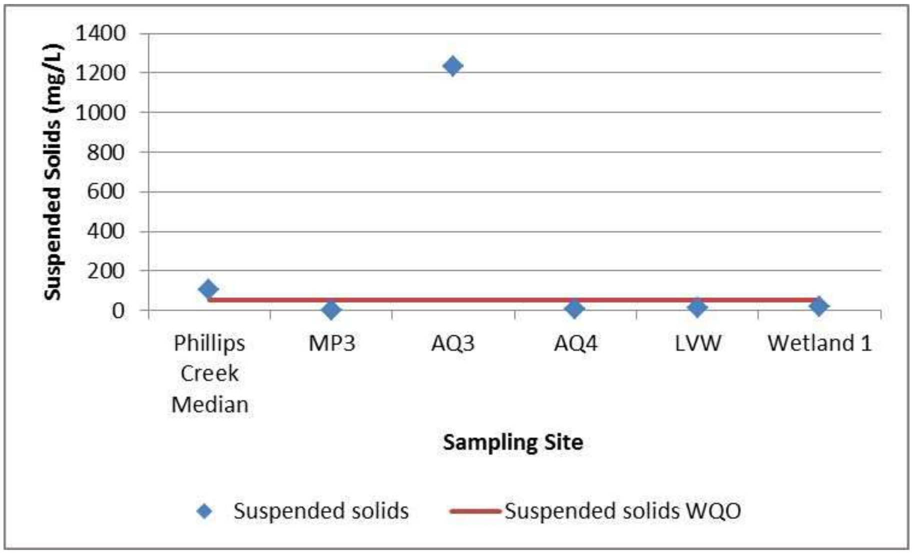

Figure 15 Suspended Solids Concentrations

Turbidity levels recorded at all sampling sites are shown in Figure 16. The WQO value for turbidity is represented in Figure 16 as a red line. One sampling site, AQ3 (Phillips Creek) was found to contain a turbidity concentration of 1570 NTU, which is a significant exceedance of the WQO of <50 NTU. As previously mentioned, sampling at AQ3 was conducted during a heavy rainfall event while the creek was flowing rapidly and high sediment loads were observed. The trend in turbidity levels reflects the trend observed for suspended solids indicating the first flow event contained elevated sediment loads, potentially a direct result of the creek crossing immediately upstream of AQ3.

Turbidity levels recorded at all other sampling sites fell well below the WQO limit. However, the median turbidity level previously recorded from Phillips Creek is 240 NTU, a notable exceedance of the WQO. This suggests that land uses upstream and adjacent to Phillips Creek commonly causes elevated turbidity levels.

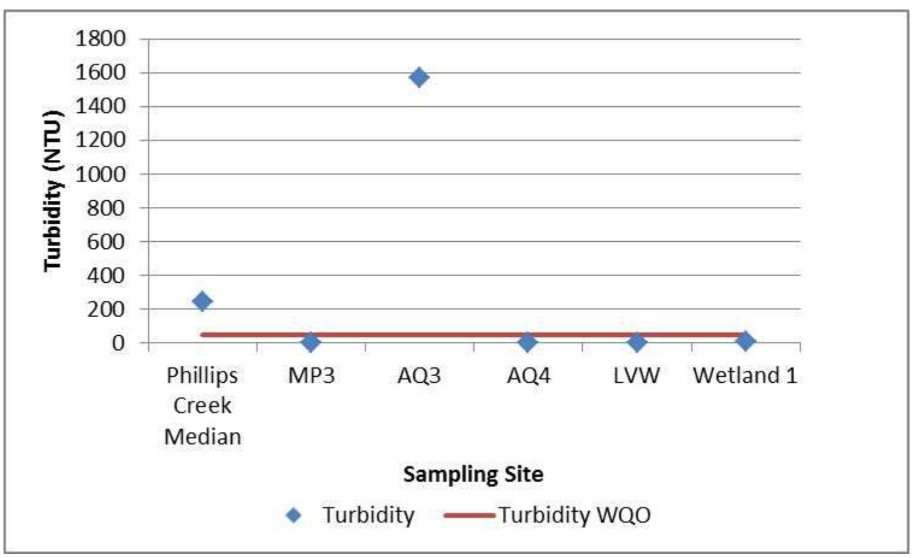

Figure 16 Turbidity Levels

Nutrient levels in water were often above the guideline limits with the exception of sampling site MP3, where the only nutrient exceedance was ammonia. Ammonia levels recorded at all sampling sites were found to exceed the WQO. The EPP water quality objectives for total nitrogen and phosphorus were exceeded at most sites (i.e. AQ3, AQ4, LVW and Wetland 1). Elevated nutrient levels are likely a result of runoff from agricultural land uses and high sediment loads in the flowing waterways.

Surface water results for dissolved metals were compared with the EPP (Water) Water Quality Objectives (WQO) for dissolved metals which are equivalent to the trigger levels for *95% Species Protection* under the *Australia and New Zealand Environmental Conservation Council (ANZECC) 2000 Aquatic Ecosystems.* Surface water results for total metals were also compared with the EPP (Water) WQO for total metals which refer to the *ANZECC (2000) Guidelines for Livestock Drinking Water*.

Dissolved metal levels in surface waters were generally low and below guideline values with the exception of copper and zinc exceedances at one site. A copper concentration of 3.6 mg/L was recorded at AQ4 (Phillips Creek) presenting an exceedance of the WQO value of 1.4 mg/L. Surface water sampling at Wetland 1 recorded a zinc level of 0.009, a slight exceedance of the WQO for zinc (0.008 mg/L).

The analysis of total metals revealed an elevated level of aluminium at the Phillips Creek sampling site AQ3 (33 mg/L), presenting a significant exceedance of the WQO guideline limit of 5 mg/L. Elevated aluminium levels were recorded only in the total metals state and may be attributable to the high levels of suspended solids recorded at AQ3 at the time of sampling. No other total metal concentrations were recorded in exceedance of the WQOs.

6.2 STREAM SEDIMENT

6.2.1 Metal Concentrations

Sediment samples were collected from seven sites on Phillips Creek, one site at the Lake Vermont wetland (LVW) and one site at the wetland adjacent to Phillips Creek (Wetland 1). Sediment samples were analysed for trace metals and particle size. These results have been compared against the ANZECC / ARMCANZ Interim Sediment Quality Guidelines (ISQG) limits for contaminants. Stream sediment results for each sampling site are shown in Table 8.

Table 8 Sediment Metals Analysis

	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)	Mercury (mg/kg)
ISQG – Low	**20**	**1.5**	**80**	**65**	**50**	**21**	**200**	**0.15**
ISQG – High	**70**	**10**	**370**	**270**	**220**	**52**	**410**	**1**
LOR	5	1	2	5	5	2	5	0.1
Palustrine Wetlands								
LVW	<5	<1	23	<5	<5	6	12	<0.1
Wetland 1	<5	<1	64	25	12	**48**	59	<0.1
Riverine Systems								
Isaac River								
MP3	<5	<1	5	<5	<5	3	<5	<0.1
Phillips Creek								

	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)	Mercury (mg/kg)
AQ1	<5	<1	8	<5	<5	7	6	<0.1
MP4	<5	<1	7	<5	<5	6	<5	<0.1
AQ2	<5	<1	9	<5	<5	7	<5	<0.1
AQ3	<5	<1	13	<5	<5	15	14	<0.1
AQ4	<5	<1	9	<5	<5	9	6	<0.1
SM15	<5	<1	8	<5	<5	7	7	<0.1

Key:

Exceeds Trigger Level as defined by the ANZECC/ARMCANZ Interim Sediment Quality Guidelines – low value based on total sediments

Exceeds Release Limit as defined by the ANZECC/ARMCANZ Interim Sediment Quality Guidelines – high value based on total sediments

The analysis of sediment samples revealed that metal concentrations are generally low with all sites containing metal levels below the relevant ANZECC / ARMCANZ ISQG high trigger values. The ISQG low trigger value for nickel concentration was exceeded at the Wetland 1 sampling site. No other parameters recorded at Wetland 1 exceeded the ISQG low trigger values. All metal concentrations at all other sites fell below the ISQG low trigger values.

6.2.2 Particle Size Distribution

All sediment samples were also analysed for particle size distribution. The results of the particle size analysis are summarised in Table 9 and shown in Figure 17.

Sampling sites on Phillips creek generally exhibited a sand (0.06 – 2.00 mm) composition of 95% or greater. Sampling site AQ3 was comprised of just 81% sand with 12% gravel (>2 mm), 4% clay (<2 µm) and 3% silt (2 – 6 µm). The altered composition of sediments in this section of Phillips Creek can be attributed to the introduction of gravel and other material that was flushed downstream from an adjacent road crossing.

It should be noted that historic data for Phillips Creek also demonstrates a high sand composition (96 – 99%) throughout Phillips Creek (AQ1 & MP4) and at the junction of the Isaac River and Phillips Creek (MP3) (refer to Figure 17).

Sediment composition for wetland sites included a more significant clay and silt component. Lake Vermont Wetland (LVW) exhibited a reasonably high sand content (68%) with moderate clay (12%) and silt (18%) compositions. Sediments at Wetland 1 comprised a much greater composition of clay (43%) and silt (35%) with a much lower composition of sand particles (21%).

Table 9 Sediment Particle Size Analysis

Site	Unit	Clay (<2 µm)	Silt (2-60 µm)	Sand (0.06-2.00 mm)	Gravel (>2mm)	Cobbles (>6cm)
Historic Data* – Phillips Creek						
MP2	%	1	<1	98	1	<1
MP3	%	<1	<1	96	4	<1
MP4	%	1	<1	99	<1	<1

Site	Unit	Clay (<2 µm)	Silt (2-60 µm)	Sand (0.06-2.00 mm)	Gravel (>2mm)	Cobbles (>6cm)
Riverine Systems						
Isaac River						
MP3	%	<1	1	99	<1	<1
Phillips Creek						
AQ1 (MP2)	%	<1	1	97	2	<1
MP4	%	<1	<1	97	3	<1
AQ2	%	<1	1	99	<1	<1
AQ3	%	4	3	81	12	<1
AQ4	%	2	1	95	2	<1
SM15	%	<1	<1	95	5	<1
Palustrine Wetlands						
LVW	%	12	18	68	2	<1
Wetland 1	%	43	35	21	1	<1

Key: * based on Stream sediment data collected in January 2013 during surveys conducted for the Lake Vermont Project Receiving Environment Monitoring Program

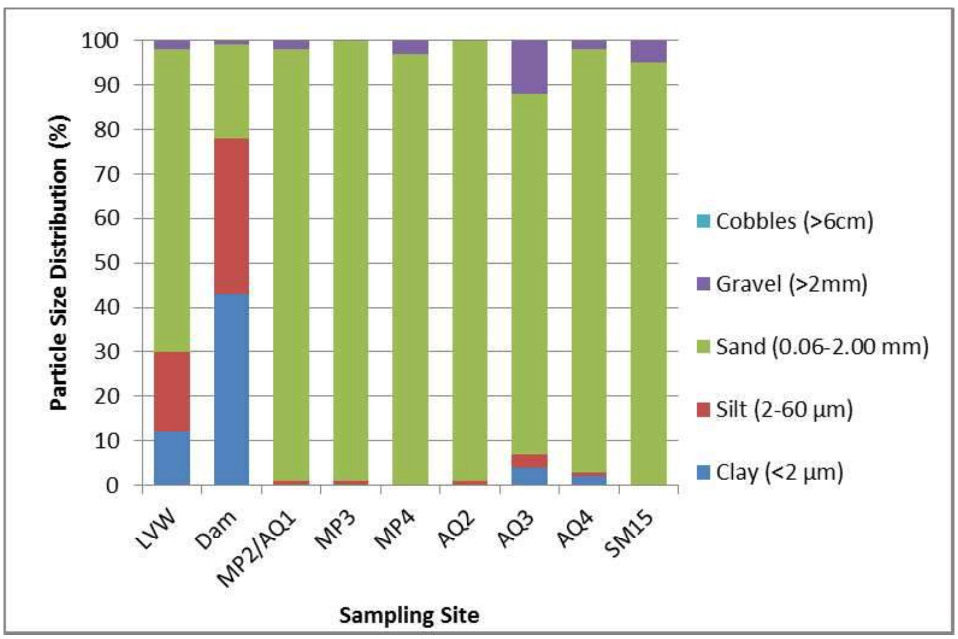

Figure 17 Sediment Particle Size Analysis

6.3 AQUATIC AND RIPARIAN VEGETATION

Vegetation communities occurring in association with watercourses and wetlands on the Project site were surveyed to identify the values of aquatic ecosystems. A total of 102 species of aquatic and riparian flora were observed on the Project site, including 19 wetland indicator species and 22 introduced species. A full list of these species is provided in Appendix B.

Two vegetation communities were recorded in the riparian and wetland areas of the Project site. These communities include:

- RE 11.3.25 – *Eucalyptus camaldulensis* riparian woodland fringing watercourses; and
- RE 11.3.27 – Freshwater wetlands.

Aquatic and riparian vegetation communities occurring on the Project are described below with regard to aquatic ecosystem type such as riverine systems, palustrine wetlands and lacustrine wetlands.

6.3.1 Riverine Systems

Riverine systems surveyed as part of the aquatic ecology assessment include Phillips Creek and the Isaac River. The riparian communities occurring in association with each watercourse are consistent with RE 11.3.25 – *Eucalyptus camaldulensis* riparian woodland fringing watercourses. RE 11.3.25 is listed as Least Concern under the VM Act and Of Concern under EHP's Biodiversity Status. RE 11.3.25 is impacted by cattle grazing and weed invasion on both the regional and local scale.

The riparian zone occurring along Phillips Creek consists of a thin, linear, fringing community. This community typically comprises a co-dominant canopy of River Red Gum (*Eucalyptus camaldulensis),* River She-oak (*Casuarina cunninghamiana)* and Moreton Bay Ash (*Corymbia tessellaris*) with White Bauhinia (*Lysiphyllum hookeri*) in the sub-canopy. The ground layer was dominated by the introduced Giant Panic Grass (*Megathyrsus maximus var. maximus).*

The Isaac River was surveyed immediately downstream of the confluence with Phillips Creek. The canopy layer was dominated by River Red Gum, with a sub-dominant presence of River She-oak occurring on the lower embankment. The upper banks were co-dominated by Coolabah (*Eucalyptus coolabah*) and Moreton Bay Ash (*Corymbia tessellaris*). The mid-storey consisted of a co-dominant mix of Sandpaper Fig (*Ficus opposita*) and Bauhinia while the shrub layer was dominated by Bitterbark (*Alstonia constricta*) with an occasional presence of *Albizia canescens*. The ground layer was generally dominated by Giant Panic Grass, although Couch Grass (*Cynodon dactylon*) was found to dominate the lower banks.

Riverine areas on the Project site were found to be moderately disturbed due to grazing pressures, weed invasion, previous clearing and the presence of creek crossings.

Flora of Conservation Significance

No flora species of conservation significance were recorded from the riparian communities on the Isaac River or Phillips Creek.

Introduced Flora Species

Twenty introduced flora species were recorded along Phillips Creek. Two weed species were recorded from one sampling site on the Isaac River. All weeds recorded in the riverine communities are listed in Table 10 below. Three declared species (as listed under the LP Act) and three Weeds of National Significance (WONS) were recorded in the Phillips Creek riparian corridor.

While no weed infestations were observed on the Project site, the high diversity of weeds occurring in association with Phillips Creek indicates moderate disturbance within and upstream of the Project site.

Table 10 Introduced Weed Species recorded in association with Riverine Systems

Species Name	Common Name	LP Act Status	WONS	Isaac River	Phillips Creek
Aster subulatus	Wild Aster	-	-		X
Bidens bipinnata	Bipinnate Beggar's Ticks	-	-		X
Bidens pilosa	Cobbler's Pegs	-	-		X
Conyza bonariensis	Flaxleaf fleabane	-	-		X
Emilia sonchifolia	Emilia	-	-		X
Parthenium hysterophorus	Parthenium Weed	Class 2	YES		X
Sonchus oleraceus	Common Sowthistle	-	-		X
Opuntia stricta	Prickly Pear	Class 2	YES		X
Cucumis myriocarpus subsp. myriocarpus	Prickly Pademelon	-	-		X
Euphorbia hirta	Asthma Plant	-	-		X
Ricinus communis	Castor Oil Bush	-	-	X	
Macroptilium lathyroides	Phasey Bean	-	-		X
Sida cordifolia	Flannel Weed	-	-		X
Sida spinosa	Spiny Sida	-	-		X
Vachellia farnesiana	Mimosa Bush	-	-		X
Passiflora foetida	Stinking Passionfruit	-	-		X
Cenchrus ciliaris	Buffel Grass	-	-		X
Sorghum halepense	Johnson Grass	-	-	X	X
Megathyrsus maximus var. maximus	Giant Panic Grass	-	-	X	X
Urochloa mosambicensis	Sabi Grass	-	-		X
Solanum nigrum	Blackberry Nightshade	-	-		X
Lantana camara	Lantana	Class 3	YES		X

Key: - Indicates that this species is either not a WONS and/or is not a declared species under the LP Act.

6.3.2 Palustrine Wetlands

Palustrine wetlands on the Project site include Lake Vermont and a smaller palustrine wetland that adjoins Phillips Creek. The vegetation community occurring in association with these wetlands is consistent with RE 11.3.27 and is best described as palustrine wetlands (e.g. vegetated swamp) comprising *Eucalyptus camaldulensis* woodland. RE 11.3.27 is listed as Least Concern under the VM Act and Of Concern under the EHP Biodiversity Status. The extent of this regional ecosystem in reserves is classified as low.

The vegetation canopy in the palustrine wetland areas is dominated by River Red Gum (*Eucalyptus camaldulensis)*. The ground layer is typically dominated by a variety of macrophytes such as Tall Spike Rush (*Eleocharis sphacelata*), Umbrella Cane Grass (*Leptochloa digitata*), Tall Flatsedge (*Cyperus exaltatus*) and *Juncus polyanthemus* with aquatic emergents such as Smartweed (*Persicaria attenuata*) and Water Primrose (*Ludwigia peploides*). Detailed discussion and mapping of vegetation communities is provided in the Terrestrial Flora and Fauna Report for the Lake Vermont Northern Extension Project (AARC 2013).

The Lake Vermont wetland consists of a large permanent waterbody with shallow edges and abundant macrophyte growth. Macrophyte density was reduced on the western edge of the wetland due to livestock disturbance. This wetland was found to provide habitat for a large diversity of birds, several amphibian and fish species. A photograph of the wetland is provided in Photo Plate 1.

Photo Plate 1 Lake Vermont Wetland

The smaller palustrine wetland adjoining Phillips Creek consisted of large, shallow pools of water with a high density of macrophytes and an open canopy of Forest Red Gum (*Eucalyptus tereticornis*) (refer to Photo Plate 2). This wetland provides habitat for a number of bird and frog species.

Photo Plate 2 Palustrine Wetland adjacent to Phillips Creek

The palustrine wetlands were found to be slightly impacted by grazing with stock utilising the water bodies as a watering point.

Flora of Conservation Significance

No flora species of conservation significance were recorded in association with either of the palustrine wetlands.

Introduced Flora Species

A total of seven introduced weed species were recorded in the palustrine wetland areas (refer to Table 11). None of these weeds are listed as declared pest plants under the LP Act or WONS.

Table 11 Introduced Weed Species recorded in association with the Palustrine Wetlands

Species Name	Common Name	LP Act Status	WONS	Lake Vermont Wetland	Wetland 1
Aster subulatus	Wild Aster	-	-		X
Conyza bonariensis	Flaxleaf fleabane	-	-		X
Argemone ochroleuca subsp. *ochroleuca*	Mexican Poppy	-	-	X	
Passiflora foetida	Stinking Passionfruit	-	-		X
Cynodon dactylon	Couch	-	-	X	X
Portulaca oleracea	Pig Weed	-	-	X	
Physalis lanceifolia	Gooseberry	-	-	X	

Key: - Indicates that this species is either not a WONS and/or is not a declared species under the LP Act.

6.3.3 Lacustrine Wetlands

The large pastoral dam occurring in the south of the Project is mapped on the Queensland wetland mapping as a lacustrine wetland (Figure 5). This wetland consists of a large permanent body of water that lacks canopy and understorey vegetation (refer to Photo Plate 3). While the edges of the dam are dominated by grasses, aquatic emergents occur in abundance throughout the waterbody. Aquatic emergents present include Water Snowflake (*Nymphoides indica*), Tussock Grass (*Juncus aridicola*), Water Primrose (*Ludwigia peploides*), Willow Primrose (*Ludwigia octovalvis*) and Smartweed (*Persicaria attenuata*). This wetland area is known to support a large diversity of birds.

The dam was observed to be slightly – moderately impacted by previous clearing and grazing with stock using the dam as a watering point.

Photo Plate 3 Pastoral Dam

Flora of Conservation Significance

No flora species of conservation significance were recorded in the lacustrine wetland area.

Introduced Flora Species

No weed species were recorded in association with the pastoral dam.

6.4 AQUATIC VERTEBRATE FAUNA

Aquatic environments on the Project site were found to support a moderate diversity of aquatic fauna species including 5 fish species, 1 crustacean, 1 mammal, 2 reptiles, 5 amphibians and 47 bird species. The wetland areas, in particular Lake Vermont, supported a large diversity of aquatic birds, as well as moderate diversities of fish and amphibians. The riverine environment (Phillips Creek) also supported several amphibians. The availability of aquatic habitat within the riverine environment was limited by the lack of surface water present at the time of the survey. A full list of aquatic and riparian fauna species for the Project site is provided in Appendix C. The findings of the aquatic fauna survey on the Project site are discussed below.

6.4.1 Mammals

The Riverine ecosystem (i.e. Phillips Creek) and palustrine wetland (i.e. Lake Vermont) were found to support one aquatic mammal species, the Water Rat (*Hydromys chrysogaster*).

The Water Rat was filmed on infrared sensor camera at Lake Vermont wetland in association with the Terrestrial Flora and Fauna Survey (AARC 2013). Tracks attributable to the Water Rat were also observed in Phillips Creek (MP4). This was the only strictly aquatic mammal observed on the Project site.

6.4.2 Amphibians

Riverine and wetland environments on the Project site provided habitat for five amphibian species:

- Salmon-striped Frog (*Limnodynastes salmini*);
- Spotted Marsh Frog (*Limnodynastes tasmaniensis*);
- Desert Treefrog (*Litoria rubella*);
- Bumpy Rocketfrog (*Litoria inermis*); and
- the introduced Cane Toad (*Rhinella marina*).

These species are common and abundant across the broader region surrounding the Project site.

Amphibian species were recorded in conjunction with both the aquatic and terrestrial flora and fauna surveys over the Project site. With the exception of the Bumpy Rocketfrog, all amphibian species listed above, were recorded in association with the Phillips Creek riverine ecosystem. A photograph of a Desert Treefrog captured in Phillips Creek is provided in Photo Plate 4.

Photo Plate 4 Desert Treefrog (*Litoria rubella*)

Of the five amphibian species recorded in riparian or aquatic habitats on the Project site, four were also recorded at the Lake Vermont palustrine wetland. These included the Salmon-striped Frog (Photo Plate 5), Spotted Marsh Frog, Bumpy Rocketfrog and the introduced Cane Toad. The Spotted Marsh Frog was also recorded in the palustrine wetland adjacent to Phillips Creek.

Photo Plate 5 Salmon-striped Frog (*Limnodynastes salmini*)

Although the Cane Toad is an introduced species, it is not a declared pest, so there is no legal requirement to control their numbers within the Project site. Cane Toads are poisonous and prey on a variety of small native animals. The creation of permanent areas of shallow water should be avoided where possible during Project development, as such areas form artificial habitat for Cane Toads.

A pest fact sheets for this pest species is provided in Appendix D.

6.4.3 Reptiles

Aquatic habitats within the Project site were utilised by two aquatic reptiles, the Keelback (*Tropidonophis mairii*) and Eastern Snake-neck Turtle (*Chelodina longicollis*). The Eastern Snake-neck Turtle was recorded following the discovery of a dead specimen near the pastoral dam. The Keelback was recorded opportunistically in Phillips Creek. No reptiles were recorded in the vicinity of the palustrine wetlands.

These reptile species are both common and abundant in the region.

6.4.4 Birds

A total of 47 aquatic bird species were recorded in association with aquatic and riparian habitats on the Project site. The highest diversity of aquatic birds was recorded at Lake Vermont where 35 species were observed. Surveys at the dam also recorded a high diversity of aquatic birds (30 species). Surveys on Phillips Creek recorded three strictly aquatic bird species.

Surveys on the Project site recorded the presence of three aquatic bird species that are listed as Near Threatened under the NC Act. These species included the Black-necked Stork (*Ephippiorhynchus asiaticus*), Cotton Pygmy-goose (*Nettapus coromandelianus*) and Freckled Duck (*Strictonetta naevosa*). Lake Vermont wetland was found to support all three species, while the lacustrine wetland (i.e. pastoral dam) was also found to support the Freckled Duck.

Two Migratory wetland bird species, the Cattle Egret (*Ardea ibis*) and Eastern Great Egret (*Ardea intermedia*), were recorded within the Project area.

Five common bird species were recorded from all three surveyed wetland areas (i.e. Lake Vermont, the large dam and the wetland adjoining Phillips Creek). These species were the Grey Teal (*Anas gracilis*), Pacific Black Duck (*Anas superciliosa*), White-necked Heron (*Ardea pacifica*), Little Pied Cormorant (*Microcarbo melanoleucos*) and Straw-necked Ibis (*Threskiornis spinicollis*). A full list of aquatic bird species recorded on the Project site is provided in Appendix C.

6.4.5 Fish

Wetlands on the Project site were found to support five fish species. These species are as follows:

- Midgley's Carp Gudgeon (*Hypseleotris* species 1);
- Spangled Perch (*Leiopotherapon unicolor*);
- Flyspecked Hardyhead (*Craterocephalus stercusmuscarum*);
- Agassiz's Glassfish (*Ambassis agassizii*); and
- Southern Purple-spotted Gudgeon (*Mogurnda adspersa*).

Due to the lack of surface water in Phillips Creek, aquatic trapping was limited to the Lake Vermont wetland and the large pastoral dam. Most of the recorded fish species were captured in both waterbodies where trapping was conducted. The most frequently captured species were Midgley's Carp Gudgeon and Agassiz's Glassfish. A brief description of each of the recorded species is provided below. The fish species observed are generally widespread and common species, and most are capable of withstanding harsh environmental conditions. Such species are typical of a slightly to moderately disturbed aquatic ecosystems.

Midgley's Carp Gudgeon (Photo Plate 6) is a widespread species occurring in many coastal drainages of eastern Queensland (Pusey *et al.* 2004). This species is particularly common in floodplain swamps and wetlands, but also occurs in small coastal streams, large rivers, coastal wetlands, dune lake and stream systems, and reservoirs. This species occurs in areas of low flow velocity in a range of depths, but largely between 10 and 50 cm. Midgely's Carp Gudgeon is tolerant of a range of water quality conditions and is commonly recorded in heavily degraded habitats (Pusey *et al.* 2004). This species is not considered threatened under Queensland or Commonwealth legislation.

Photo Plate 6 Midgley's Carp Gudgeon (*Hypseleotris* species 1)

Agassiz's Glassfish (Photo Plate 7) occurs throughout the Murray-Darling system, in coastal drainages of New South Wales and Queensland. This species is found to occur in still or slow-flowing parts of lowland rivers, upland rivers and streams as well as small coastal streams (Pusey *et al.* 2004). It is also know to occur in lakes, ponds, drainage ditches and swamps, particularly where aquatic plants occur. Although the species occupies streams of all sizes it occurs more commonly in larger streams with a low to moderate cover of riparian vegetation. Agassiz's Glassfish is most abundant in habitats containing in-stream vegetation and fine substrates comprised of sand, fine gravel and course gravel. This species is not considered threatened under Queensland or Commonwealth legislation.

Photo Plate 7 Agassiz's Glassfish (*Ambassis agassizii*)

The Spangled Perch (Photo Plate 8) is widespread, occurring in a broad range of habitat types such as streams, lakes, bores, dams and billabongs. It occurs in abundance in most coastal drainage systems in northern and eastern Australia; north of the Greenough River in Western Australia and as far south as the Murray-Darling River system in New South Wales. The Spangled Perch is common throughout the region in which the Project is located. It is known to be tolerant of varying and harsh conditions (Allen *et al*. 2002). This species is not considered threatened under Queensland or Commonwealth legislation.

Photo Plate 8 Spangled Perch (*Leiopotherapon unicolour*)

The Southern Purple-spotted Gudgeon (Photo Plate 9) is common throughout New South Wales, Victoria, southern and eastern Queensland occupying drainages of the east coast from Clarence River in NSW to central Cape York Peninsula in Queensland (Allen *et al.* 2002). This species occupies rivers, creeks and billabongs, usually in slow-flowing sections over rocks or among vegetation. Suitable habitat for this species consists of slow flowing waters containing aquatic weeds and suitable hard objects that support spawning activities. The Southern Purple-spotted Gudgeon is a bottom dweller that rarely swims continuously, tending to cover long distances in a series of jerky darts. This species will migrate from deeper water to spend winter in sheltered habitats. The Southern Purple-spotted Gudgeon is not considered threatened under Queensland or Commonwealth legislation.

Photo Plate 9 Southern Purple-spotted Gudgeon (*Mogurnda adspersa*)

The Flyspecked Hardyhead (Photo Plate 10) has a widespread distribution extending throughout the coastal and inland drainages of eastern and northern Queensland (Pusey *et al.* 2004). Suitable habitats for this species include fast-flowing creeks, still or slow-moving sections of rivers, small creeks, lakes, ponds, reservoirs, and brackish river estuaries. The Flyspecked Hardyhead generally occurs in shallow water among aquatic vegetation with substrates comprised of sand, gravel or mud. The Flyspecked Hardyhead is not considered threatened under Queensland and Commonwealth legislation.

Photo Plate 10 Flyspecked Hardyhead (*Craterocephalus stercusmuscarum*)

One crustacean species, the Freshwater Shrimp (*Paratya australiensis*) was also captured during the aquatic surveys.

6.5 MACRO-INVERTEBRATES

Sampling for macro-invertebrates was completed at MP3, which is located on the Isaac River just past the confluence of Phillips Creek. Due to the shallow depth and narrow width of the stream at the time of sampling, sampling was restricted to deeper edge habitats where in-stream vegetation and leaf litter provided improved habitat opportunities.

A total of 17 macro-invertebrate taxa were identified from samples collected at MP3. The complete taxa list of macro-invertebrates identified during this survey is provided in Appendix E. The most abundant macro-invertebrates included the diving beetle (Coleoptera: Dytiscidae), baetid (Ephemeroptera: Baetidae), caenid (Ephemeroptera: Caenidae) and backswimmer (Hemiptera: Notonectidae).

16 of the 17 macro-invertebrate taxa identified during the aquatic survey were used to compute a SIGNAL 2 Score for MP3. The single remaining taxa (Crustacea: Copepoda) has not been assigned a sensitivity grade number and as such could not be included in the SIGNAL 2 analysis.

Figure 18 below shows the results of the SIGNAL 2 assessment of macro-invertebrate assemblages of watercourses surrounding the Project site. The SIGNAL 2 Score for MP3 has been compared against reference SIGNAL values for the region. Reference values include (i) the EPP (Water) WQO upper and lower SIGNAL Score values for edge habitats (i.e. 3.31 – 4.20), (ii) data collected from upstream of the Project site and Phillips Creek (MAC 5) during previous monitoring events for the existing Lake Vermont Project, and (iii) data collected from Phillips Creek in association with the Lake Vermont Western Extension Project (AARC 2012). SIGNAL reference values are illustrated in Figure 18.

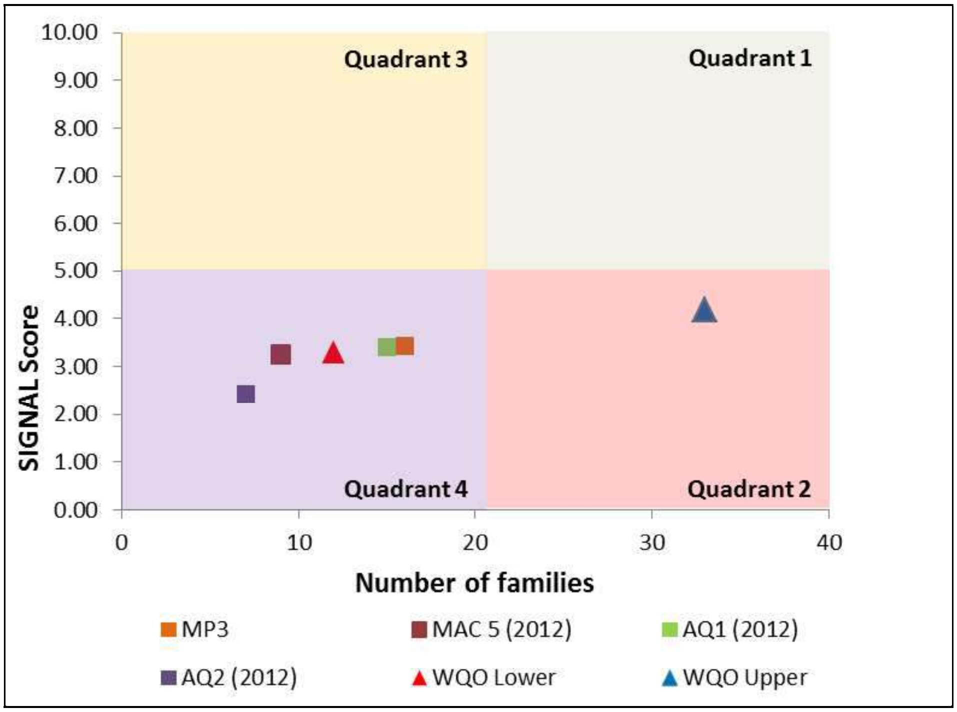

Figure 18 SIGNAL 2 Score

The SIGNAL 2 Score of 3.42 recorded at MP3 was higher than the WQO lower guideline value of 3.31 (edge habitats) and all other SIGNAL 2 scores previously recorded from sampling sites on or upstream of Phillips Creek. However, the SIGNAL 2 Score for MP3 was significantly lower than the WQO upper limit (4.2 for edge habitats) for the Upper Isaac catchment region. While the WQO upper limit lies within Quadrant 2, all SIGNAL scores for the sampling sites and the WQO lower limit fell within Quadrant 4. These results suggest that all sampling sites are subject to some degree of agricultural pollution. Sampling site MP3 occurs on the Isaac River and downstream of all other sites previously sampled for macro-invertebrates. While all of the sampled streams are ephemeral in nature, the Isaac River has a much larger catchment area and would contain surface water for longer periods than Phillips Creek or streams further upstream. As a result, it is expected that MP3 would support a higher diversity and abundance of macro-invertebrates.

It is generally accepted that three orders of macro-invertebrates, the Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) are most sensitive to disturbance (Marshall et al, 2001). The total number of families of these groups occurring at sampling sites can be used to assess degradation of habitat and water quality. The use of EPT analysis is limited to regional comparisons, as the comparison of fauna varies between regions and larger river systems.

A total of four EPT taxa were recorded at MP3. As shown in Figure 19, two Ephemeroptera and two Trichoptera taxa were sampled whilst dip-netting at this site. No taxa belonging to the Plecoptera order were identified at MP3. Again, EPT richness at MP3 has been compared against the data collected at MAC5 in February 2012 and AQ1 and AQ2 in January 2012 (refer to Figure 19). Sampling at MAC 5, AQ1 and AQ2 recorded similarly low numbers of taxa belonging to the orders Ephemeroptera and Trichoptera. The EPT richness analysis indicates that waterways in the vicinity of the Project do not typically support taxa belonging to the Plecoptera order.

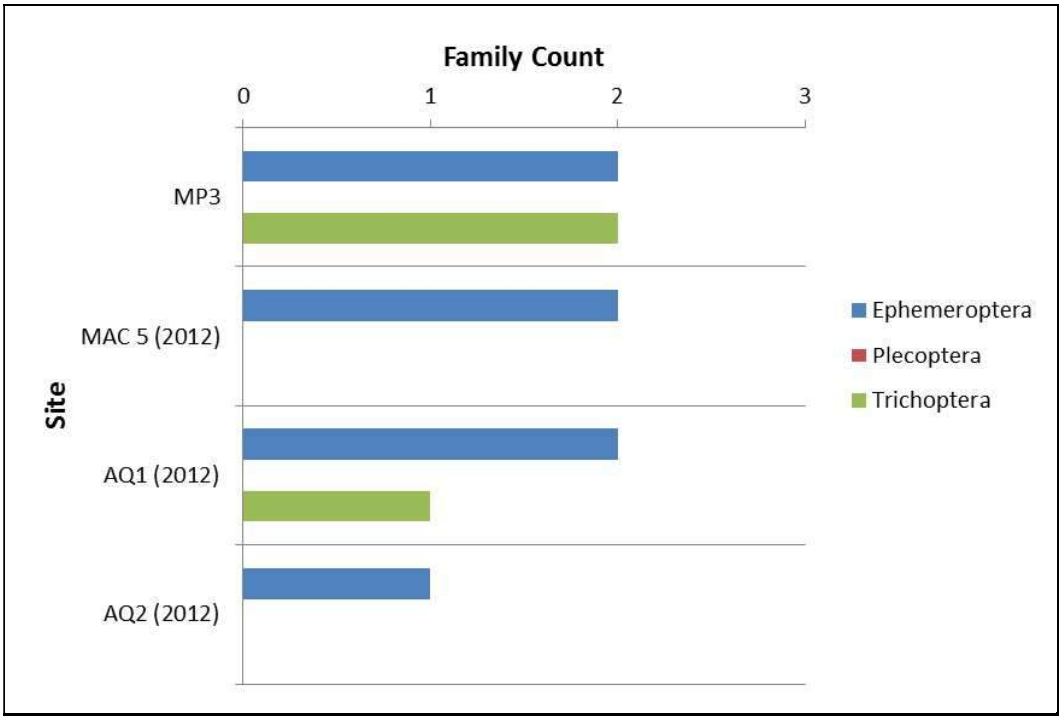

Figure 19 EPT Richness

A summary of all macro-invertebrate data collected prior to and during the aquatic ecology survey is provided in Table 12 below. The results of the sampling conducted at MP3 have been compared with the WQOs for macro-invertebrate diversity and abundance within the Upper Isaac River catchment waters.

Table 12 Macro-invertebrate Sampling Results

Macro-invertebrate Analysis	Macro-invertebrate WQO (Protection of Aquatic Ecosystem EV)	Historical Data			Isaac River – Downstream of Phillips Creek (MP3)
		Upstream of Phillips Creek (MAC5)	Phillips Creek (AQ1)	Phillips Creek (AQ2)	
Taxa richness	23 – 33 (edge habitat) 12 – 21 (composite)	9	18	9	17
EPT taxa richness	2 – 5	2	3	1	4
SIGNAL index	3.31 – 4.2 (edge habitat) 3.33 – 3.85 (composite)	3.25	3.41	2.43	3.42

As shown in Table 12, MP3 exhibited levels of macro-invertebrate diversity and abundance that were generally consistent with the WQOs for sampling edge habitats of moderately disturbed aquatic ecosystems throughout the catchment. The macro-invertebrate assemblage recorded from the Isaac River (MP3) was found to be more diverse than that recorded in and upstream of Phillips Creek (i.e.

historic data). The January 2012 sampling results (AQ1) indicate that given sufficient periods of flow, Phillips Creek has the potential to support a similar assemblage of macro-invertebrates. Overall, the results suggest that, of the surveyed streams, the Isaac River comprises the highest level of stream health.

6.6 HABITAT ASSESSMENT

Habitat assessment surveys were conducted at four aquatic sites along Phillips Creek and one site on the Isaac River. Table 13 below shows the Habitat Assessment scores, as determined by the AUSRIVAS assessment for each of the riverine survey sites. All sites surveyed along Phillips Creek and the Isaac River fell into the category of moderate habitat variety. Refer to Table 6 for interpretation of Habitat Assessment Scores. Riparian zones at all sites were well vegetated with trees forming the dominant vegetation on the upper banks while exotic grasses were dominant on the lower embankments. The dominance of exotic grasses on the lower embankments contributed to the generally poor to moderate bank stability. Erosion and bank slumping was recorded commonly along the watercourse and while most areas of impact were small, some areas were extensive. Stream banks at most sites were subject to the impacts of livestock access. Overall, the habitat assessment results indicate riverine ecosystems within, upstream and downstream of the Project are typical of slightly – moderately disturbed ecosystems.

Each riverine survey site is discussed in detail in the following sections. The AUSRIVAS Habitat Assessment proforma is provided in Appendix F. A short summary of habitat assessment data for each site is presented in Sections 6.6.1 to 6.6.2.

Table 13 AUSRIVAS Habitat Assessment Results

Sampling Site	Habitat Assessment Score / 135
Phillips Creek	
MP2 (AQ1)	54
MP4	50
AQ2	66
AQ3	46
Isaac River	
MP3	61

6.6.1 Phillips Creek

6.6.1.1 MP2

MP2 (also identified in this assessment as AQ1) occurs on Phillips Creek in the far west of the Project site. MP2 was dry at the time of the AUSRIVAS habitat assessment. This section of the creek is considered to provide moderate habitat variety during wet periods. Habitat features include a limited abundance of detritus, and small areas of leaf litter and vegetation overhang. Streamside vegetation consists predominantly of exotic grasses while trees form the dominant vegetation type. Bank stability was ranked as moderate with small, infrequent areas of erosion. The stream bed was flat and generally straight with little substrate variability. This section of Phillips Creek was awarded a moderate habitat assessment score of 54 out of 135.

Photo Plate 11 Habitat Assessment Site on Phillips Creek – MP2

6.6.1.2 MP4

MP4 is located on Phillips Creek in the eastern region of the Project site. This section of the creek offers moderate habitat variety for aquatic flora and fauna. Habitat features include fallen woody debris, bank overhang vegetation and exposed tree roots. The stream is flat, relatively straight and highly ephemeral being dry at the time of the habitat assessment. Stream channelisation was minimal with no recent increases in bar formation. Banks were moderately unstable with moderate frequency and size of eroded and slumping areas. Greater than 80 % of streambank surfaces were covered by vegetation such as grasses. Trees form the dominant vegetation type. Overall, this section of the creek recorded a moderate habitat assessment score of 50 out of 135.

Photo Plate 12 Habitat Assessment Site on Phillips Creek – MP4

6.6.1.3 AQ2

AQ2 is located on Phillips Creek in the central portion of the Project site. This survey site is located in the general vicinity of the proposed creek diversion area. AQ2 provides moderate habitat variety owing to a moderate density of in-stream coarse woody debris (i.e. fallen logs) and small areas of overhanging vegetation. Streamside vegetation consists of mosses, rushes and grasses. The stream bed was relatively flat with little channelisation. This section of the creek features two gentle bends approximately 50 m apart. The streambanks were moderately unstable exhibiting moderate frequency and size of eroded areas and side slopes up to 60° on some sections of bank. Trees form the dominant vegetation type. This section of the creek was awarded a moderate habitat assessment score of 66 out of 135.

Photo Plate 13 Habitat Assessment Site on Phillips Creek – AQ2

6.6.1.4 AQ3

AQ3 is located on Phillips Creek, approximately 4.5 km upstream of the Project boundary. AQ3 provides moderate habitat variety. The stream is highly ephemeral tending to flow only after prolonged periods of rainfall. Both slow, shallow and fast, shallow velocity / depth factors, featuring riffles and runs were observed following heavy rainfall. Habitat features are limited to fallen woody debris which is sparsely scattered throughout the stream reach. Streamside vegetation includes mosses, rushes and grasses. Bank stability was low with many eroded and raw areas observed either side of the stream. This section of the creek was moderately disturbed due to the presence of eroded gullies and cattle tracks and a gravel road crossing, materials from which were observed to be washing downstream of the crossing. Surface waters were observed to contain high sediment loads and stream sediment composition was also slightly altered. Trees are typically the dominant form of vegetation in this stretch of Phillips Creek. The habitat assessment undertaken at AQ3 recorded a moderate habitat assessment score of 46 out 135.

Photo Plate 14 Habitat Assessment Site on Phillips Creek – AQ3

6.6.2 Isaac River

6.6.2.1 MP3

MP3 occurs on the Isaac River, immediately downstream of the confluence of Phillips Creek. This site offers moderate habitat variety through the presence of a small amount of detritus, submerged leaf litter and algae. Stream bank surfaces were dominated by exotic grasses while trees form the dominant vegetation type. The embankments were moderately stable with erosion occurring in small, infrequent patches that were largely healed over by grasses. Streambank slopes ranged from 50° to 70° with a height of up to 9 m. Although the stream bed was largely flat and straight, minor channelisation was noted. This section of the Isaac River recorded a moderate habitat assessment score of 61 out of 135.

Photo Plate 15 Habitat Assessment Site on Isaac River – MP3

6.7 STREAM MORPHOLOGY

A range of morphologies in riverine systems (i.e. river and creek channels), palustrine and lacustrine wetlands occur on the Project site (refer to Figure 5). Stream morphology analysis was conducted at 19 sites along the section of Phillips Creek that traverses the Project site. The stream morphology assessment provides a detailed description of the physical characteristics of Phillips Creek and provides baseline data for future reference. This assessment was limited to Phillips Creek as no other riverine systems occur within the Project boundary.

Phillips Creek is a third order stream flowing in a northeast direction through the Project site. The creek comprises a wide (to 12 m) channel with steep embankments up to 9 m in height. The stream bed is relatively flat and consists predominantly of sand. Riparian vegetation fringing Phillips Creek is dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*), typically with an associated presence of Moreton Bay Ash (*Corymbia tessellaris*).

Bank stability along Phillips Creek ranged from very poor to good with average side slopes of 60° on both banks. The majority of the creek was found to be of moderate condition with small to moderately sized areas of erosion occurring intermittently. However, the downstream section of the creek (i.e. downstream of SM2) was considered to be of poor or very poor condition due to the concentration of impacts, such as creek crossings and livestock access, which have resulted in significant areas of erosion. Overall, the results of the stream morphology assessment along Phillips Creek describe a slightly – moderately disturbed ecosystem.

The results of the stream morphology assessment are summarised in Table 14. Detailed stream morphology data for each survey site is presented in Appendix G.

Table 14 Phillips Creek Stream Morphology Summary

Location	Phillips Creek			
Co-ordinates (GDA 94, Zone 55)	Start: 22.43179° S, 148.38063° E		End: 22.38172° S, 148.44792° E	
Mean Channel Depth	A well defined channel to a mean depth of 7 m			
Mean Channel Width	9 m			
Flow Direction	North-east			
Mean Bank Slope	North Bank:	60°	South Bank:	60°
Bank Stability	Varies from very poor to good, but typically classified as moderate. Sampling sites downstream of SM2 were ranked as poor or very poor due to considerable areas of erosion, typically due to high level disturbances such as creek crossings and livestock access points.			
Substrate Composition	Bed: yellow / red sand Bank: red / yellow sandy loam			
Terracing	Terracing was recorded on one or both banks along Phillips Creek. Sections of bank terracing were typically <1 m to 1.5 m in height, with the occasional terrace observed on the mid to high banks (i.e. at heights of 3 to 8 m) of the watercourse.			
Surface Water	Dry at the time of assessment, except one site (SM2) where two small, stagnant pools were recorded.			
Channel Alteration (channelisation, scouring & deposition)	A small degree of channelisation was observed at all sites, except SM18 and MP4 where there was no obvious channelisation.			
Habitat Features	A low – moderate density of fallen woody debris occurs throughout the stream reach. Stream edges consist of occasional exposed tree roots and small, sporadically occurring areas of undercut bank.			
Mean Width of Riparian Zone	North Bank:	30 m	South Bank:	30 m
Mean Canopy Cover	North Bank:	40 %	South Bank:	40 %
Riparian Vegetation	Co-dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*) +/- Moreton Bay Ash (*Corymbia tessellaris*).			

6.8 SUMMARY OF AQUATIC VALUES

In summary, the aquatic ecology assessment described the whole Project area as containing aquatic ecosystem values typical of a slightly to moderately disturbed ecosystem, impacted by upstream mining activities and surrounding land uses such as cattle grazing and associated access tracks. Aquatic values were described by ecosystem type such as riverine areas, palustrine wetlands or lacustrine wetlands. Aquatic values identified in each aquatic ecosystem type are summarised below.

Riverine Ecosystems

The riverine ecosystems (i.e. Phillips Creek and Isaac River) comprise linear, fringing, remnant vegetation communities with a ground layer that is dominated by the introduced Giant Panic Grass. A high diversity of introduced weeds was recorded in association with Phillips Creek overall, indicating moderate disturbance within and upstream of the Project site. The Phillips Creek riverine system supports a low – moderate diversity of fauna including one aquatic mammal, four amphibians (including the introduced Cane Toad), one reptile and three aquatic birds. Biological sampling in the Isaac River revealed levels of macro-invertebrate diversity and abundance that were generally consistent with the WQOs for sampling edge habitats of moderately disturbed aquatic ecosystems throughout the catchment.

The habitat assessments recorded moderate habitat variety throughout the riverine ecosystems. Although the riverine sites comprised little substrate variation (i.e. predominantly sandy, flat creek beds), limited abundances of leaf litter and fallen woody debris and a small degree of vegetation overhang, the riparian zones were well vegetated with trees forming the dominant vegetation on the upper banks. The embankments were dominated by exotic grasses which likely contributed to the generally poor to moderate bank stability. Stream banks at most sites suffered some degree of erosion as a result of either livestock access and/or creek crossings.

Surface water sampling in the riverine ecosystems recorded water quality that is representative of a slightly – moderately disturbed ecosystem. Most metal concentrations in surface waters and stream sediment were recorded below the WQO values for the Isaac River Sub-basin catchment. Elevated levels of dissolved copper and total aluminium were encountered along Phillips Creek (at AQ4 and AQ3, respectively). All other metals results were below guideline values.

Some riverine sites recorded elevated levels of nutrients and physico-chemical parameters, possibly a result of runoff from agricultural land uses and high sediment loads. Overall, the riverine area associated with Phillips Creek was found to be moderately disturbed due to the presence of road crossings, grazing impacts and upstream land uses including mining.

Palustrine Wetlands

Lake Vermont wetland consists of a large permanent waterbody with shallow edges. The smaller palustrine wetland adjoining Phillips Creek consisted of large, shallow pools of water. Both of these palustrine wetlands support an open canopy of remnant vegetation and an abundance of macrophytes in the ground layer. The palustrine wetland areas contained several weed species.

Lake Vermont supports a large diversity and abundance of aquatic birds (i.e. 35 species), four common species of fish and four amphibians including the Cane Toad. The suite of bird species recorded at this wetland includes three species that are listed as Near Threatened under the NC Act (i.e. Black-necked Stork, Cotton Pygmy-goose and Freckled Duck) and two Migratory wetland bird species (i.e. the Cattle Egret and Eastern Great Egret). Overall, Lake Vermont provides an important habitat area for aquatic fauna species. The palustrine wetland adjacent to Phillips Creek supports a small number of aquatic birds and frogs.

Analysis of water quality and sediment data for the palustrine wetlands revealed parameters generally fell below the WQOs for disturbed aquatic ecosystems in the Isaac River sub-basin catchment. One slight exceedance of dissolved zinc was recorded at Lake Vermont. Nickel levels in stream sediments at the Wetland indicate an exceedance of the ISQG Low trigger level. The wetland areas exhibited low level disturbance due to livestock accessing the waterbodies. Overall, the aquatic values of the palustrine wetlands are indicative of slightly disturbed ecosystems.

Lacustrine Wetlands

The lacustrine wetland (i.e. large pastoral dam) in the south of the Project consists of a large permanent body of water that lacks canopy and understorey vegetation. While the edges of the dam are dominated by grasses, various aquatic emergents occur throughout the wetland environment. This wetland area also supports a large diversity of birds (i.e. 30 species), four common fish species and one reptile. The suite of bird species recorded on the dam includes one threatened species, the Freckled Duck.

Site access restrictions following rainfall prevented the collection of surface water and sediment samples at the dam site. As a result, the quality of surface waters could not be used as a measure of aquatic values for this lacustrine wetland environment. The dam was observed to be slightly – moderately impacted by previous clearing and grazing with stock using the dam as a watering point. This wetland area is representative of a slightly – moderately disturbed aquatic ecosystem.

7.0 POTENTIAL IMPACTS AND MITIGATION STRATEGIES

7.1 POTENTIAL IMPACTS

The Project has the potential to cause the following impacts on the aquatic ecology values of the Project site:

- Clearing of vegetation in riparian and wetland areas may lead to habitat loss and the disruption of existing wildlife corridors along Phillips Creek and adjoining habitats. As shown in Figure 2, the Project proposes clearing of riparian vegetation within the section of Phillips Creek that is to be diverted. The lacustrine wetland (Farm Dam) is also located within the proposed mining footprint, as is the small palustrine wetland adjacent to Phillips Creek (impacted by construction of the flood levee). No disturbance is proposed for Lake Vermont wetland.

- Mining of the target resource areas in the vicinity of Lake Vermont may have a drawdown impacts , however, JBT (2014) concludes that the risk that drawdown from mining will impact on groundwater dependant ecosystems is low. This is due to the depth of the regional groundwater table from surface and the limited extent of drawdown impacts from mining.

- Potential exists for increased erosion and sedimentation of riverine and wetland habitats due to land clearing, construction activities and mining operations;

- Unplanned releases of contaminated water from mining operations may reach downstream riverine habitats and wetland areas. Any releases of pollutants to aquatic environments can have potential impacts on ecosystem health;

- Potential exists for the introduction or spread of weed and pest species on the Project site. Any project construction and operational activities that result in land disturbance or provide additional water sources (i.e. ponding) may increase habitat suitability for weed and pest species. The operation of vehicles and machinery on the site may also lead to the introduction of additional weed species and the spreading of weeds across the Project site; and

- Diversion of Phillips Creek and changes associated with proposed mine infrastructure may result in alterations to downstream surface water / flood dynamics. Such changes have potential to impact on downstream aquatic values, including Lake Vermont. A summary of potential impacts on Lake Vermont are included below:

  - Lake Vermont occasionally receives Phillips Creek floodwater inflows. Hydraulic modelling of Phillips Creek shows that this occurs when the flow rate exceeds approximately 250 m^3/s, which is less than the 1 in 5 Annual Exceedance Probability peak flood flow. The Vermont North Flood Impact Assessment (WRM 2104) shows the overflow paths in the vicinity of Lake Vermont at a time close to the point of overtopping in the post-diversion case. The assessment shows that at this time (with the exception of inundation caused by local inflows), water is still contained within the channel in upstream locations (the upstream channel capacity is generally greater than 1 in 5 AEP). The infrastructure proposed for the Northern Extension will therefore not significantly impact on the frequency of Phillips Creek floodwater entering Lake Vermont. During a larger flood, the levees will cause a small reduction in the southern floodplain flow depths, which will result in a reduction in the rate of inflow to Lake Vermont. However, at the expected rate of inflow, by the time these changes become significant, it is likely that Lake Vermont would have received in excess of its 690 Ml capacity through the combined effects of catchment runoff and flooding. Therefore, changes in Phillips Creek flooding are unlikely to have impact on Lake Vermont storage volumes and in turn are not expected to impact on aquatic / ecological values of the Lake.

- The local catchment area of Lake Vermont is 10.7 km^2. Part of this catchment will by disturbed by mining, and will be captured within the mine water management system. At the end of mine life a reduction in local catchment area of 1.2 km^2 (11% of existing) is predicted (WRM 2014). This will result in reduced of inputs to Lake Vermont between flood events. Local catchment runoff is small compared to evaporation, and is insufficient to fill Lake Vermont. Lake Vermont only fills during Phillips Creek floods significant greater than the 1 in 2 AEP flood. As a result the reduction of local catchment is likely to have limited impact on the overall volume stored in the Lake. Subsequent impacts on aquatic / ecological values of Lake Vermont are unlikely or insignificant.

7.2 MITIGATION MEASURES

- Clearing of the mine site should be limited to the approved footprint to minimise impacts and where possible, should be conducted using a staged approach to minimise the area of active land disturbance at any one time;

- Impacts on aquatic values which comprise matters of state environmental significance should be considered for offset in accordance with the relevant state policy;

- To minimise erosion and create a safe and stable landform, rehabilitation should be completed progressively as suitable land becomes available;

- Rehabilitation works should aim to reinstate riparian vegetation along the Phillips Creek diversion. Rehabilitation should aim to prevent erosion of the channel and restore vegetation and habitat values of the waterway. Details of the proposed diversion rehabilitation strategy are provided in the Function Design Report (WRM 2014);

- The creek diversion should be designed in accordance with the Department of Natural Resources and Mines current guidelines and should aim to replicate existing conditions, including stream length, flow rates and habitat values;

- To protect aquatic values of the Project site, pest species should be monitored and actively controlled;

- Weed species should be monitored for local abundance and the presence of new species occurring on the Project site. Weed controls should be implemented as required to protect aquatic values;

- Appropriate erosion and sediment controls should be implemented during construction and operational stages to protect the receiving waterways;

- The current EA conditions for managing releases from the mine should continue to be implemented for the extended Project; and

- The receiving environment monitoring program in place at the existing Lake Vermont Mine should be extended to accommodate the receiving environment of the Lake Vermont Northern

Extension Project and updated to include monitoring of the Lake Vermont Wetland. Where feasible, design of the program should incorporate monitoring locations used in this report to enable direct comparison during and post mining.

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Appendix A Database Search Results

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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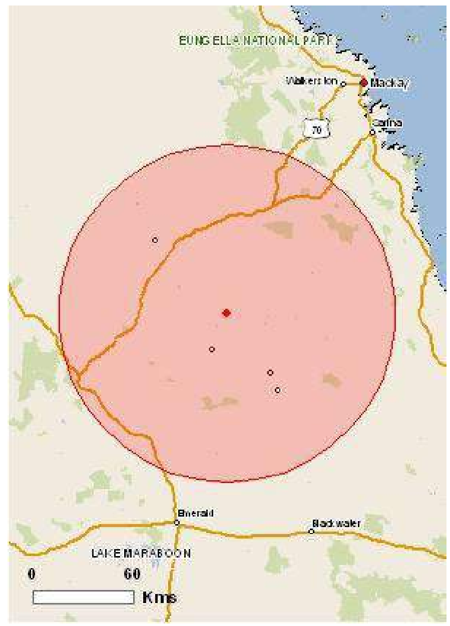

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

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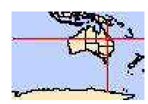

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	31
Listed Migratory Species:	14

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	4
State and Territory Reserves:	10
Regional Forest Agreements:	None
Invasive Species:	32
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Broad leaf tea-tree (Melaleuca viridiflora) woodlands in high rainfall coastal north Queensland	Endangered	Community may occur within area
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	Endangered	Community likely to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Erythrotriorchis radiatus		
Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Geophaps scripta scripta		
Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area
Neochmia ruficauda ruficauda		
Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Poephila cincta cincta		
Black-throated Finch (southern) [64447]	Endangered	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Vulnerable	Species or species habitat likely to occur within area
Mammals		

Name	Status	Type of Presence
Dasyurus hallucatus		
Northern Quoll [331]	Endangered	Species or species habitat known to occur within area
Nyctophilus corbeni		
South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Other		
Cycas megacarpa		
[55794]	Endangered	Species or species habitat known to occur within area
Cycas ophiolitica		
[55797]	Endangered	Species or species habitat likely to occur within area
Plants		
Cadellia pentastylis		
Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
Daviesia discolor		
[3567]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium queenslandicum		
King Blue-grass [5481]	Endangered	Species or species habitat known to occur within area
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Digitaria porrecta		
Finger Panic Grass [12768]	Endangered	Species or species habitat likely to occur within area
Eucalyptus raveretiana		
Black Ironbox [16344]	Vulnerable	Species or species habitat likely to occur within area
Leucopogon cuspidatus		
[9739]	Vulnerable	Species or species habitat likely to occur within area
Omphalea celata		
[64586]	Vulnerable	Species or species habitat likely to occur within area
Phaius australis		
Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Phalaenopsis rosenstromii		
Native Moth Orchid [15984]	Endangered	Species or species habitat may occur within area
Samadera bidwillii		
[29708]	Vulnerable	Species or species habitat likely to occur within area
Streblus pendulinus		
Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Taeniophyllum muelleri		
Minute Orchid, Ribbon-root Orchid [10771]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Reptiles		
Delma labialis		
Striped-tailed Delma, Single-striped Delma [25930]	Vulnerable	Species or species habitat may occur within area
Delma torquata		
Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Denisonia maculata		
Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area
Egernia rugosa		
Yakka Skink [1420]	Vulnerable	Species or species habitat likely to occur within area
Furina dunmalli		
Dunmall's Snake [59254]	Vulnerable	Species or species habitat known to occur within area
Lerista allanae		
Allan's Lerista, Retro Slider [1378]	Endangered	Species or species habitat known to occur within area
Paradelma orientalis		
Brigalow Scaly-foot [59134]	Vulnerable	Species or species habitat known to occur within area
Rheodytes leukops		
Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Marine Species		
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat likely to occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
[Myiagra cyanoleuca] Satin Flycatcher [612]		Species or species habitat known to occur within area
[Rhipidura rufifrons] Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Ardea alba] Great Egret, White Egret [59541]		Species or species habitat known to occur within area
[Ardea ibis] Cattle Egret [59542]		Species or species habitat likely to occur within area
[Gallinago hardwickii] Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Rostratula benghalensis (sensu lato)] Painted Snipe [889]	Vulnerable*	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
[Anseranas semipalmata] Magpie Goose [978]		Species or species habitat may occur within area
[Apus pacificus] Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba] Great Egret, White Egret [59541]		Species or species habitat known to occur within area
[Ardea ibis] Cattle Egret [59542]		Species or species habitat likely to occur within area
[Gallinago hardwickii] Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Haliaeetus leucogaster] White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Hirundapus caudacutus] White-throated Needletail [682]		Species or species habitat likely to occur within area
[Hirundo rustica] Barn Swallow [662]		Species or species habitat may occur within area
[Merops ornatus] Rainbow Bee-eater [670]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Vulnerable*	Species or species habitat likely to occur within area
Reptiles		
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Dipperu National Park	QLD	Registered
Peak Range Areas	QLD	Registered
Historic		
Nebo Hotel	QLD	Indicative Place
Old Peak Downs Homestead	QLD	Indicative Place

State and Territory Reserves [Resource Information]

Name	State
Coolibah	QLD
Dipperu (Scientific)	QLD
German Creek	QLD
Henellen	QLD
Homevale	QLD
Homevale	QLD
Junee	QLD
Kemmis Creek	QLD
Lords Table Mountain	QLD
Peak Range	QLD

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Bufo marinus Cane Toad [1772]		Species or species habitat likely to occur within area
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica		
Prickly Acacia [6196]		Species or species habitat may occur within area
Andropogon gayanus		
Gamba Grass [66895]		Species or species habitat likely to occur within area
Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis		
Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Jatropha gossypifolia		
Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Opuntia spp.		
Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata		
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus		
Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla		
Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Vachellia nilotica		
Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Lake Elphinstone	QLD

Coordinates

-22.39639 148.42798

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- -Department of Environment, Climate Change and Water, New South Wales
- -Department of Sustainability and Environment, Victoria
- -Department of Primary Industries, Parks, Water and Environment, Tasmania
- -Department of Environment and Natural Resources, South Australia
- -Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
- -Environmental and Resource Management, Queensland
- -Department of Environment and Conservation, Western Australia
- -Department of the Environment, Climate Change, Energy and Water
- -Birds Australia
- -Australian Bird and Bat Banding Scheme
- -Australian National Wildlife Collection
- -Natural history museums of Australia
- -Museum Victoria
- -Australian Museum
- -SA Museum
- -Queensland Museum
- -Online Zoological Collections of Australian Museums
- -Queensland Herbarium
- -National Herbarium of NSW
- -Royal Botanic Gardens and National Herbarium of Victoria
- -Tasmanian Herbarium
- -State Herbarium of South Australia
- -Northern Territory Herbarium
- -Western Australian Herbarium
- -Australian National Herbarium, Atherton and Canberra
- -University of New England
- -Ocean Biogeographic Information System
- -Australian Government, Department of Defence
- -State Forests of NSW
- -Geoscience Australia
- -CSIRO
- -Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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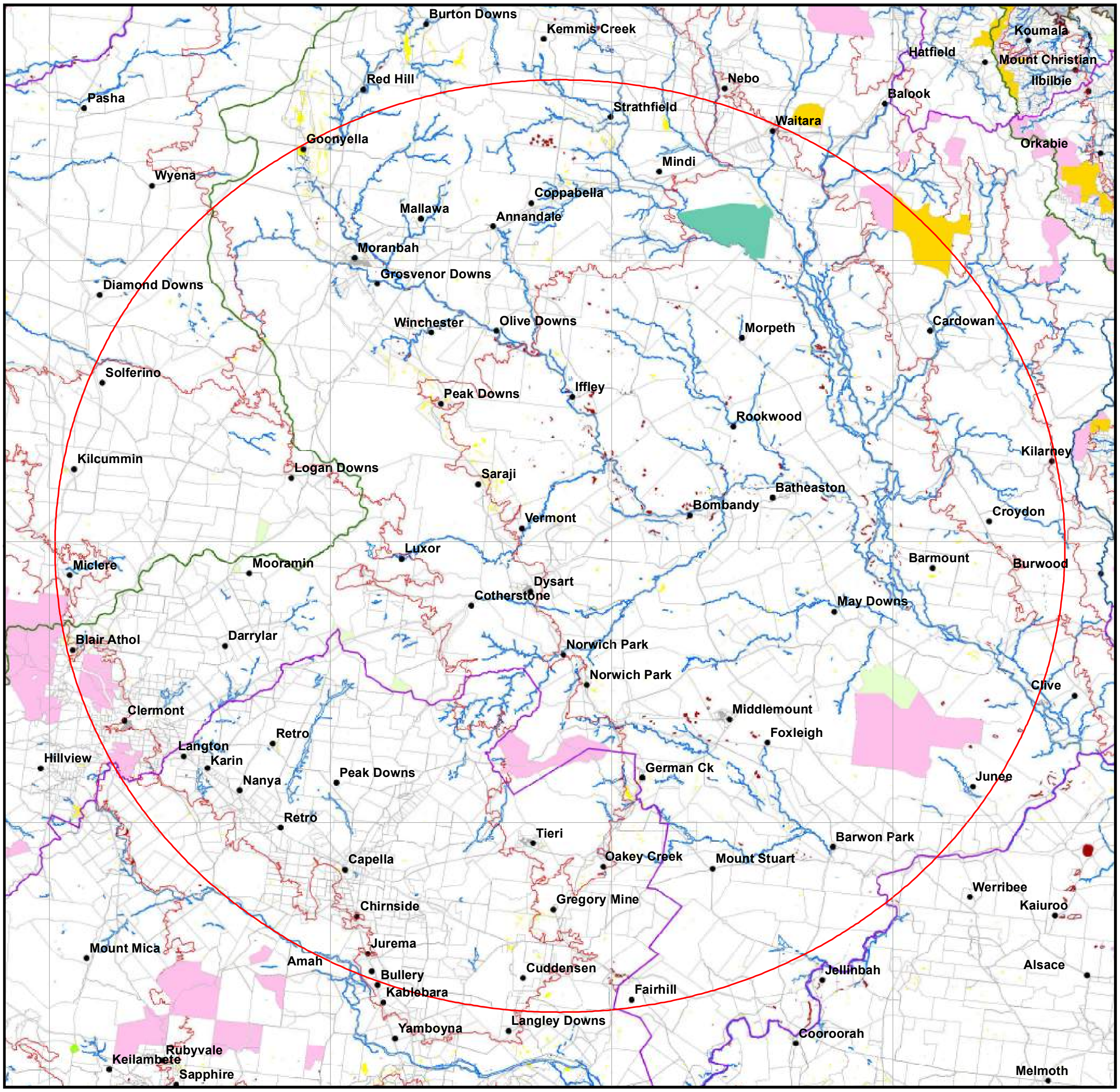


Legend

WB **RE**

- Marine System (e.g. open ocean)
- Estuarine System (e.g. mangroves, salt flats and estuaries)
- Riverine System (e.g. river and creek channels)
- Lacustrine System (e.g. lakes)
- Palustrine System (e.g. vegetated swamps)
- Springs
- Riverine System Drainage Lines
- Remnant Regional Ecosystem 51-80% Wetland (mosaic units)
- Nominated Area of Interest

For the purposes of mapping and classification, are:
"Areas of permanent or periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exc eed 6m. To be a wetland the area must have one or more of the following attributes:

i. at least periodically the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or
ii. the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or
iii. the substratum is not soil and is saturated with water, the substratum is or covered by water at some time."

Other features

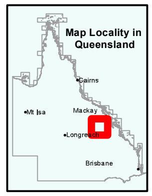
- Towns
- Cadastral boundaries
- Roads
- Major Roads
- Built-up areas of QLD
- Ocean Areas

Queensland Wetland Map

Queensland Government

Australian Government

Queensland Wetlands Program



Horizontal Datum: Geographic Datum of Australia 1994 (GDA94)

Further information on wetland mapping (including methodology and digital data) is available from: www.wetlandinfo.derm.qld.gov.au

Accuracy Information
The positional accuracy of wetland data mapped at a scale of 1:100 000 is +/ -100m with a minimum polygon size of 5ha or 75m wide for linear features, except for areas along the east coast which are mapped at the 1:50 000 scale with a positional accuracy of +/ -50m, with a minimum polygon size of 1ha or 35m wide for linear features. Wetlands smaller than 1ha are not delineated on the wetland data.
Consideration of the effects of mapped scale is necessary when interpreting data at a larger scale, eg: 1:25,000. For property assessment, digital line work should be used as a guide only.
The extent of wetlands depicted on this map is based on rectified 2009 Landsat ETM+ imagery supplied by Statewide Landcover and Trees Study (SLATS), Department of Environment and Resource Management (DERM).
The extent of water bodies is based on the maximum extent of inundation derived from available Landsat imagery up to and including the 2009 imagery.

Data Sources
Water body mapping derived from satellite imagery, DERM; Regional Ecosystem mapping, DERM ; drainage mapping, Geoscience Australia (GA), Department of Defence, DERM; roads, Pitney Bowes Software; towns and built up areas GA, 2003; coastline, GA, 2004; Queensland 3NM Limit, Australian Maritime Boundaries Information System (AMBIS), GA, 2001; Digital Cadastral Database (DCDB) DERM, July 2011; springs database, Queensland Herbarium, 2011; SRTM 90m DEM USGS/NASA, 2006. Landsat ETM+ imagery supplied by the Australian Centre for Remote Sensing (ACRES), Australian Surveying and Land Information Group (AUSLIG), Canberra. The satellite imagery used in this product has been pre-processed by SLATS, DERM.

Disclaimer
While every care is taken to ensure the accuracy of this product, the Queensland Government and Australian Government and Pitney Bowes Software make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a consequence of reliance on the product, or as a result of the product being inaccurate or incomplete in any way and for any reason.

Based on data from November 2011 © The State of Queensland 2013

Major Towns

Name
Grosvenor Downs
Peak Downs
Mallawa
Blair Athol
Clermont
Nanya
Peak Downs
Luxor
Coppabella
German Ck
Morpeth
Mindi
Barmount
Miclere
Kilcummin
Chirnside
Amah
Gregory Mine
Winchester
Strathfield
Rookwood
Kilarney
Karin
Solferino
Tieri
Norwich Park
Saraji
Bombandy
Waitara
Logan Downs
Jurema
Dysart
May Downs
Junee
Cardowan
Darrylar
Mooramin
Cuddensen
Cotherstone
Olive Downs
Fairhill
Barwon Park
Middlemount
Retro
Capella
Annandale
Batheaston
Langton
Retro
Goonyella
Oakey Creek
Norwich Park
Vermont
Iffley
Moranbah
Mount Stuart
Foxleigh
Croydon

Local Government

Name	LGA Code	ABBREV_NAME	ABBREV_NAME
ISAAC REGIONAL	3980	ISAAC REGIONAL	Null
CENTRAL HIGHLANDS REGIONAL	2270	CENTRAL HIGHLANDS REGIONAL	Null

NRM Regions

NRM Body Name
Fitzroy Basin Association
NQ Dry Tropics

Basins

Basin Name
Burdekin
Fitzroy

Protected Areas

Lot/Plan	Estate Name	Estate Type	Estate Tenure	Area (ha)	Gazetteer Date	QPWS_REG
127FTY1849	Blair Athol State Forest	SF	SF	52717	2/12/2005	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
10CLM665	Clermont Workshop - QPW	LO	FH	0.474203	Null	Central
4RP620140	Clermont Residence Site	LO	FH	0.083297	Null	Central
202NPW394	Peak Range National Park	NP	NP	2500	16/12/1994	Central
9FTY1819	Junee State Forest	SF	SF	24800	1/01/2020	Central
23SP100966	Junee National Park	NP	NP	5400	15/12/2000	Central
189NPW152	Peak Range National Park	NP	NP	2500	16/12/1994	Central
21FTY1202	Bundoora State Forest	SF	SF	8393.3	1/01/2020	Central
1AP19302	Tierawoomba Forest Reserve	FR	FR	10973	3/06/2011	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
42NPW668	Dipperu National Park (Scientific)	NS	NP	11100	18/05/2001	Central
89FTY1933	Tierawoomba State Forest	SF	SF	4181	3/06/2011	Central
1AP19302	Tierawoomba Forest Reserve	FR	FR	10973	3/06/2011	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
89FTY1933	Tierawoomba State Forest	SF	SF	4181	3/06/2011	Central
145FTY1413	Copperfield State Forest	SF	SF	2379	1/01/2020	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
145FTY1413	Copperfield State Forest	SF	SF	2379	1/01/2020	Central
145FTY1413	Copperfield State Forest	SF	SF	2379	1/01/2020	Central
145FTY1413	Copperfield State Forest	SF	SF	2379	1/01/2020	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
145FTY1413	Copperfield State Forest	SF	SF	2379	1/01/2020	Central

Lot/Plan	Estate Name	Estate Type	Estate Tenure	Area (ha)	Gazetteer Date	QPWS_REG
13C9546	Clermont Duplex Residence Site	LO	FH	0.207375	Null	Central
15NPW152	Peak Range National Park	NP	NP	2500	16/12/1994	Central
202NPW394	Peak Range National Park	NP	NP	2500	16/12/1994	Central
202NPW394	Peak Range National Park	NP	NP	2500	16/12/1994	Central
108NPW154	Peak Range National Park	NP	NP	2500	16/12/1994	Central
21FTY1202	Bundoora State Forest	SF	SF	8393.3	1/01/2020	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
127FTY1849	Blair Athol State Forest	SF	SF	52717	2/12/2005	Central
145FTY1413	Copperfield State Forest	SF	SF	2379	1/01/2020	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
19C9547	Clermont Office Site	LO	FH	0.060932	Null	Central
21FTY1202	Bundoora State Forest	SF	SF	8393.3	1/01/2020	Central
15MPH172	Apsley State Forest	SF	SF	4981	4/06/2010	Central
145FTY1413	Copperfield State Forest	SF	SF	2379	1/01/2020	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
117FTY1842	Apsley State Forest	SF	SF	4981	4/06/2010	Central
21FTY1202	Bundoora State Forest	SF	SF	8393.3	1/01/2020	Central
21FTY1202	Bundoora State Forest	SF	SF	8393.3	1/01/2020	Central
9FTY1819	Junee State Forest	SF	SF	24800	1/01/2020	Central

Water Resource Plan Boundaries

Name
Burdekin
Fitzroy

Bioregions

Region Name
BRB
BRB
BRB
CQC
BRB
BRB
BRB

Flora Species List

Kingdom	Class	Family	Scientific Name	Common Name	I	NCA	EPBC	No.	Last Seen
Fungi	Basidiomycetes	Basidiomycota	Agrocybe		N	C		1/1	2008-07-23
Fungi	Basidiomycetes	Basidiomycota	Ganoderma		N	C		1/1	1971-02-28
Fungi	Ascomycetes	Acarosporaceae	Acarospora citrina		N	C		1/1	1998-07-11
Fungi	Ascomycetes	Heterodeaceae	Heterodea muelleri		N	C		3/3	2007-06-15
Fungi	Ascomycetes	Lecideaceae	Lecidea		N	C		3/3	2007-06-18
Fungi	Ascomycetes	Lichen	Lichen		N	C		1/1	2007-06-15
Fungi	Ascomycetes	Parmeliaceae	Parmotrema poolii		N	C		1/1	2004-06-28
Fungi	Ascomycetes	Parmeliaceae	Xanthoparmelia ballingalliana		N	C		2/2	2007-06-15
Fungi	Ascomycetes	Parmeliaceae	Xanthoparmelia exuviata		N	C		1/1	1984-04-26
Fungi	Ascomycetes	Parmeliaceae	Xanthoparmelia remanens		N	C		1/1	1998-07-11
Fungi	Ascomycetes	Peltulaceae	Peltula placodizans		N	C		1/1	2007-06-15
Fungi	Ascomycetes	Physciaceae	Heterodermia comosa		N	C		1/1	2004-06-28
Fungi	Ascomycetes	Physciaceae	Heterodermia leucomela		N	C		1/1	2004-06-28

Kingdom	Class	Family	Scientific Name	Common Name	I	NCA	EPBC	No.	Last Seen
Fungi	Ascomycetes	Physciaceae	Physcia crispa		N	C		1/1	2004-06-28
Fungi	Ascomycetes	Physciaceae	Physcia jackii		N	C		1/1	2004-06-28
Fungi	Ascomycetes	Physciaceae	Pyxine desudans		N	C		1/1	2004-06-28
Fungi	Ascomycetes	Physciaceae	Rinodina		N	C		1/1	2007-06-15
Fungi	Ascomycetes	Ramalinaceae	Ramalina celastri subsp. celastri		N	C		1/1	2004-06-28
Fungi	Ascomycetes	Ramalinaceae	Ramalina inflata		N	C		1/1	2004-06-28
Fungi	Ascomycetes	Ramalinaceae	Ramalina peruviana		N	C		2/2	2004-06-28
Fungi	Ascomycetes	Ramalinaceae	Ramalinora glaucolivida		N	C		1/1	2007-06-15
Fungi	Ascomycetes	Teloschistaceae	Caloplaca cinnabarina		N	C		1/1	2007-06-15
Fungi	Ascomycetes	Trichotheliaceae	Porina subargillacea		N	C		1/1	2007-06-15
Plantae	Cycadopsida	Cycadaceae	Cycas megacarpa		N	E	E	1/0	1991-04-01
Plantae	Cycadopsida	Cycadaceae	Cycas terryana		N	C		2/2	2011-06-17
Plantae	Polypodiopsida	Adiantaceae	Adiantum aethiopicum		N	C		1/0	1997-09-30
Plantae	Polypodiopsida	Adiantaceae	Adiantum atroviride		N	C		2/2	1993-02-26
Plantae	Polypodiopsida	Adiantaceae	Adiantum hispidulum		N	C		3/1	2006-02-01
Plantae	Polypodiopsida	Adiantaceae	Adiantum hispidulum var. hispidulum		N	C		1/1	1992-08-17
Plantae	Polypodiopsida	Adiantaceae	Cheilanthes		N	C		2/0	2001-10-17
Plantae	Polypodiopsida	Adiantaceae	Cheilanthes distans	bristly cloak fern	N	C		7/4	2012-04-12
Plantae	Polypodiopsida	Adiantaceae	Cheilanthes nudiuscula		N	C		1/1	1998-10-15
Plantae	Polypodiopsida	Adiantaceae	Cheilanthes sieberi		N	C		2/0	2012-04-12
Plantae	Polypodiopsida	Adiantaceae	Cheilanthes sieberi subsp. sieberi		N	C		16/2	2009-12-11
Plantae	Polypodiopsida	Adiantaceae	Pellaea paradoxa	heart fern	N	C		1/1	1997-09-30
Plantae	Polypodiopsida	Aspleniaceae	Asplenium paleaceum	scaly asplenium	N	C		1/1	1997-09-30
Plantae	Polypodiopsida	Dennstaedtiaceae	Pteridium esculentum	common bracken	N	C		1/0	2007-11-21
Plantae	Polypodiopsida	Marsileaceae	Marsilea drummondii	common nardoo	N	C		1/0	2011-06-05
Plantae	Polypodiopsida	Marsileaceae	Marsilea exarata	sway-back nardoo	N	C		1/1	1991-08-07
Plantae	Polypodiopsida	Marsileaceae	Marsilea hirsuta	hairy nardoo	N	C		2/0	2012-04-12
Plantae	Polypodiopsida	Marsileaceae	Marsilea mutica	shiny nardoo	N	C		3/0	2011-07-05
Plantae	Polypodiopsida	Ophioglossaceae	Ophioglossum lusitanicum	adder's tongue	N	C		1/1	2006-02-02
Plantae	Polypodiopsida	Polypodiaceae	Drynaria rigidula		N	C		1/1	1993-03-02
Plantae	Polypodiopsida	Polypodiaceae	Pyrrosia rupestris	rock felt fern	N	C		3/3	1997-09-30
Plantae	Rosopsida	Acanthaceae	Brunoniella acaulis		N	C		3/0	1997-05-01
Plantae	Rosopsida	Acanthaceae	Brunoniella australis	blue trumpet	N	C		45/4	2012-04-12
Plantae	Rosopsida	Acanthaceae	Dipteracanthus australasicus		N	C		1/1	2007-09-19
Plantae	Rosopsida	Acanthaceae	Dipteracanthus australasicus subsp. corynothecus		N	C		7/6	2008-11-10
Plantae	Rosopsida	Acanthaceae	Hypoestes floribunda var. floribunda		N	C		1/1	1971-09-22
Plantae	Rosopsida	Acanthaceae	Pseuderanthemum tenellum		N	C		13/0	2009-12-11
Plantae	Rosopsida	Acanthaceae	Pseuderanthemum variabile	pastel flower	N	C		16/7	2012-04-12
Plantae	Rosopsida	Acanthaceae	Rostellularia adscendens		N	C		49/4	2012-04-12
Plantae	Rosopsida	Acanthaceae	Rostellularia adscendens var. clementii		N	C		4/4	2003-03-20
Plantae	Rosopsida	Acanthaceae	Rostellularia adscendens var. hispida		N	C		2/2	1999-02-13
Plantae	Rosopsida	Acanthaceae	Rostellularia obtusa		N	C		1/0	2012-04-12
Plantae	Rosopsida	Acanthaceae	Ruellia simplex		I			1/1	2001-04-10
Plantae	Rosopsida	Aizoaceae	Tetragonia tetragonioides	New Zealand spinach	N	C		1/1	1998-11-26
Plantae	Rosopsida	Aizoaceae	Trianthema portulacastrum	black pigweed	I			2/1	2010-05-27
Plantae	Rosopsida	Aizoaceae	Trianthema triquetra	red spinach	N	C		7/3	2010-05-27
Plantae	Rosopsida	Aizoaceae	Zaleya galericulata		N	C		3/3	1998-10-15
Plantae	Rosopsida	Aizoaceae	Zaleya galericulata subsp. galericulata		N	C		4/4	2006-05-24
Plantae	Rosopsida	Amaranthaceae	Achyranthes		N			1/0	2005-08-10
Plantae	Rosopsida	Amaranthaceae	Achyranthes aspera		N	C		13/3	2009-12-11
Plantae	Rosopsida	Amaranthaceae	Alternanthera		N	C		2/1	1995-05-30
Plantae	Rosopsida	Amaranthaceae	Alternanthera denticulata	lesser joyweed	N	C		7/4	2009-12-11

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Plantae	Rosopsida	Amaranthaceae	Alternanthera denticulata var. micrantha		N	C		10/4	2011-07-05
Plantae	Rosopsida	Amaranthaceae	Alternanthera nana	hairy joyweed	N	C		29/5	2012-04-12
Plantae	Rosopsida	Amaranthaceae	Amaranthaceae		N	C		1/0	2010-12-19
Plantae	Rosopsida	Amaranthaceae	Amaranthus cochleitepalus		N	C		1/1	1997-04-12
Plantae	Rosopsida	Amaranthaceae	Amaranthus interruptus		N	C		4/4	2006-02-02
Plantae	Rosopsida	Amaranthaceae	Amaranthus macrocarpus	dwarf amaranth	N	C		1/1	1998-07-10
Plantae	Rosopsida	Amaranthaceae	Amaranthus mitchellii	Boggabri weed	N	C		5/4	2001-12-17
Plantae	Rosopsida	Amaranthaceae	Deeringia amaranthoides	redberry	N	C		4/3	2006-02-05
Plantae	Rosopsida	Amaranthaceae	Gomphrena celosioides	gomphrena weed	I			10/1	2011-07-05
Plantae	Rosopsida	Amaranthaceae	Gomphrena lanata		N	C		1/1	2001-03-29
Plantae	Rosopsida	Amaranthaceae	Guilleminea densa	small matweed	I			1/1	2005-12-07
Plantae	Rosopsida	Amaranthaceae	Nyssanthes diffusa	barbed-wire weed	N	C		5/1	1997-05-01
Plantae	Rosopsida	Amaranthaceae	Nyssanthes erecta		N	C		4/4	1998-07-11
Plantae	Rosopsida	Amaranthaceae	Ptilotus		N	C		1/0	2011-05-05
Plantae	Rosopsida	Amaranthaceae	Ptilotus polystachyus		N	C		1/1	1985-08-22
Plantae	Rosopsida	Anacardiaceae	Euroschinus falcatus		N	C		9/0	1997-10-01
Plantae	Rosopsida	Anacardiaceae	Euroschinus falcatus var. angustifolius		N	C		2/2	1999-03-23
Plantae	Rosopsida	Anacardiaceae	Pleiogynium timorense	Burdekin plum	N	C		3/1	2009-12-11
Plantae	Rosopsida	Apiaceae	Eryngium plantagineum	long eryngium	N	C		5/4	2012-04-12
Plantae	Rosopsida	Apiaceae	Platysace valida		N	C		2/2	2006-01-31
Plantae	Rosopsida	Apocynaceae	Alstonia constricta	bitterbark	N	C		15/4	2008-11-10
Plantae	Rosopsida	Apocynaceae	Alyxia magnifolia		N	C		1/0	1991-04-01
Plantae	Rosopsida	Apocynaceae	Alyxia ruscifolia		N	C		7/4	2009-05-11
Plantae	Rosopsida	Apocynaceae	Asclepias curassavica	red-head cottonbush	I			1/0	2007-11-21
Plantae	Rosopsida	Apocynaceae	Carissa lanceolata		N	C		1/0	2008-11-10
Plantae	Rosopsida	Apocynaceae	Carissa ovata	currantbush	N	C		40/4	2012-04-12
Plantae	Rosopsida	Apocynaceae	Cascabela thevetia	yellow oleander	I			1/1	1972-06-08
Plantae	Rosopsida	Apocynaceae	Catharanthus roseus	pink periwinkle	I			2/0	2005-08-10
Plantae	Rosopsida	Apocynaceae	Cerbera dumicola		N	NT		7/7	2011-11-11
Plantae	Rosopsida	Apocynaceae	Cryptostegia grandiflora	rubber vine	I			2/0	1997-09-30
Plantae	Rosopsida	Apocynaceae	Cynanchum bowmanii	bowman's milkvine	N	C		1/0	1991-04-01
Plantae	Rosopsida	Apocynaceae	Cynanchum floribundum		N	C		4/3	2002-05-17
Plantae	Rosopsida	Apocynaceae	Gomphocarpus physocarpus	balloon cottonbush	I			2/1	2009-12-11
Plantae	Rosopsida	Apocynaceae	Gymnanthera oblonga		N	C		1/1	2006-02-01
Plantae	Rosopsida	Apocynaceae	Hoya australis		N	C		1/0	1997-09-30
Plantae	Rosopsida	Apocynaceae	Hoya australis subsp. australis		N	C		2/2	1999-03-23
Plantae	Rosopsida	Apocynaceae	Marsdenia		N	C		1/0	2010-05-27
Plantae	Rosopsida	Apocynaceae	Marsdenia australis	doubah	N	C		1/0	2006-05-10
Plantae	Rosopsida	Apocynaceae	Marsdenia micradenia	gymnema	N	C		1/0	1991-04-01
Plantae	Rosopsida	Apocynaceae	Marsdenia microlepis		N	C		9/5	2009-12-11
Plantae	Rosopsida	Apocynaceae	Marsdenia pleiadenia		N	C		5/3	2008-11-10
Plantae	Rosopsida	Apocynaceae	Marsdenia viridiflora		N	C		3/0	2012-04-12
Plantae	Rosopsida	Apocynaceae	Marsdenia viridiflora subsp. viridiflora		N	C		8/3	2009-12-11
Plantae	Rosopsida	Apocynaceae	Parsonsia		N	C		1/0	2001-10-18
Plantae	Rosopsida	Apocynaceae	Parsonsia eucalyptophylla	gargaloo	N	C		4/2	2001-10-18
Plantae	Rosopsida	Apocynaceae	Parsonsia lanceolata	northern silkpod	N	C		35/18	2009-12-11
Plantae	Rosopsida	Apocynaceae	Parsonsia longipetiolata		N	C		1/1	1993-03-02
Plantae	Rosopsida	Apocynaceae	Parsonsia plaesiophylla		N	C		5/4	2006-02-01
Plantae	Rosopsida	Apocynaceae	Parsonsia rotata	veinless silkpod	N	C		1/1	1990-08-24
Plantae	Rosopsida	Apocynaceae	Parsonsia straminea	monkey rope	N	C		1/0	1997-09-30
Plantae	Rosopsida	Apocynaceae	Sarcostemma viminale		N			2/0	2008-11-10
Plantae	Rosopsida	Apocynaceae	Sarcostemma viminale subsp. australe		N	C		1/0	1991-04-01
Plantae	Rosopsida	Apocynaceae	Sarcostemma viminale subsp. brunonianum		N	C		7/0	2009-12-11
Plantae	Rosopsida	Apocynaceae	Secamone elliptica		N	C		6/3	2009-12-11
Plantae	Rosopsida	Apocynaceae	Tylophora erecta		N	C		2/2	1997-10-01
Plantae	Rosopsida	Apocynaceae	Wrightia versicolor		N	C		2/2	1998-01-24

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Plantae	Rosopsida	Araliaceae	Astrotricha biddulphiana		N	C		2/2	2001-10-17
Plantae	Rosopsida	Araliaceae	Polyscias elegans	celery wood	N	C		7/3	2009-05-11
Plantae	Rosopsida	Asteraceae	Acanthospermum hispidum	star burr	I			4/2	2009-12-11
Plantae	Rosopsida	Asteraceae	Acmella grandiflora var. brachyglossa		N	C		4/4	1997-04-17
Plantae	Rosopsida	Asteraceae	Ageratum conyzoides	billygoat weed	I			1/0	2003-10-30
Plantae	Rosopsida	Asteraceae	Ageratum houstonianum	blue billygoat weed	I			1/1	2004-06-28
Plantae	Rosopsida	Asteraceae	Bidens bipinnata	bipinnate beggar's ticks	I			2/2	1997-04-17
Plantae	Rosopsida	Asteraceae	Bidens pilosa		I			2/0	2011-06-05
Plantae	Rosopsida	Asteraceae	Brachyscome basaltica var. basaltica		N	C		2/2	2000-11-07
Plantae	Rosopsida	Asteraceae	Brachyscome microcarpa		N	C		1/1	1997-06-17
Plantae	Rosopsida	Asteraceae	Calotis		N	C		2/0	2001-10-17
Plantae	Rosopsida	Asteraceae	Calotis cuneata		N	C		8/5	2008-11-10
Plantae	Rosopsida	Asteraceae	Calotis cuneifolia	burr daisy	N	C		9/5	2010-05-27
Plantae	Rosopsida	Asteraceae	Calotis dentex	white burr daisy	N	C		7/4	2009-05-11
Plantae	Rosopsida	Asteraceae	Calotis lappulacea	yellow burr daisy	N	C		3/3	2010-10-06
Plantae	Rosopsida	Asteraceae	Calotis scabiosifolia		N	C		1/0	2007-11-21
Plantae	Rosopsida	Asteraceae	Calotis squamigera		N	C		1/1	1998-09-30
Plantae	Rosopsida	Asteraceae	Camptacra barbata		N	C		7/7	2000-11-07
Plantae	Rosopsida	Asteraceae	Carthamus lanatus	saffron thistle	I			4/4	1965-01-13
Plantae	Rosopsida	Asteraceae	Cassinia laevis		N	C		1/1	2006-02-01
Plantae	Rosopsida	Asteraceae	Centaurea solstitialis	St. Barnaby's thistle	I			1/1	1882-12-12
Plantae	Rosopsida	Asteraceae	Centipeda borealis		N	C		1/1	1990-11-13
Plantae	Rosopsida	Asteraceae	Centipeda minima		N	C		1/0	2008-11-10
Plantae	Rosopsida	Asteraceae	Centipeda minima subsp. minima		N	C		2/2	1997-04-17
Plantae	Rosopsida	Asteraceae	Centipeda nidiformis		N	C		1/1	2002-10-03
Plantae	Rosopsida	Asteraceae	Centipeda racemosa	snuffweed	N	C		1/1	2000-11-07
Plantae	Rosopsida	Asteraceae	Centratherum punctatum		I			1/1	2011-06-12
Plantae	Rosopsida	Asteraceae	Chrysocephalum apiculatum	yellow buttons	N	C		9/2	2010-12-19
Plantae	Rosopsida	Asteraceae	Cirsium vulgare	spear thistle	I			3/2	2007-11-21
Plantae	Rosopsida	Asteraceae	Conyza aegyptiaca		I			1/1	2006-02-02
Plantae	Rosopsida	Asteraceae	Cyanthillium cinereum		N	C		34/8	2012-04-12
Plantae	Rosopsida	Asteraceae	Eclipta prostrata	white eclipta	N	C		3/2	2012-04-12
Plantae	Rosopsida	Asteraceae	Emilia sonchifolia		I			7/0	2011-06-05
Plantae	Rosopsida	Asteraceae	Emilia sonchifolia var. sonchifolia		I			1/1	2001-07-28
Plantae	Rosopsida	Asteraceae	Epaltes australis	spreading nutheads	N	C		5/1	2009-12-11
Plantae	Rosopsida	Asteraceae	Euchiton involucratus		N	C		5/1	2011-07-05
Plantae	Rosopsida	Asteraceae	Euchiton sp. (Hughenden C.E.Hubbard+ 7639)		N	C		1/1	1995-03-08
Plantae	Rosopsida	Asteraceae	Euchiton sphaericus		N	C		1/0	2008-11-10
Plantae	Rosopsida	Asteraceae	Flaveria trinervia		I			1/1	1927-04-30
Plantae	Rosopsida	Asteraceae	Gamochaeta pensylvanica		I			2/2	1990-08-27
Plantae	Rosopsida	Asteraceae	Glossocardia bidens	native cobbler's pegs	N	C		4/2	1997-05-01
Plantae	Rosopsida	Asteraceae	Gnaphalium diamantinense		N	C		2/2	2010-08-05
Plantae	Rosopsida	Asteraceae	Gnaphalium polycaulon		I			1/1	2002-07-21
Plantae	Rosopsida	Asteraceae	Gynura drymophila var. glabrifolia		N	C		1/1	2006-02-03
Plantae	Rosopsida	Asteraceae	Lactuca serriola forma serriola		I			1/1	1951-06-23
Plantae	Rosopsida	Asteraceae	Lagenophora gracilis		N	C		2/0	2009-12-11
Plantae	Rosopsida	Asteraceae	Leiocarpa brevicompta		N	C		4/4	2000-11-07
Plantae	Rosopsida	Asteraceae	Olearia canescens		N	C		1/0	1991-04-01
Plantae	Rosopsida	Asteraceae	Olearia xerophila		N	C		4/1	2001-10-19
Plantae	Rosopsida	Asteraceae	Parthenium hysterophorus	parthenium weed	I			82/17	2012-04-12
Plantae	Rosopsida	Asteraceae	Peripleura		N	C		2/0	2001-10-17
Plantae	Rosopsida	Asteraceae	Peripleura bicolor		N	C		1/1	2006-02-04
Plantae	Rosopsida	Asteraceae	Peripleura diffusa		N	C		1/1	2006-01-31
Plantae	Rosopsida	Asteraceae	Peripleura hispidula		N	C		3/0	2011-05-05

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Plantae	Rosopsida	Asteraceae	Peripleura hispidula var. hispidula		N	C		2/1	2009-12-11
Plantae	Rosopsida	Asteraceae	Peripleura hispidula var. setosa		N	C		3/3	1998-07-11
Plantae	Rosopsida	Asteraceae	Pluchea dentex	bowl daisy	N	C		3/3	2006-02-02
Plantae	Rosopsida	Asteraceae	Pluchea dunlopii		N	C		2/2	1996-08-30
Plantae	Rosopsida	Asteraceae	Pluchea ferdinandi-muelleri		N	C		1/1	2000-11-07
Plantae	Rosopsida	Asteraceae	Podolepis jaceoides	showy copper-wire daisy	N	C		3/3	1997-09-07
Plantae	Rosopsida	Asteraceae	Pseudognaphalium luteoalbum	Jersey cudweed	N	C		2/2	1992-08-17
Plantae	Rosopsida	Asteraceae	Pterocaulon ciliosum		N	C		1/1	1990-08-24
Plantae	Rosopsida	Asteraceae	Pterocaulon redolens		N	C		8/0	2011-07-05
Plantae	Rosopsida	Asteraceae	Pterocaulon serrulatum var. serrulatum		N	C		4/4	2007-09-20
Plantae	Rosopsida	Asteraceae	Pterocaulon sphacelatum	applebush	N	C		8/2	2011-07-05
Plantae	Rosopsida	Asteraceae	Pycnosorus chrysanthes	golden billy buttons	N	C		3/3	2000-11-07
Plantae	Rosopsida	Asteraceae	Rhodanthe polyphylla		N	C		1/1	2010-09-22
Plantae	Rosopsida	Asteraceae	Rutidosis leucantha		N	C		3/2	2012-04-12
Plantae	Rosopsida	Asteraceae	Schkuhria pinnata		I			3/3	2003-03-20
Plantae	Rosopsida	Asteraceae	Senecio bathurstianus		N	C		1/1	2006-02-01
Plantae	Rosopsida	Asteraceae	Senecio brigalowensis		N	C		11/10	2008-11-10
Plantae	Rosopsida	Asteraceae	Senecio madagascariensis	fireweed	I			2/0	2007-11-21
Plantae	Rosopsida	Asteraceae	Senecio pinnatifolius var. pinnatifolius		N	C		2/0	2010-05-27
Plantae	Rosopsida	Asteraceae	Senecio tuberculatus		N	C		1/1	1998-07-10
Plantae	Rosopsida	Asteraceae	Sigesbeckia fugax		N	C		2/2	1995-03-08
Plantae	Rosopsida	Asteraceae	Sigesbeckia orientalis	Indian weed	N	C		3/2	2003-10-30
Plantae	Rosopsida	Asteraceae	Sonchus oleraceus	common sowthistle	I			11/3	2010-05-27
Plantae	Rosopsida	Asteraceae	Streptoglossa odora		N	C		1/1	1999-09-16
Plantae	Rosopsida	Asteraceae	Tagetes minuta	stinking roger	I			1/1	1997-04-17
Plantae	Rosopsida	Asteraceae	Thymophylla tenuiloba var. tenuiloba		I			1/1	2005-02-10
Plantae	Rosopsida	Asteraceae	Tridax procumbens	tridax daisy	I			5/4	2001-10-19
Plantae	Rosopsida	Asteraceae	Trioncinia patens		N	E		3/3	2006-02-09
Plantae	Rosopsida	Asteraceae	Trioncinia retroflexa		N	E		8/6	2007-11-21
Plantae	Rosopsida	Asteraceae	Verbesina encelioides	crownbeard	I			5/2	2008-11-10
Plantae	Rosopsida	Asteraceae	Vittadinia dissecta		N	C		1/0	2012-04-12
Plantae	Rosopsida	Asteraceae	Vittadinia pterochaeta	rough fuzzweed	N	C		2/2	1997-04-17
Plantae	Rosopsida	Asteraceae	Vittadinia pustulata		N	C		2/2	1999-03-29
Plantae	Rosopsida	Asteraceae	Vittadinia sulcata	native daisy	N	C		4/2	2007-05-27
Plantae	Rosopsida	Asteraceae	Wedelia asperrima		N	C		1/1	1990-08-24
Plantae	Rosopsida	Asteraceae	Wedelia spilanthoides		N	C		25/8	2011-07-05
Plantae	Rosopsida	Asteraceae	Xanthium		N	C		2/0	2012-04-12
Plantae	Rosopsida	Asteraceae	Xanthium occidentale		I			5/2	2012-04-12
Plantae	Rosopsida	Asteraceae	Xanthium spinosum	Bathurst burr	I			2/1	1997-05-01
Plantae	Rosopsida	Asteraceae	Xerochrysum bracteatum	golden everlasting daisy	N	C		4/4	1999-03-24
Plantae	Rosopsida	Asteraceae	Xerochrysum bracteatum subsp. (Mount Elliot A.R.Bean 3593)		N	C		2/2	1990-08-24
Plantae	Rosopsida	Asteraceae	Zinnia peruviana	wild zinnia	I			2/2	2005-11-20
Plantae	Rosopsida	Bignoniaceae	Bignoniaceae		N	C		1/0	2008-11-10
Plantae	Rosopsida	Bignoniaceae	Pandorea		N	C		1/1	2007-11-14
Plantae	Rosopsida	Bignoniaceae	Pandorea doratoxylon		N	C		1/0	2012-04-12
Plantae	Rosopsida	Bignoniaceae	Pandorea jasminoides		N	C		1/0	1995-03-01
Plantae	Rosopsida	Bignoniaceae	Pandorea pandorana	wonga vine	N	C		9/2	2001-10-19
Plantae	Rosopsida	Boraginaceae	Ehretia		N	C		1/1	2007-09-10
Plantae	Rosopsida	Boraginaceae	Ehretia grahamii		N	C		7/7	2005-08-09
Plantae	Rosopsida	Boraginaceae	Ehretia membranifolia	weeping koda	N	C		26/3	2012-04-12
Plantae	Rosopsida	Boraginaceae	Heliotropium		N	C		1/0	2009-12-11
Plantae	Rosopsida	Boraginaceae	Heliotropium amplexicaule	blue heliotrope	I			11/6	2010-12-19
Plantae	Rosopsida	Boraginaceae	Heliotropium brachygyne		N	C		8/6	1998-10-13
Plantae	Rosopsida	Boraginaceae	Heliotropium cunninghamii		N	C		1/1	2003-02-18

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Plantae	Rosopsida	Boraginaceae	Heliotropium geocharis		N	C		2/2	2000-11-07
Plantae	Rosopsida	Boraginaceae	Heliotropium indicum		I			4/4	1998-07-10
Plantae	Rosopsida	Boraginaceae	Heliotropium ovalifolium		N	C		4/4	2004-11-08
Plantae	Rosopsida	Boraginaceae	Heliotropium peninsulare		N	C		1/1	2003-02-18
Plantae	Rosopsida	Boraginaceae	Heliotropium tenuifolium		N	C		4/4	2000-11-07
Plantae	Rosopsida	Boraginaceae	Trichodesma zeylanicum		N	C		9/0	2010-05-27
Plantae	Rosopsida	Boraginaceae	Trichodesma zeylanicum var. latisepalum		N	C		3/3	1995-03-08
Plantae	Rosopsida	Boraginaceae	Trichodesma zeylanicum var. zeylanicum		N	C		6/6	2000-11-07
Plantae	Rosopsida	Brassicaceae	Arabidella procumbens		N	C		1/1	2010-08-05
Plantae	Rosopsida	Brassicaceae	Lepidium virginicum	Virginian peppercress	I			1/1	1996-02-17
Plantae	Rosopsida	Brassicaceae	Rorippa eustylis		N	C		2/2	2009-06-07
Plantae	Rosopsida	Brassicaceae	Rorippa laciniata		N	C		1/1	2003-03-20
Plantae	Rosopsida	Byttneriaceae	Hannafordia shanesii		N	C		2/2	2002-10-03
Plantae	Rosopsida	Byttneriaceae	Keraudrenia hookeriana		N	C		5/5	2005-08-07
Plantae	Rosopsida	Byttneriaceae	Melochia pyramidata		I			3/3	2006-02-01
Plantae	Rosopsida	Byttneriaceae	Seringia corollata		N	C		1/1	2006-01-31
Plantae	Rosopsida	Byttneriaceae	Waltheria indica		N	C		11/3	2009-12-11
Plantae	Rosopsida	Cactaceae	Acanthocereus tetragonus	sword pear	I			1/0	2007-11-21
Plantae	Rosopsida	Cactaceae	Harrisia martinii		I			23/0	2012-04-12
Plantae	Rosopsida	Cactaceae	Opuntia		N	C		16/0	2006-05-10
Plantae	Rosopsida	Cactaceae	Opuntia stricta		I			5/0	2012-04-12
Plantae	Rosopsida	Cactaceae	Opuntia tomentosa	velvety tree pear	I			32/0	2012-04-12
Plantae	Rosopsida	Caesalpiniaceae	Cassia brewsteri		N	C		37/17	2012-04-12
Plantae	Rosopsida	Caesalpiniaceae	Cassia tomentella		N	C		12/1	2009-12-11
Plantae	Rosopsida	Caesalpiniaceae	Chamaecrista absus		I			5/0	2009-12-11
Plantae	Rosopsida	Caesalpiniaceae	Chamaecrista absus var. absus		N	C		4/4	2009-06-30
Plantae	Rosopsida	Caesalpiniaceae	Chamaecrista concinna		N	C		2/0	2009-12-11
Plantae	Rosopsida	Caesalpiniaceae	Chamaecrista exigua var. minor		N	C		1/1	1998-07-09
Plantae	Rosopsida	Caesalpiniaceae	Chamaecrista mimosoides	dwarf cassia	N	C		1/0	2008-11-10
Plantae	Rosopsida	Caesalpiniaceae	Chamaecrista nomame		N	C		1/1	2006-01-31
Plantae	Rosopsida	Caesalpiniaceae	Chamaecrista nomame var. nomame		N	C		1/1	1997-04-17
Plantae	Rosopsida	Caesalpiniaceae	Chamaecrista rotundifolia var. rotundifolia		I			1/1	2003-02-18
Plantae	Rosopsida	Caesalpiniaceae	Haematoxylum campechianum	logwood tree	I			1/1	2005-09-28
Plantae	Rosopsida	Caesalpiniaceae	Lysiphyllum		N	C		2/0	2011-06-05
Plantae	Rosopsida	Caesalpiniaceae	Lysiphyllum carronii	ebony tree	N	C		8/1	2010-05-27
Plantae	Rosopsida	Caesalpiniaceae	Lysiphyllum hookeri	Queensland ebony	N	C		16/6	2008-11-10
Plantae	Rosopsida	Caesalpiniaceae	Parkinsonia aculeata	Jerusalem thorn	I			3/2	2004-11-08
Plantae	Rosopsida	Caesalpiniaceae	Petalostylis labicheoides		N	C		4/4	1993-12-15
Plantae	Rosopsida	Caesalpiniaceae	Senna		N	C		3/0	2011-05-05
Plantae	Rosopsida	Caesalpiniaceae	Senna aciphylla	Australian senna	N	C		2/2	2006-01-31
Plantae	Rosopsida	Caesalpiniaceae	Senna alata		I			1/1	1970-06-09
Plantae	Rosopsida	Caesalpiniaceae	Senna artemisioides		N	C		1/0	2012-04-12
Plantae	Rosopsida	Caesalpiniaceae	Senna artemisioides subsp. coriacea		N	C		3/1	1997-05-01
Plantae	Rosopsida	Caesalpiniaceae	Senna artemisioides subsp. zygophylla		N	C		1/0	2006-05-10

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Plantae	Rosopsida	Caesalpiniaceae	Senna barclayana		N	C		4/3	2011-07-05
Plantae	Rosopsida	Caesalpiniaceae	Senna coronilloides		N	C		9/6	2012-04-12
Plantae	Rosopsida	Caesalpiniaceae	Senna gaudichaudii		N	C		5/4	1997-04-17
Plantae	Rosopsida	Caesalpiniaceae	Senna obtusifolia		I			1/0	2005-08-08
Plantae	Rosopsida	Caesalpiniaceae	Senna occidentalis	coffee senna	I			2/1	2005-08-08
Plantae	Rosopsida	Caesalpiniaceae	Senna sophera var. (40Mile Scrub J.R.Clarkson+ 6908)		N	C		1/1	1979-01-15
Plantae	Rosopsida	Caesalpiniaceae	Senna sp. (Davies Creek R.L.Jago 3758)		N	C		2/0	2005-08-10
Plantae	Rosopsida	Caesalpiniaceae	Senna surattensis		N	C		1/1	1997-09-30
Plantae	Rosopsida	Campanulaceae	Isotoma axillaris	australian harebell	N	C		1/1	2001-09-16
Plantae	Rosopsida	Campanulaceae	Lobelia concolor		N	C		2/1	2009-12-11
Plantae	Rosopsida	Campanulaceae	Lobelia quadrangularis		N	C		1/1	1997-04-17
Plantae	Rosopsida	Campanulaceae	Wahlenbergia		N	C		1/0	1991-04-01
Plantae	Rosopsida	Campanulaceae	Wahlenbergia communis	tufted bluebell	N	C		3/3	1996-05-28
Plantae	Rosopsida	Campanulaceae	Wahlenbergia gracilis	sprawling bluebell	N	C		13/4	2011-07-05
Plantae	Rosopsida	Campanulaceae	Wahlenbergia graniticola	granite bluebell	N	C		2/1	1997-05-01
Plantae	Rosopsida	Campanulaceae	Wahlenbergia queenslandica		N	C		2/2	2006-07-23
Plantae	Rosopsida	Campanulaceae	Wahlenbergia stricta subsp. stricta		N	C		1/1	2011-05-17
Plantae	Rosopsida	Capparaceae	Apophyllum anomalum	broom bush	N	C		12/2	2012-04-12
Plantae	Rosopsida	Capparaceae	Capparis		N	C		4/1	2011-06-05
Plantae	Rosopsida	Capparaceae	Capparis arborea	brush caper berry	N	C		4/1	1997-09-30
Plantae	Rosopsida	Capparaceae	Capparis canescens		N	C		11/0	2009-12-11
Plantae	Rosopsida	Capparaceae	Capparis humistrata		N	E		1/1	1998-01-24
Plantae	Rosopsida	Capparaceae	Capparis lasiantha	nipan	N	C		25/2	2012-04-12
Plantae	Rosopsida	Capparaceae	Capparis loranthifolia		N	C		2/0	2010-05-27
Plantae	Rosopsida	Capparaceae	Capparis loranthifolia var. bancroftii		N	C		2/2	1992-08-18
Plantae	Rosopsida	Capparaceae	Capparis mitchellii		N	C		2/0	2010-05-27
Plantae	Rosopsida	Capparaceae	Capparis ornans		N	C		2/1	1991-04-01
Plantae	Rosopsida	Capparaceae	Capparis sarmentosa	scrambling caper	N	C		1/0	2007-11-21
Plantae	Rosopsida	Capparaceae	Capparis shanesiana		N	C		2/2	1993-04-05
Plantae	Rosopsida	Capparaceae	Capparis spinosa	caper bush	N			1/0	2006-05-10
Plantae	Rosopsida	Capparaceae	Capparis umbonata		N	C		2/2	2009-06-30
Plantae	Rosopsida	Caryophyllaceae	Polycarpaea corymbosa		N	C		3/2	2006-01-31
Plantae	Rosopsida	Caryophyllaceae	Polycarpaea corymbosa var. minor		N	C		1/1	1971-09-28
Plantae	Rosopsida	Caryophyllaceae	Polycarpaea longiflora		N	C		5/0	2010-05-27
Plantae	Rosopsida	Caryophyllaceae	Polycarpaea spirostylis		N	C		1/1	2006-02-03
Plantae	Rosopsida	Caryophyllaceae	Polycarpaea spirostylis subsp. spirostylis		N	C		1/1	1951-06-24
Plantae	Rosopsida	Casuarinaceae	Allocasuarina littoralis		N	C		2/2	1980-06-24
Plantae	Rosopsida	Casuarinaceae	Allocasuarina luehmannii	bull oak	N	C		7/1	2009-12-11
Plantae	Rosopsida	Casuarinaceae	Casuarina cristata	belah	N	C		22/6	2012-04-12
Plantae	Rosopsida	Casuarinaceae	Casuarina cunninghamiana		N	C		6/0	2012-04-12
Plantae	Rosopsida	Casuarinaceae	Casuarina cunninghamiana subsp. cunninghamiana		N	C		1/1	1960-06-05
Plantae	Rosopsida	Celastraceae	Denhamia cunninghamii		N	C		4/4	2000-01-16
Plantae	Rosopsida	Celastraceae	Denhamia disperma		N	C		2/2	2000-11-07
Plantae	Rosopsida	Celastraceae	Denhamia oleaster		N	C		19/6	2012-04-12
Plantae	Rosopsida	Celastraceae	Denhamia pittosporoides		N	C		1/1	1997-09-30
Plantae	Rosopsida	Celastraceae	Denhamia sp. (Junee Tableland T.J.McDonald 553)		N	C		4/4	2006-02-02
Plantae	Rosopsida	Celastraceae	Elaeodendron australe		N	C		5/2	2009-12-11

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Plantae	Rosopsida	Celastraceae	Elaeodendron australe var. australe		N	C		3/3	1971-09-08
Plantae	Rosopsida	Celastraceae	Elaeodendron australe var. integrifolium		N	C		7/6	2008-11-10
Plantae	Rosopsida	Celastraceae	Maytenus bilocularis		N	C		2/0	2001-10-17
Plantae	Rosopsida	Celastraceae	Maytenus cunninghamii	yellow berry bush	N	C		14/0	2012-04-12
Plantae	Rosopsida	Celastraceae	Maytenus disperma	orange boxwood	N	C		8/0	2001-10-19
Plantae	Rosopsida	Celastraceae	Pleurostylia opposita		N	C		1/1	1993-03-01
Plantae	Rosopsida	Celastraceae	Siphonodon australis	ivorywood	N	C		1/0	1991-04-01
Plantae	Rosopsida	Chenopodiaceae	Atriplex		N	C		1/0	1995-05-30
Plantae	Rosopsida	Chenopodiaceae	Atriplex lindleyi		N	C		1/1	1999-09-30
Plantae	Rosopsida	Chenopodiaceae	Atriplex muelleri	lagoon saltbush	N	C		5/2	2012-04-12
Plantae	Rosopsida	Chenopodiaceae	Atriplex nummularia		N	C		1/1	1934-07-08
Plantae	Rosopsida	Chenopodiaceae	Atriplex semibaccata	creeping saltbush	N	C		2/1	2012-04-12
Plantae	Rosopsida	Chenopodiaceae	Chenopodium auricomiforme		N	C		3/3	1996-02-17
Plantae	Rosopsida	Chenopodiaceae	Chenopodium auricomum		N	C		2/2	2003-04-03
Plantae	Rosopsida	Chenopodiaceae	Dysphania ambrosioides		I			1/1	2009-06-07
Plantae	Rosopsida	Chenopodiaceae	Dysphania carinata		N	C		2/1	2012-04-12
Plantae	Rosopsida	Chenopodiaceae	Dysphania glomulifera subsp. glomulifera		N	C		1/1	1990-11-14
Plantae	Rosopsida	Chenopodiaceae	Dysphania kalpari		N	C		1/1	1989-08-28
Plantae	Rosopsida	Chenopodiaceae	Dysphania melanocarpa forma melanocarpa		N	C		3/1	2009-12-11
Plantae	Rosopsida	Chenopodiaceae	Dysphania pumilio		N	C		1/1	2006-01-31
Plantae	Rosopsida	Chenopodiaceae	Einadia hastata		N	C		1/0	2008-11-10
Plantae	Rosopsida	Chenopodiaceae	Einadia nutans		N	C		4/1	2001-10-18
Plantae	Rosopsida	Chenopodiaceae	Einadia nutans subsp. linifolia		N	C		8/6	2007-09-18
Plantae	Rosopsida	Chenopodiaceae	Einadia nutans subsp. nutans		N	C		5/4	2000-11-07
Plantae	Rosopsida	Chenopodiaceae	Einadia polygonoides	knotweed goosefoot	N	C		2/1	2009-12-11
Plantae	Rosopsida	Chenopodiaceae	Enchylaena tomentosa		N	C		24/3	2012-04-12
Plantae	Rosopsida	Chenopodiaceae	Enchylaena tomentosa var. glabra		N	C		2/2	1998-07-08
Plantae	Rosopsida	Chenopodiaceae	Enchylaena tomentosa var. tomentosa		N	C		1/1	1970-05-26
Plantae	Rosopsida	Chenopodiaceae	Maireana		N	C		1/0	1995-05-30
Plantae	Rosopsida	Chenopodiaceae	Maireana enchylaenoides		N	C		1/1	1998-03-16
Plantae	Rosopsida	Chenopodiaceae	Maireana microphylla		N	C		5/0	2012-04-12
Plantae	Rosopsida	Chenopodiaceae	Rhagodia spinescens	thorny saltbush	N	C		2/2	1993-02-26
Plantae	Rosopsida	Chenopodiaceae	Salsola		N	C		1/1	2003-10-13
Plantae	Rosopsida	Chenopodiaceae	Salsola australis		N	C		1/1	2007-09-17
Plantae	Rosopsida	Chenopodiaceae	Salsola kali		N	C		6/0	2012-04-12
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena		N	C		3/0	1995-05-30
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena anisacanthoides	yellow burr	N	C		1/1	1998-03-23
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena bicornis		N	C		1/0	2012-04-12

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Plantae	Rosopsida	Chenopodiaceae	Sclerolaena bicornis var. horrida		N	C		1/1	1934-02-17
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena birchii	galvanised burr	N	C		7/5	1997-05-01
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena calcarata	red burr	N	C		1/1	1997-04-10
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena diacantha	grey copper burr	N	C		3/1	1997-05-01
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena muricata		N	C		1/0	2012-04-12
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena muricata var. muricata		N	C		3/1	2010-05-27
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena muricata var. semiglabra		N	C		1/1	1995-03-09
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena muricata var. villosa		N	C		4/1	2010-05-27
Plantae	Rosopsida	Chenopodiaceae	Sclerolaena tetracuspis	brigalow burr	N	C		2/2	1998-07-10
Plantae	Rosopsida	Cleomaceae	Cleome gynandra		I			3/3	2000-11-07
Plantae	Rosopsida	Cleomaceae	Cleome viscosa	tick-weed	N	C		10/4	2010-05-27
Plantae	Rosopsida	Clusiaceae	Hypericum gramineum		N	C		4/4	2010-12-03
Plantae	Rosopsida	Combretaceae	Macropteranthes fitzalanii		N	NT		1/0	1991-04-01
Plantae	Rosopsida	Combretaceae	Macropteranthes leiocaulis		N	NT		3/3	1993-12-15
Plantae	Rosopsida	Combretaceae	Terminalia		N	C		1/0	2008-11-10
Plantae	Rosopsida	Combretaceae	Terminalia oblongata		N	C		20/0	2012-04-12
Plantae	Rosopsida	Combretaceae	Terminalia oblongata subsp. oblongata		N	C		9/9	2005-08-09
Plantae	Rosopsida	Combretaceae	Terminalia porphyrocarpa		N	C		2/1	1993-03-01
Plantae	Rosopsida	Convolvulaceae	Bonamia media		N	C		1/1	2003-02-18
Plantae	Rosopsida	Convolvulaceae	Bonamia media var. media		N	C		1/1	1963-07-22
Plantae	Rosopsida	Convolvulaceae	Convolvulus erubescens	Australian bindweed	N	C		4/0	2012-04-12
Plantae	Rosopsida	Convolvulaceae	Convolvulus graminetinus		N	C		8/8	2000-01-12
Plantae	Rosopsida	Convolvulaceae	Evolvulus		N	C		1/0	1995-03-01
Plantae	Rosopsida	Convolvulaceae	Evolvulus alsinoides		N	C		31/2	2012-04-12
Plantae	Rosopsida	Convolvulaceae	Evolvulus alsinoides var. decumbens		N	C		4/3	2007-09-17
Plantae	Rosopsida	Convolvulaceae	Evolvulus alsinoides var. villosicalyx		N	C		1/1	1998-07-09
Plantae	Rosopsida	Convolvulaceae	Ipomoea argillicola		N	C		3/2	1997-05-01
Plantae	Rosopsida	Convolvulaceae	Ipomoea brownii		N	C		4/3	2009-12-11
Plantae	Rosopsida	Convolvulaceae	Ipomoea calobra		N	C		3/3	2006-02-04
Plantae	Rosopsida	Convolvulaceae	Ipomoea lonchophylla		N	C		41/8	2012-04-12
Plantae	Rosopsida	Convolvulaceae	Ipomoea plebeia	bellvine	N	C		15/7	2012-04-12
Plantae	Rosopsida	Convolvulaceae	Ipomoea polymorpha		N	C		4/4	2003-02-18
Plantae	Rosopsida	Convolvulaceae	Ipomoea quamoclit	star of Bethlehem	I			1/1	2000-11-07
Plantae	Rosopsida	Convolvulaceae	Jacquemontia paniculata		N	C		26/8	2010-05-27
Plantae	Rosopsida	Convolvulaceae	Jacquemontia paniculata var. paniculata		N	C		1/1	2001-01-16
Plantae	Rosopsida	Convolvulaceae	Jacquemontia paniculata var. tomentosa		N	C		1/1	1983-10-17
Plantae	Rosopsida	Convolvulaceae	Jacquemontia sp. (Fairview R.W.Johnson 4026)		N	C		1/1	1999-03-21
Plantae	Rosopsida	Convolvulaceae	Merremia hederacea		N	C		1/1	1990-11-14
Plantae	Rosopsida	Convolvulaceae	Operculina aequisepala		N	C		2/2	2007-04-18
Plantae	Rosopsida	Convolvulaceae	Polymeria ambigua		N	C		1/1	1998-07-10
Plantae	Rosopsida	Convolvulaceae	Polymeria calycina	pink bindweed	N	C		3/0	2012-04-12
Plantae	Rosopsida	Convolvulaceae	Polymeria longifolia	polymeria	N	C		29/5	2010-05-27
Plantae	Rosopsida	Convolvulaceae	Polymeria pusilla		N	C		10/3	2010-05-27
Plantae	Rosopsida	Convolvulaceae	Xenostegia tridentata		N	C		1/1	1985-08-22
Plantae	Rosopsida	Crassulaceae	Bryophyllum delagoense		I			3/3	1992-08-17
Plantae	Rosopsida	Cucurbitaceae	Cucumis anguria var. anguria	West Indian gherkin	I			4/0	2009-12-11
Plantae	Rosopsida	Cucurbitaceae	Cucumis argenteus		N	C		1/1	2006-02-03
Plantae	Rosopsida	Cucurbitaceae	Cucumis melo		N	C		13/5	2010-05-27
Plantae	Rosopsida	Cucurbitaceae	Cucumis picrocarpus		N	C		1/1	2006-05-23

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Plantae	Rosopsida	Cucurbitaceae	Cucurbitaceae		N	C		1/0	2011-07-05
Plantae	Rosopsida	Cucurbitaceae	Diplocyclos palmatus		N	C		2/0	2010-03-18
Plantae	Rosopsida	Cucurbitaceae	Diplocyclos palmatus subsp. affinis		N	C		1/1	1991-04-20
Plantae	Rosopsida	Cucurbitaceae	Neoachmandra cunninghamii		N	C		1/0	1991-04-01
Plantae	Rosopsida	Cucurbitaceae	Neoalsomitra capricornica		N	C		1/0	1991-04-01
Plantae	Rosopsida	Cucurbitaceae	Sicyos australis	star cucumber	N	C		1/1	1990-08-24
Plantae	Rosopsida	Dilleniaceae	Hibbertia stricta		N	C		2/2	2006-02-01
Plantae	Rosopsida	Droseraceae	Drosera		N	C		1/0	2011-07-05
Plantae	Rosopsida	Droseraceae	Drosera indica		N	C		5/1	2009-12-11
Plantae	Rosopsida	Ebenaceae	Diospyros geminata	scaly ebony	N	C		1/0	1991-04-01
Plantae	Rosopsida	Ebenaceae	Diospyros humilis	small-leaved ebony	N	C		24/11	2012-04-12
Plantae	Rosopsida	Elaeagnaceae	Elaeagnus triflora		N	C		1/1	1993-09-20
Plantae	Rosopsida	Elatinaceae	Elatine gratioloides	waterwort	N	C		1/1	2003-03-20
Plantae	Rosopsida	Erythroxylaceae	Erythroxylum australe	cocaine tree	N	C		57/14	2012-04-12
Plantae	Rosopsida	Erythroxylaceae	Erythroxylum sp. (Splityard Creek L.Pedley 5360)		N	C		1/1	1998-11-26
Plantae	Rosopsida	Euphorbiaceae	Acalypha eremorum	soft acalypha	N	C		10/7	2006-02-03
Plantae	Rosopsida	Euphorbiaceae	Adriana urticoides var. urticoides		N	C		8/8	2008-10-23
Plantae	Rosopsida	Euphorbiaceae	Alchornea ilicifolia	native holly	N	C		1/0	1991-04-01
Plantae	Rosopsida	Euphorbiaceae	Bertya pedicellata		N	NT		21/21	2012-05-04
Plantae	Rosopsida	Euphorbiaceae	Chamaesyce dallachyana	mat spurge	N	C		1/0	2008-11-10
Plantae	Rosopsida	Euphorbiaceae	Chamaesyce drummondii	caustic-weed	N	C		1/0	2012-04-12
Plantae	Rosopsida	Euphorbiaceae	Claoxylon tenerifolium	Queensland brittlewood	N	C		1/0	1991-04-01
Plantae	Rosopsida	Euphorbiaceae	Croton acronychioides	thick-leaved croton	N	C		1/0	1991-04-01
Plantae	Rosopsida	Euphorbiaceae	Croton insularis	Queensland cascarilla	N	C		7/6	1993-12-15
Plantae	Rosopsida	Euphorbiaceae	Croton phebalioides	narrow-leaved croton	N	C		13/11	2001-10-17
Plantae	Rosopsida	Euphorbiaceae	Croton stigmatosus	white croton	N	C		1/0	1997-05-01
Plantae	Rosopsida	Euphorbiaceae	Euphorbia		N	C		5/1	2010-12-19
Plantae	Rosopsida	Euphorbiaceae	Euphorbia biconvexa		N	C		1/1	2000-11-07
Plantae	Rosopsida	Euphorbiaceae	Euphorbia bifida		N	C		1/1	1994-01-11
Plantae	Rosopsida	Euphorbiaceae	Euphorbia coghlanii		N	C		16/10	2010-05-27
Plantae	Rosopsida	Euphorbiaceae	Euphorbia dallachyana		N	C		4/2	1997-05-01
Plantae	Rosopsida	Euphorbiaceae	Euphorbia drummondii		N	C		22/2	2010-05-27
Plantae	Rosopsida	Euphorbiaceae	Euphorbia hirta		I			3/2	2009-06-10
Plantae	Rosopsida	Euphorbiaceae	Euphorbia hyssopifolia		I			11/2	2011-06-12
Plantae	Rosopsida	Euphorbiaceae	Euphorbia laciniloba		N	C		2/2	1995-07-08
Plantae	Rosopsida	Euphorbiaceae	Euphorbia mitchelliana var. mitchelliana		N	C		1/1	2006-02-03
Plantae	Rosopsida	Euphorbiaceae	Euphorbia papillifolia var. papillifolia		N	C		1/1	1995-03-08
Plantae	Rosopsida	Euphorbiaceae	Euphorbia parvicaruncula	rough-seeded spurge	N	C		1/1	1997-04-17
Plantae	Rosopsida	Euphorbiaceae	Euphorbia stevenii	bottle tree spurge	N	C		4/4	1972-12-13
Plantae	Rosopsida	Euphorbiaceae	Euphorbia tannensis		N	C		3/0	2008-11-10
Plantae	Rosopsida	Euphorbiaceae	Euphorbia tannensis subsp. eremophila		N	C		10/4	2009-12-11
Plantae	Rosopsida	Euphorbiaceae	Euphorbia thymifolia		I			1/1	2011-06-12
Plantae	Rosopsida	Euphorbiaceae	Excoecaria dallachyana	scrub poison tree	N	C		1/0	1991-04-01
Plantae	Rosopsida	Euphorbiaceae	Jatropha gossypiifolia	bellyache bush	I			2/1	2005-04-04
Plantae	Rosopsida	Euphorbiaceae	Mallotus claoxyloides	green kamala	N	C		1/0	1991-04-01
Plantae	Rosopsida	Euphorbiaceae	Mallotus philippensis	red kamala	N	C		1/0	1991-04-01
Plantae	Rosopsida	Euphorbiaceae	Monotaxis macrophylla		N	C		1/1	2006-02-01
Plantae	Rosopsida	Euphorbiaceae	Ricinocarpos ledifolius	scrub wedding bush	N	C		3/2	2005-08-09
Plantae	Rosopsida	Euphorbiaceae	Ricinus communis	castor oil bush	I			6/3	2006-02-01
Plantae	Rosopsida	Euphorbiaceae	Tragia novae-hollandiae	stinging-vine	N	C		1/0	1991-04-01
Plantae	Rosopsida	Fabaceae	Aeschynomene indica	budda pea	N	C		4/1	2011-06-05
Plantae	Rosopsida	Fabaceae	Alysicarpus muelleri		N	C		12/11	2010-05-07
Plantae	Rosopsida	Fabaceae	Alysicarpus rugosus		N			9/0	2010-05-27
Plantae	Rosopsida	Fabaceae	Alysicarpus vaginalis		I			2/2	2003-08-14
Plantae	Rosopsida	Fabaceae	Austrosteenisia blackii	bloodvine	N	C		1/0	1991-04-01

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Plantae	Rosopsida	Fabaceae	Bossiaea carinalis		N	C		2/2	2009-05-11
Plantae	Rosopsida	Fabaceae	Cajanus reticulatus var. reticulatus		N	C		1/1	1962-07-15
Plantae	Rosopsida	Fabaceae	Canavalia papuana	wild jack bean	N	C		1/1	1999-02-15
Plantae	Rosopsida	Fabaceae	Crotalaria		N	C		4/0	2012-04-12
Plantae	Rosopsida	Fabaceae	Crotalaria dissitiflora		N	C		3/0	2011-06-05
Plantae	Rosopsida	Fabaceae	Crotalaria dissitiflora subsp. dissitiflora		N	C		2/2	1995-03-07
Plantae	Rosopsida	Fabaceae	Crotalaria incana subsp. incana		I			4/4	1998-10-15
Plantae	Rosopsida	Fabaceae	Crotalaria juncea	sunhemp	I			19/3	2010-05-27
Plantae	Rosopsida	Fabaceae	Crotalaria laburnifolia		I			2/2	1979-02-20
Plantae	Rosopsida	Fabaceae	Crotalaria medicaginea	trefoil rattlepod	N	C		4/0	2009-12-11
Plantae	Rosopsida	Fabaceae	Crotalaria medicaginea var. neglecta		N	C		1/1	1990-11-14
Plantae	Rosopsida	Fabaceae	Crotalaria mitchellii		N	C		2/0	2010-12-19
Plantae	Rosopsida	Fabaceae	Crotalaria mitchellii subsp. mitchellii		N	C		3/1	2009-12-11
Plantae	Rosopsida	Fabaceae	Crotalaria montana		N	C		9/1	2010-05-27
Plantae	Rosopsida	Fabaceae	Crotalaria novae-hollandiae		N	C		1/0	2012-04-12
Plantae	Rosopsida	Fabaceae	Crotalaria pallida		I			1/0	2012-04-12
Plantae	Rosopsida	Fabaceae	Crotalaria sessiliflora		N			8/0	2009-12-11
Plantae	Rosopsida	Fabaceae	Cullen australasicum		N	C		1/1	1927-03-03
Plantae	Rosopsida	Fabaceae	Cullen cinereum		N	C		2/2	1984-12-31
Plantae	Rosopsida	Fabaceae	Cullen tenax	emu-foot	N	C		17/5	2010-05-27
Plantae	Rosopsida	Fabaceae	Daviesia discolor		N	V	V	1/1	1993-02-26
Plantae	Rosopsida	Fabaceae	Daviesia filipes		N	C		2/2	2006-02-04
Plantae	Rosopsida	Fabaceae	Desmodium		N	C		5/0	2011-06-05
Plantae	Rosopsida	Fabaceae	Desmodium brachypodum	large ticktrefoil	N	C		11/2	2009-12-11
Plantae	Rosopsida	Fabaceae	Desmodium campylocaulon		N	C		11/2	2010-05-27
Plantae	Rosopsida	Fabaceae	Desmodium filiforme		N	C		4/4	1997-04-30
Plantae	Rosopsida	Fabaceae	Desmodium macrocarpum		N	NT		4/4	2010-03-30
Plantae	Rosopsida	Fabaceae	Desmodium muelleri		N	C		3/3	1996-02-17
Plantae	Rosopsida	Fabaceae	Desmodium rhytidophyllum		N	C		4/4	1999-03-24
Plantae	Rosopsida	Fabaceae	Desmodium tortuosum	Florida beggar-weed	I			1/1	2011-03-31
Plantae	Rosopsida	Fabaceae	Desmodium varians	slender tick trefoil	N	C		7/1	2009-12-11
Plantae	Rosopsida	Fabaceae	Erythrina vespertilio		N	C		7/0	2008-11-10
Plantae	Rosopsida	Fabaceae	Galactia		N	C		1/1	1997-04-17
Plantae	Rosopsida	Fabaceae	Galactia muelleri		N	C		7/0	2010-05-27
Plantae	Rosopsida	Fabaceae	Galactia tenuiflora		N	C		10/5	2012-04-12
Plantae	Rosopsida	Fabaceae	Galactia tenuiflora var. lucida		N	C		3/3	1999-02-15
Plantae	Rosopsida	Fabaceae	Galactia tenuiflora var. macrantha		N	C		1/1	1989-12-01
Plantae	Rosopsida	Fabaceae	Gastrolobium grandiflorum		N	C		3/3	1987-08-18
Plantae	Rosopsida	Fabaceae	Glycine		N	C		8/1	2010-12-19
Plantae	Rosopsida	Fabaceae	Glycine falcata		N	C		23/8	2010-05-27
Plantae	Rosopsida	Fabaceae	Glycine latifolia		N	C		11/8	2010-05-27
Plantae	Rosopsida	Fabaceae	Glycine sp. (Mackay S.B.Andrews+ 43)		N	C		1/1	1975-05-05
Plantae	Rosopsida	Fabaceae	Glycine tabacina	glycine pea	N	C		22/3	2010-12-19
Plantae	Rosopsida	Fabaceae	Glycine tomentella	woolly glycine	N	C		14/4	2012-04-12
Plantae	Rosopsida	Fabaceae	Hardenbergia perbrevidens		N	C		1/1	1987-08-18
Plantae	Rosopsida	Fabaceae	Hardenbergia violacea		N	C		1/0	2010-12-19
Plantae	Rosopsida	Fabaceae	Hovea		N	C		1/0	2001-10-17
Plantae	Rosopsida	Fabaceae	Hovea longipes	brush hovea	N	C		3/2	1991-04-01
Plantae	Rosopsida	Fabaceae	Hovea tholiformis		N	C		5/3	2002-10-03
Plantae	Rosopsida	Fabaceae	Indigastrum parviflorum		N	C		2/2	1997-04-17
Plantae	Rosopsida	Fabaceae	Indigofera		N	C		1/0	1995-05-30
Plantae	Rosopsida	Fabaceae	Indigofera adesmiifolia x I.australis		N	C		1/1	1991-12-12
Plantae	Rosopsida	Fabaceae	Indigofera australis subsp. australis		N	C		1/1	1996-02-17
Plantae	Rosopsida	Fabaceae	Indigofera brevidens		N	C		5/5	2000-10-15

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Plantae	Rosopsida	Fabaceae	Indigofera colutea	sticky indigo	N	C		10/3	2009-12-11
Plantae	Rosopsida	Fabaceae	Indigofera glandulosa		N	C		1/1	1958-03-31
Plantae	Rosopsida	Fabaceae	Indigofera haplophylla		N	C		2/2	2003-02-18
Plantae	Rosopsida	Fabaceae	Indigofera hirsuta	hairy indigo	N	C		5/3	2009-06-30
Plantae	Rosopsida	Fabaceae	Indigofera linifolia		N	C		20/6	2011-06-05
Plantae	Rosopsida	Fabaceae	Indigofera linnaei	Birdsville indigo	N	C		13/4	2012-04-12
Plantae	Rosopsida	Fabaceae	Indigofera pratensis		N	C		3/2	2008-11-10
Plantae	Rosopsida	Fabaceae	Indigofera queenslandica		N	C		2/2	2006-01-31
Plantae	Rosopsida	Fabaceae	Indigofera sericovexilla		N	C		2/0	2009-12-11
Plantae	Rosopsida	Fabaceae	Lotus australis	Australian trefoil	N	C		8/7	2008-10-23
Plantae	Rosopsida	Fabaceae	Macroptilium atropurpureum	siratro	I			2/0	2011-07-05
Plantae	Rosopsida	Fabaceae	Macroptilium lathyroides		I			1/1	1975-05-05
Plantae	Rosopsida	Fabaceae	Pultenaea petiolaris		N	C		1/1	2002-10-03
Plantae	Rosopsida	Fabaceae	Rhynchosia acuminatissima		N	C		1/1	1993-03-01
Plantae	Rosopsida	Fabaceae	Rhynchosia minima		N	C		17/2	2012-04-12
Plantae	Rosopsida	Fabaceae	Rhynchosia minima var. australis		N	C		18/6	2009-12-11
Plantae	Rosopsida	Fabaceae	Rhynchosia minima var. minima		N	C		21/2	2010-05-27
Plantae	Rosopsida	Fabaceae	Sesbania cannabina		N	C		12/0	2012-04-12
Plantae	Rosopsida	Fabaceae	Sesbania cannabina var. cannabina		N	C		1/1	1995-03-10
Plantae	Rosopsida	Fabaceae	Stylosanthes hamata		I			12/1	2011-07-05
Plantae	Rosopsida	Fabaceae	Stylosanthes humilis	Townsville stylo	I			1/0	1997-05-01
Plantae	Rosopsida	Fabaceae	Stylosanthes scabra		I			17/1	2012-04-12
Plantae	Rosopsida	Fabaceae	Swainsona galegifolia	smooth Darling pea	N	C		1/0	2007-11-21
Plantae	Rosopsida	Fabaceae	Swainsona luteola	dwarf darling pea	N	C		4/3	1997-05-01
Plantae	Rosopsida	Fabaceae	Swainsona queenslandica		N	C		3/3	2000-10-10
Plantae	Rosopsida	Fabaceae	Tephrosia astragaloides		N	C		1/1	2011-06-12
Plantae	Rosopsida	Fabaceae	Tephrosia brachyodon var. longifolia		N	C		2/0	2009-12-11
Plantae	Rosopsida	Fabaceae	Tephrosia dietrichiae		N	C		3/1	2009-12-11
Plantae	Rosopsida	Fabaceae	Tephrosia filipes		N	C		3/0	2010-05-27
Plantae	Rosopsida	Fabaceae	Tephrosia filipes subsp. filipes		N	C		2/2	1997-04-17
Plantae	Rosopsida	Fabaceae	Tephrosia filipes var. (Mt Blackjack A.R.Bean+ 7332)		N	C		2/2	1998-07-10
Plantae	Rosopsida	Fabaceae	Tephrosia flagellaris		N	C		2/2	2006-06-08
Plantae	Rosopsida	Fabaceae	Tephrosia juncea		N	C		5/0	2009-12-11
Plantae	Rosopsida	Fabaceae	Tephrosia leptoclada		N	C		4/1	2009-12-11
Plantae	Rosopsida	Fabaceae	Tephrosia oblongata		N	C		1/0	2012-04-12
Plantae	Rosopsida	Fabaceae	Tephrosia rufula		N	C		1/1	2006-01-31
Plantae	Rosopsida	Fabaceae	Tephrosia sp. (Miriam Vale E.J.Thompson+ MIR33)		N	C		2/2	2005-07-28
Plantae	Rosopsida	Fabaceae	Tephrosia sp. (The Grampians L.H.Bird AQ565381)		N	C		1/1	2009-05-11
Plantae	Rosopsida	Fabaceae	Trifolium		N			1/0	2010-12-19
Plantae	Rosopsida	Fabaceae	Vigna		N	C		1/1	2010-10-05
Plantae	Rosopsida	Fabaceae	Vigna lanceolata		N	C		38/0	2010-05-27
Plantae	Rosopsida	Fabaceae	Vigna lanceolata var. lanceolata		N	C		2/2	1993-02-05
Plantae	Rosopsida	Fabaceae	Vigna radiata		N	C		1/0	1997-05-01
Plantae	Rosopsida	Fabaceae	Vigna radiata var. sublobata		N	C		12/7	2010-05-27
Plantae	Rosopsida	Fabaceae	Vigna suberecta		N	C		3/3	1995-03-11
Plantae	Rosopsida	Fabaceae	Vigna vexillata		N	C		2/0	2012-04-12
Plantae	Rosopsida	Fabaceae	Zornia		N	C		1/0	2011-06-05
Plantae	Rosopsida	Fabaceae	Zornia dyctiocarpa var. filifolia		N	C		3/3	1999-03-31
Plantae	Rosopsida	Fabaceae	Zornia muelleriana		N	C		2/0	2011-06-05
Plantae	Rosopsida	Fabaceae	Zornia muelleriana subsp. muelleriana		N	C		3/3	1998-01-23
Plantae	Rosopsida	Fabaceae	Zornia muriculata		N	C		11/0	2009-12-11

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Plantae	Rosopsida	Fabaceae	Zornia muriculata subsp. angustata		N	C		3/3	2000-12-20
Plantae	Rosopsida	Fabaceae	Zornia muriculata subsp. muriculata		N	C		3/3	1997-04-17
Plantae	Rosopsida	Gentianaceae	Centaurium erythraea	common centaury	I			1/1	2010-09-22
Plantae	Rosopsida	Gentianaceae	Schenkia australis		N	C		2/2	2003-10-30
Plantae	Rosopsida	Goodeniaceae	Brunonia australis	blue pincushion	N	C		3/0	2001-10-19
Plantae	Rosopsida	Goodeniaceae	Dampiera discolor		N	C		1/1	1990-08-23
Plantae	Rosopsida	Goodeniaceae	Goodenia		N	C		4/0	2001-10-19
Plantae	Rosopsida	Goodeniaceae	Goodenia glabra		N	C		22/2	2010-05-27
Plantae	Rosopsida	Goodeniaceae	Goodenia grandiflora		N	C		9/9	2011-06-12
Plantae	Rosopsida	Goodeniaceae	Goodenia hirsuta		N	C		2/2	1990-11-14
Plantae	Rosopsida	Goodeniaceae	Goodenia rotundifolia		N	C		5/2	2006-01-31
Plantae	Rosopsida	Goodeniaceae	Goodenia sp. (Mt Castletower M.D.Crisp 2753)		N	C		5/5	2010-12-03
Plantae	Rosopsida	Goodeniaceae	Scaevola parvibarbata		N	C		1/1	2000-11-07
Plantae	Rosopsida	Goodeniaceae	Scaevola spinescens	prickly fan flower	N	C		3/2	2012-04-12
Plantae	Rosopsida	Goodeniaceae	Velleia		N	C		5/0	2009-12-11
Plantae	Rosopsida	Gyrostemonaceae	Codonocarpus attenuatus		N	C		1/1	2002-10-02
Plantae	Rosopsida	Haloragaceae	Gonocarpus teucrioides		N	C		1/1	2006-01-31
Plantae	Rosopsida	Haloragaceae	Haloragis aspera	raspweed	N	C		7/5	1997-05-01
Plantae	Rosopsida	Haloragaceae	Haloragis heterophylla	rough raspweed	N	C		1/1	1960-06-05
Plantae	Rosopsida	Haloragaceae	Haloragis stricta		N	C		15/1	2012-04-12
Plantae	Rosopsida	Helicteraceae	Helicteres semiglabra		N	C		1/1	1993-02-05
Plantae	Rosopsida	Lamiaceae	Ajuga australis	Australian bugle	N	C		2/2	1959-09-02
Plantae	Rosopsida	Lamiaceae	Anisomeles malabarica		N	C		3/2	1997-10-01
Plantae	Rosopsida	Lamiaceae	Basilicum polystachyon		N	C		11/7	2011-07-05
Plantae	Rosopsida	Lamiaceae	Clerodendrum		N	C		1/0	2001-10-19
Plantae	Rosopsida	Lamiaceae	Clerodendrum floribundum		N	C		14/6	2012-04-12
Plantae	Rosopsida	Lamiaceae	Clerodendrum tomentosum		N	C		1/1	1962-07-23
Plantae	Rosopsida	Lamiaceae	Glossocarya hemiderma		N	C		3/2	2004-02-10
Plantae	Rosopsida	Lamiaceae	Lamium amplexicaule	deadnettle	I			1/1	2001-07-23
Plantae	Rosopsida	Lamiaceae	Leonotis nepetifolia		I			1/1	2009-06-07
Plantae	Rosopsida	Lamiaceae	Leucas lavandulifolia		I			3/3	2009-06-07
Plantae	Rosopsida	Lamiaceae	Mentha		N	C		1/0	2010-05-27
Plantae	Rosopsida	Lamiaceae	Mentha grandiflora		N	C		1/1	2006-01-31
Plantae	Rosopsida	Lamiaceae	Moluccella laevis	molucca balm	I			1/1	1985-09-30
Plantae	Rosopsida	Lamiaceae	Ocimum tenuiflorum		N	C		10/7	2010-05-27
Plantae	Rosopsida	Lamiaceae	Plectranthus		N	C		5/3	2007-05-27
Plantae	Rosopsida	Lamiaceae	Plectranthus actites		N	C		2/2	1997-06-17
Plantae	Rosopsida	Lamiaceae	Plectranthus diversus		N	C		1/1	1993-04-05
Plantae	Rosopsida	Lamiaceae	Plectranthus graveolens	flea bush	N	C		4/4	1997-09-30
Plantae	Rosopsida	Lamiaceae	Plectranthus parviflorus		N	C		8/3	2009-12-11
Plantae	Rosopsida	Lamiaceae	Prostanthera collina		N	C		2/2	1999-02-14
Plantae	Rosopsida	Lamiaceae	Prostanthera cryptandroides subsp. euphrasioides		N	C		2/2	2002-10-03
Plantae	Rosopsida	Lamiaceae	Prostanthera leichhardtii		N	C		3/3	2006-01-31
Plantae	Rosopsida	Lamiaceae	Salvia plebeia	common sage	N	C		2/1	2003-10-30
Plantae	Rosopsida	Lamiaceae	Salvia reflexa		I			5/5	2003-03-19
Plantae	Rosopsida	Lamiaceae	Spartothamnella juncea	native broom	N	C		7/5	2006-02-03
Plantae	Rosopsida	Lamiaceae	Spartothamnella puberula		N	C		1/1	1962-05-18
Plantae	Rosopsida	Lamiaceae	Teucrium integrifolium		N	C		7/7	2010-05-07
Plantae	Rosopsida	Lamiaceae	Teucrium sp. (Pittsworth A.R.Bean 18338)		N	C		1/1	1957-03-14
Plantae	Rosopsida	Loganiaceae	Mitrasacme alsinoides		N	C		5/0	2009-12-11
Plantae	Rosopsida	Loganiaceae	Mitrasacme neldneri		N	C		1/1	1999-02-14
Plantae	Rosopsida	Loganiaceae	Mitrasacme pygmaea		N	C		8/0	2009-12-11
Plantae	Rosopsida	Loganiaceae	Strychnos psilosperma	strychnine tree	N	C		3/2	1993-04-21
Plantae	Rosopsida	Loranthaceae	Amyema		N	C		1/0	1997-09-30
Plantae	Rosopsida	Loranthaceae	Amyema congener subsp. rotundifolia		N	C		3/3	2006-02-02

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Plantae	Rosopsida	Loranthaceae	Amyema lucasii		N	C		1/1	2001-11-07
Plantae	Rosopsida	Loranthaceae	Amyema miquelii		N	C		4/4	2003-05-31
Plantae	Rosopsida	Loranthaceae	Amyema pendulum		N	C		1/0	2012-04-12
Plantae	Rosopsida	Loranthaceae	Amyema quandang		N	C		1/0	2007-11-21
Plantae	Rosopsida	Loranthaceae	Amyema quandang var. bancroftii	broad-leaved grey mistletoe	N	C		1/1	2002-10-05
Plantae	Rosopsida	Loranthaceae	Amyema quandang var. quandang		N	C		2/2	1992-08-17
Plantae	Rosopsida	Loranthaceae	Dendrophthoe glabrescens		N	C		1/0	2007-11-21
Plantae	Rosopsida	Loranthaceae	Dendrophthoe homoplastica		N	C		3/3	2002-10-02
Plantae	Rosopsida	Lythraceae	Ammannia multiflora	jerry-jerry	N	C		6/3	2012-04-12
Plantae	Rosopsida	Lythraceae	Lythrum paradoxum		N	C		2/1	2009-12-11
Plantae	Rosopsida	Lythraceae	Rotala mexicana		N	C		2/2	2003-03-20
Plantae	Rosopsida	Malvaceae	Abelmoschus ficulneus	native rosella	N	C		15/4	2010-05-27
Plantae	Rosopsida	Malvaceae	Abutilon		N	C		5/3	1998-05-31
Plantae	Rosopsida	Malvaceae	Abutilon auritum	Chinese lantern	N	C		7/7	2002-07-20
Plantae	Rosopsida	Malvaceae	Abutilon calliphyllum	velvet lanternflower	N	C		1/1	2006-05-24
Plantae	Rosopsida	Malvaceae	Abutilon fraseri	dwarf lantern flower	N	C		3/0	2010-05-27
Plantae	Rosopsida	Malvaceae	Abutilon fraseri subsp. fraseri		N	C		4/4	2000-11-07
Plantae	Rosopsida	Malvaceae	Abutilon guineense		N	C		9/9	2007-05-27
Plantae	Rosopsida	Malvaceae	Abutilon hannii		N	C		2/0	2011-05-05
Plantae	Rosopsida	Malvaceae	Abutilon indicum		N			1/0	1991-04-01
Plantae	Rosopsida	Malvaceae	Abutilon leucopetalum		N	C		4/2	2006-02-04
Plantae	Rosopsida	Malvaceae	Abutilon malvifolium	bastard marshmallow	N	C		2/1	2010-05-07
Plantae	Rosopsida	Malvaceae	Abutilon micropetalum		N	C		6/6	1993-09-28
Plantae	Rosopsida	Malvaceae	Abutilon nobile		N	C		2/2	2006-02-04
Plantae	Rosopsida	Malvaceae	Abutilon oxycarpum		N	C		5/0	1997-10-01
Plantae	Rosopsida	Malvaceae	Abutilon oxycarpum var. incanum		N	C		2/2	2007-05-27
Plantae	Rosopsida	Malvaceae	Abutilon oxycarpum var. oxycarpum		N	C		5/5	1997-04-17
Plantae	Rosopsida	Malvaceae	Abutilon oxycarpum var. subsagittatum		N	C		18/2	2009-12-11
Plantae	Rosopsida	Malvaceae	Abutilon subviscosum		N	C		2/2	1997-07-31
Plantae	Rosopsida	Malvaceae	Abutilon theophrasti	velvet leaf	I			1/1	2006-01-31
Plantae	Rosopsida	Malvaceae	Abutilon tubulosum var. tubulosum		N	C		1/1	1951-06-25
Plantae	Rosopsida	Malvaceae	Gossypium australe		N	C		6/6	2008-04-21
Plantae	Rosopsida	Malvaceae	Hibiscus divaricatus		N	C		5/5	2006-01-31
Plantae	Rosopsida	Malvaceae	Hibiscus heterophyllus		N	C		3/3	1993-03-01
Plantae	Rosopsida	Malvaceae	Hibiscus krichauffianus		N	C		2/2	1998-03-16
Plantae	Rosopsida	Malvaceae	Hibiscus meraukensis	Merauke hibiscus	N	C		3/0	2012-04-12
Plantae	Rosopsida	Malvaceae	Hibiscus sp. (Emerald S.L.Everist 2124)		N	C		2/2	2006-02-02
Plantae	Rosopsida	Malvaceae	Hibiscus splendens	pink hibiscus	N	C		2/2	1993-04-23
Plantae	Rosopsida	Malvaceae	Hibiscus sturtii		N	C		7/4	2010-12-03
Plantae	Rosopsida	Malvaceae	Hibiscus sturtii var. sturtii		N	C		11/3	2009-12-11
Plantae	Rosopsida	Malvaceae	Hibiscus trionum		N	C		29/0	2010-05-27
Plantae	Rosopsida	Malvaceae	Hibiscus trionum var. trionum		N			2/0	1997-05-01
Plantae	Rosopsida	Malvaceae	Hibiscus trionum var. vesicarius		N	C		1/0	2012-04-12
Plantae	Rosopsida	Malvaceae	Hibiscus verdcourtii		N	C		7/7	2005-05-09
Plantae	Rosopsida	Malvaceae	Hibiscus vitifolius		N	C		3/3	2006-01-31
Plantae	Rosopsida	Malvaceae	Malvastrum americanum		I			29/0	2012-04-12
Plantae	Rosopsida	Malvaceae	Malvastrum americanum var. americanum		I			18/4	1998-12-10
Plantae	Rosopsida	Malvaceae	Malvastrum americanum var. stellatum		N	C		9/9	1999-06-05
Plantae	Rosopsida	Malvaceae	Sida		N	C		23/3	2011-06-05
Plantae	Rosopsida	Malvaceae	Sida atherophora		N	C		5/4	2006-01-31
Plantae	Rosopsida	Malvaceae	Sida brachypoda		N	C		1/1	1979-03-29
Plantae	Rosopsida	Malvaceae	Sida cordifolia		I			23/4	2012-04-12
Plantae	Rosopsida	Malvaceae	Sida corrugata		N	C		25/3	2010-05-27

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Plantae	Rosopsida	Malvaceae	Sida cunninghamii		N	C		8/0	2010-05-27
Plantae	Rosopsida	Malvaceae	Sida everistiana		N	C		2/1	2006-10-17
Plantae	Rosopsida	Malvaceae	Sida fibulifera		N	C		6/5	2012-04-12
Plantae	Rosopsida	Malvaceae	Sida filiformis		N	C		6/0	2008-11-10
Plantae	Rosopsida	Malvaceae	Sida hackettiana		N	C		21/4	2012-04-12
Plantae	Rosopsida	Malvaceae	Sida laevis		N	C		2/2	1995-03-09
Plantae	Rosopsida	Malvaceae	Sida pleiantha		N	C		5/3	1997-05-13
Plantae	Rosopsida	Malvaceae	Sida rhombifolia		I			17/0	2012-04-12
Plantae	Rosopsida	Malvaceae	Sida rohlenae		N	C		11/0	2012-04-12
Plantae	Rosopsida	Malvaceae	Sida rohlenae subsp. rohlenae		N	C		3/3	1971-09-30
Plantae	Rosopsida	Malvaceae	Sida sp. (Aramac E.J.Thompson+ JER192)		N	C		1/1	1999-09-30
Plantae	Rosopsida	Malvaceae	Sida sp. (Charters Towers E.J.THompson+ CHA456)		N	C		2/2	2008-04-02
Plantae	Rosopsida	Malvaceae	Sida sp. (Greenvale R.J.Fensham 1150)		N	C		1/1	1997-06-17
Plantae	Rosopsida	Malvaceae	Sida sp. (Musselbrook M.B.Thomas+ MRS437)		N	C		2/2	2006-02-01
Plantae	Rosopsida	Malvaceae	Sida spinosa	spiny sida	I			36/11	2011-07-05
Plantae	Rosopsida	Malvaceae	Sida trichopoda		N	C		22/3	2012-04-12
Plantae	Rosopsida	Martyniaceae	Martynia annua	small-fruited devil's claw	I			1/1	1994-03-20
Plantae	Rosopsida	Meliaceae	Aglaia brownii		N	C		1/1	1985-06-30
Plantae	Rosopsida	Meliaceae	Melia azedarach	white cedar	N	C		6/3	1999-03-23
Plantae	Rosopsida	Meliaceae	Owenia acidula	emu apple	N	C		26/0	2012-04-12
Plantae	Rosopsida	Meliaceae	Owenia venosa	crow's apple	N	C		1/0	1991-04-01
Plantae	Rosopsida	Meliaceae	Owenia x reliqua		N	C		1/1	1996-08-03
Plantae	Rosopsida	Meliaceae	Toona ciliata	red cedar	N	C		1/1	1985-07-31
Plantae	Rosopsida	Meliaceae	Turraea pubescens	native honeysuckle	N	C		3/0	1997-09-30
Plantae	Rosopsida	Memecylaceae	Memecylon pauciflorum var. pauciflorum		N	C		1/1	1985-07-31
Plantae	Rosopsida	Mimosaceae	Acacia		N	C		7/3	2011-07-05
Plantae	Rosopsida	Mimosaceae	Acacia amblygona	fan-leaf wattle	N	C		6/5	2006-02-01
Plantae	Rosopsida	Mimosaceae	Acacia angusta		N	C		4/2	2007-11-21
Plantae	Rosopsida	Mimosaceae	Acacia aprepta	Miles mulga	N	C		2/2	2002-10-04
Plantae	Rosopsida	Mimosaceae	Acacia arbiana		N	NT		9/9	2006-06-07
Plantae	Rosopsida	Mimosaceae	Acacia argyrodendron		N	C		7/6	2008-11-10
Plantae	Rosopsida	Mimosaceae	Acacia aulacocarpa		N	C		1/0	1991-04-01
Plantae	Rosopsida	Mimosaceae	Acacia bancroftiorum		N	C		22/17	2011-11-02
Plantae	Rosopsida	Mimosaceae	Acacia bidwillii		N	C		2/0	2012-04-12
Plantae	Rosopsida	Mimosaceae	Acacia blakei subsp. blakei		N	C		1/1	1991-09-15
Plantae	Rosopsida	Mimosaceae	Acacia burdekensis		N	C		7/2	2001-10-19
Plantae	Rosopsida	Mimosaceae	Acacia cambagei	gidgee	N	C		1/0	1995-03-01
Plantae	Rosopsida	Mimosaceae	Acacia caroleae		N	C		1/0	2003-11-18
Plantae	Rosopsida	Mimosaceae	Acacia catenulata	bendee	N	C		2/0	2007-11-21
Plantae	Rosopsida	Mimosaceae	Acacia conferta		N	C		4/4	2006-02-01
Plantae	Rosopsida	Mimosaceae	Acacia cowleana		N	C		1/1	1999-06-25
Plantae	Rosopsida	Mimosaceae	Acacia crassa		N	C		1/0	2006-05-10
Plantae	Rosopsida	Mimosaceae	Acacia crassa subsp. crassa		N	C		5/1	2001-10-16
Plantae	Rosopsida	Mimosaceae	Acacia crassa subsp. longicoma		N	C		13/0	2001-10-16
Plantae	Rosopsida	Mimosaceae	Acacia cretata		N	C		5/3	2010-12-19
Plantae	Rosopsida	Mimosaceae	Acacia cretata - A.fodinalis		N	C		1/1	1995-08-05
Plantae	Rosopsida	Mimosaceae	Acacia cretata - A.leiocalyx (Domin)		N	C		5/5	1988-09-30
Plantae	Rosopsida	Mimosaceae	Acacia cretata x A.fodinalis		N	C		4/2	2001-10-16
Plantae	Rosopsida	Mimosaceae	Acacia decora	pretty wattle	N	C		10/3	2007-11-21
Plantae	Rosopsida	Mimosaceae	Acacia dietrichiana		N	C		2/2	2002-10-03
Plantae	Rosopsida	Mimosaceae	Acacia disparrima subsp. disparrima		N	C		1/1	1958-06-13
Plantae	Rosopsida	Mimosaceae	Acacia excelsa		N	C		9/0	2011-11-02
Plantae	Rosopsida	Mimosaceae	Acacia excelsa subsp. excelsa		N	C		16/7	2001-10-19

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Plantae	Rosopsida	Mimosaceae	Acacia falciformis	broad-leaved hickory	N	C		2/0	2001-10-19
Plantae	Rosopsida	Mimosaceae	Acacia farnesiana	mimosa bush	N	C		2/0	2008-11-10
Plantae	Rosopsida	Mimosaceae	Acacia fasciculifera	scaly bark	N	C		1/0	1991-04-01
Plantae	Rosopsida	Mimosaceae	Acacia faucium		N	C		2/2	1972-06-08
Plantae	Rosopsida	Mimosaceae	Acacia fimbriata	Brisbane golden wattle	N	C		1/1	1991-09-11
Plantae	Rosopsida	Mimosaceae	Acacia flavescens	toothed wattle	N	C		13/2	2009-12-11
Plantae	Rosopsida	Mimosaceae	Acacia fodinalis		N	C		6/6	2010-10-05
Plantae	Rosopsida	Mimosaceae	Acacia gnidium		N	C		3/3	1990-08-23
Plantae	Rosopsida	Mimosaceae	Acacia harpophylla	brigalow	N	C		22/5	2011-11-02
Plantae	Rosopsida	Mimosaceae	Acacia holosericea		N	C		6/3	2009-12-11
Plantae	Rosopsida	Mimosaceae	Acacia ixodes		N	C		1/0	2010-12-19
Plantae	Rosopsida	Mimosaceae	Acacia julifera		N	C		2/0	2009-12-11
Plantae	Rosopsida	Mimosaceae	Acacia julifera subsp. curvinervia		N	C		15/15	2012-10-17
Plantae	Rosopsida	Mimosaceae	Acacia julifera subsp. julifera		N	C		4/4	1983-09-11
Plantae	Rosopsida	Mimosaceae	Acacia leiocalyx		N	C		4/0	2011-11-02
Plantae	Rosopsida	Mimosaceae	Acacia leiocalyx subsp. leiocalyx		N	C		3/3	2010-08-12
Plantae	Rosopsida	Mimosaceae	Acacia ligulata		N	C		1/1	1999-09-30
Plantae	Rosopsida	Mimosaceae	Acacia macradenia	zig-zag wattle	N	C		2/2	2002-10-03
Plantae	Rosopsida	Mimosaceae	Acacia melvillei		N	C		5/5	2010-10-05
Plantae	Rosopsida	Mimosaceae	Acacia nilotica		I			1/0	2008-11-10
Plantae	Rosopsida	Mimosaceae	Acacia omalophylla		N	C		1/1	1961-09-11
Plantae	Rosopsida	Mimosaceae	Acacia oswaldii	miljee	N	C		11/9	2006-05-10
Plantae	Rosopsida	Mimosaceae	Acacia pendula	myall	N	C		3/0	2007-11-21
Plantae	Rosopsida	Mimosaceae	Acacia rhodoxylon	ringy rosewood	N	C		75/6	2001-10-19
Plantae	Rosopsida	Mimosaceae	Acacia salicina	doolan	N	C		27/4	2011-05-05
Plantae	Rosopsida	Mimosaceae	Acacia shirleyi	lancewood	N	C		124/8	2011-11-02
Plantae	Rosopsida	Mimosaceae	Acacia sp. (Comet L.Pedley 4091)		N	C		6/6	1996-11-30
Plantae	Rosopsida	Mimosaceae	Acacia spania		N	NT		5/5	2000-05-20
Plantae	Rosopsida	Mimosaceae	Acacia sparsiflora		N	C		5/3	1997-05-01
Plantae	Rosopsida	Mimosaceae	Acacia tephrina		N	C		4/4	1988-08-03
Plantae	Rosopsida	Mimosaceae	Acacia victoriae		N	C		3/1	2007-11-21
Plantae	Rosopsida	Mimosaceae	Albizia canescens		N	C		3/3	2006-02-05
Plantae	Rosopsida	Mimosaceae	Archidendropsis basaltica	red lancewood	N	C		23/2	2012-04-12
Plantae	Rosopsida	Mimosaceae	Archidendropsis thozetiana		N	C		3/1	2005-08-09
Plantae	Rosopsida	Mimosaceae	Leucaena leucocephala		I			1/0	2011-11-02
Plantae	Rosopsida	Mimosaceae	Leucaena leucocephala subsp. leucocephala		I			1/1	2003-03-20
Plantae	Rosopsida	Mimosaceae	Neptunia gracilis forma glandulosa		N	C		2/0	2012-04-12
Plantae	Rosopsida	Mimosaceae	Neptunia gracilis forma gracilis		N	C		44/12	2011-05-05
Plantae	Rosopsida	Mimosaceae	Neptunia monosperma		N	C		1/1	2002-02-06
Plantae	Rosopsida	Mimosaceae	Prosopis pallida		I			1/1	1992-02-29
Plantae	Rosopsida	Mimosaceae	Vachellia bidwillii		N	C		10/6	2009-12-11
Plantae	Rosopsida	Mimosaceae	Vachellia farnesiana		I			32/5	2010-05-27
Plantae	Rosopsida	Mimosaceae	Vachellia nilotica		I			3/3	1997-03-05
Plantae	Rosopsida	Molluginaceae	Glinus lotoides	hairy carpet weed	N	C		3/3	2003-11-11
Plantae	Rosopsida	Molluginaceae	Glinus oppositifolius		N	C		2/2	2009-06-07
Plantae	Rosopsida	Molluginaceae	Mollugo cerviana		N	C		1/1	1993-12-15
Plantae	Rosopsida	Moraceae	Ficus coronata	creek sandpaper fig	N	C		4/1	1997-10-01
Plantae	Rosopsida	Moraceae	Ficus obliqua		N	C		4/1	2006-02-03
Plantae	Rosopsida	Moraceae	Ficus opposita		N	C		12/9	2012-04-12
Plantae	Rosopsida	Moraceae	Ficus rubiginosa forma glabrescens		N	C		1/1	1992-08-17
Plantae	Rosopsida	Moraceae	Ficus rubiginosa forma rubiginosa		N	C		4/4	1993-02-26
Plantae	Rosopsida	Moraceae	Ficus virens		N	C		1/0	1997-09-30
Plantae	Rosopsida	Moraceae	Streblus pendulinus		N	C		1/1	1993-09-29
Plantae	Rosopsida	Myoporaceae	Eremophila bignoniiflora	eurah	N	C		4/3	2006-05-10

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Plantae	Rosopsida	Myoporaceae	Eremophila debilis	winter apple	N	C		13/3	2012-04-12
Plantae	Rosopsida	Myoporaceae	Eremophila deserti		N	C		18/11	2012-04-12
Plantae	Rosopsida	Myoporaceae	Eremophila longifolia	berrigan	N	C		6/4	1997-05-01
Plantae	Rosopsida	Myoporaceae	Eremophila maculata		N	C		8/0	2011-07-05
Plantae	Rosopsida	Myoporaceae	Eremophila maculata subsp. maculata		N	C		6/6	1998-07-11
Plantae	Rosopsida	Myoporaceae	Eremophila mitchellii		N	C		23/2	2012-04-12
Plantae	Rosopsida	Myoporaceae	Myoporum acuminatum	coastal boobialla	N	C		16/9	2012-04-12
Plantae	Rosopsida	Myrsinaceae	Myrsine variabilis		N	C		4/2	1997-09-30
Plantae	Rosopsida	Myrtaceae	Backhousia kingii		N	C		2/1	1996-08-04
Plantae	Rosopsida	Myrtaceae	Corymbia		N	C		4/0	2011-07-05
Plantae	Rosopsida	Myrtaceae	Corymbia aureola		N	C		8/8	2009-05-01
Plantae	Rosopsida	Myrtaceae	Corymbia blakei subsp. rasilis		N	C		2/0	2005-08-08
Plantae	Rosopsida	Myrtaceae	Corymbia brachycarpa		N	C		1/1	2002-10-02
Plantae	Rosopsida	Myrtaceae	Corymbia citriodora	spotted gum	N	C		2/0	1995-05-30
Plantae	Rosopsida	Myrtaceae	Corymbia citriodora subsp. citriodora		N	C		84/2	2006-02-01
Plantae	Rosopsida	Myrtaceae	Corymbia clarksoniana		N	C		60/6	2012-04-12
Plantae	Rosopsida	Myrtaceae	Corymbia dallachiana		N	C		19/5	2011-11-02
Plantae	Rosopsida	Myrtaceae	Corymbia erythrophloia	variable-barked bloodwood	N	C		49/3	2012-04-12
Plantae	Rosopsida	Myrtaceae	Corymbia leichhardtii	rustyjacket	N	C		7/3	2006-02-02
Plantae	Rosopsida	Myrtaceae	Corymbia papuana	ghost gum	N	C		3/0	2012-04-12
Plantae	Rosopsida	Myrtaceae	Corymbia terminalis		N	C		1/1	1985-08-22
Plantae	Rosopsida	Myrtaceae	Corymbia tessellaris	Moreton Bay ash	N	C		34/2	2012-04-12
Plantae	Rosopsida	Myrtaceae	Corymbia trachyphloia subsp. trachyphloia		N	C		5/5	2006-01-31
Plantae	Rosopsida	Myrtaceae	Corymbia watsoniana		N	C		1/0	1995-05-29
Plantae	Rosopsida	Myrtaceae	Eucalyptus		N	C		4/0	2011-07-05
Plantae	Rosopsida	Myrtaceae	Eucalyptus apothalassica		N	C		7/3	2006-02-03
Plantae	Rosopsida	Myrtaceae	Eucalyptus bakeri	Baker's mallee	N	C		1/1	1921-11-04
Plantae	Rosopsida	Myrtaceae	Eucalyptus camaldulensis		N	C		3/0	2012-04-12
Plantae	Rosopsida	Myrtaceae	Eucalyptus cambageana	Dawson gum	N	C		18/10	2012-04-12
Plantae	Rosopsida	Myrtaceae	Eucalyptus cloeziana	Gympie messmate	N	C		5/2	2009-05-11
Plantae	Rosopsida	Myrtaceae	Eucalyptus coolabah	coolabah	N	C		10/7	2008-11-10
Plantae	Rosopsida	Myrtaceae	Eucalyptus coolabah x E.melanophloia		N	C		1/1	1971-09-30
Plantae	Rosopsida	Myrtaceae	Eucalyptus crebra	narrow-leaved red ironbark	N	C		138/15	2012-04-12
Plantae	Rosopsida	Myrtaceae	Eucalyptus crebra x E.melanophloia		N	C		1/1	2006-02-07
Plantae	Rosopsida	Myrtaceae	Eucalyptus crebra x E.orgadophila		N	C		1/1	1996-01-21
Plantae	Rosopsida	Myrtaceae	Eucalyptus crebra x E.populnea		N	C		7/2	2001-10-19
Plantae	Rosopsida	Myrtaceae	Eucalyptus drepanophylla		N	C		3/3	1976-08-28
Plantae	Rosopsida	Myrtaceae	Eucalyptus exserta	Queensland peppermint	N	C		10/8	2011-11-11
Plantae	Rosopsida	Myrtaceae	Eucalyptus fibrosa subsp. fibrosa		N	C		4/0	2001-10-17
Plantae	Rosopsida	Myrtaceae	Eucalyptus melanophloia		N	C		7/0	2012-04-12
Plantae	Rosopsida	Myrtaceae	Eucalyptus melanophloia subsp. melanophloia		N	C		3/3	1991-11-15
Plantae	Rosopsida	Myrtaceae	Eucalyptus microcarpa	inland grey box	N	C		2/0	2011-11-02
Plantae	Rosopsida	Myrtaceae	Eucalyptus moluccana	gum-topped box	N	C		2/2	1997-04-27
Plantae	Rosopsida	Myrtaceae	Eucalyptus orgadophila	mountain coolibah	N	C		58/5	2012-04-12
Plantae	Rosopsida	Myrtaceae	Eucalyptus persistens		N	C		4/3	2011-11-10
Plantae	Rosopsida	Myrtaceae	Eucalyptus platyphylla	poplar gum	N	C		12/7	2012-04-12
Plantae	Rosopsida	Myrtaceae	Eucalyptus platyphylla x E.tereticornis		N	C		2/2	1971-09-30
Plantae	Rosopsida	Myrtaceae	Eucalyptus populnea	poplar box	N	C		62/7	2012-04-12
Plantae	Rosopsida	Myrtaceae	Eucalyptus raveretiana	black ironbox	N	V	V	4/3	2011-05-31
Plantae	Rosopsida	Myrtaceae	Eucalyptus tenuipes	narrow-leaved white mahogany	N	C		6/5	2009-05-11
Plantae	Rosopsida	Myrtaceae	Eucalyptus tereticornis		N	C		7/0	2012-04-12

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Plantae	Rosopsida	Myrtaceae	Eucalyptus tereticornis subsp. tereticornis		N	C		18/5	2001-10-19
Plantae	Rosopsida	Myrtaceae	Eucalyptus tholiformis		N	C		7/6	2009-05-11
Plantae	Rosopsida	Myrtaceae	Eucalyptus thozetiana		N	C		10/10	2000-11-07
Plantae	Rosopsida	Myrtaceae	Gossia bidwillii		N	C		7/2	1997-09-30
Plantae	Rosopsida	Myrtaceae	Leptospermum lamellatum		N	C		3/3	2006-02-02
Plantae	Rosopsida	Myrtaceae	Leptospermum neglectum		N	C		4/4	2006-06-07
Plantae	Rosopsida	Myrtaceae	Lophostemon grandiflorus		N	C		4/3	2012-04-12
Plantae	Rosopsida	Myrtaceae	Lophostemon suaveolens	swamp box	N	C		3/1	2008-11-10
Plantae	Rosopsida	Myrtaceae	Lysicarpus angustifolius	budgeroo	N	C		17/5	2006-01-31
Plantae	Rosopsida	Myrtaceae	Melaleuca		N	C		1/0	1995-05-29
Plantae	Rosopsida	Myrtaceae	Melaleuca bracteata		N	C		19/6	2012-04-12
Plantae	Rosopsida	Myrtaceae	Melaleuca fluviatilis		N	C		8/5	2012-04-12
Plantae	Rosopsida	Myrtaceae	Melaleuca hemisticta		N	C		2/2	1990-08-23
Plantae	Rosopsida	Myrtaceae	Melaleuca leucadendra	broad-leaved tea-tree	N	C		4/3	1991-04-01
Plantae	Rosopsida	Myrtaceae	Melaleuca nervosa		N	C		3/0	2012-04-12
Plantae	Rosopsida	Myrtaceae	Melaleuca nervosa subsp. nervosa		N	C		11/6	2009-12-11
Plantae	Rosopsida	Myrtaceae	Melaleuca sp. (Ropers Peak P.I.Forster PIF7208)		N	C		4/4	2006-06-05
Plantae	Rosopsida	Myrtaceae	Melaleuca tamariscina		N	C		1/1	2010-09-22
Plantae	Rosopsida	Myrtaceae	Melaleuca trichostachya		N	C		2/2	1996-05-31
Plantae	Rosopsida	Myrtaceae	Melaleuca viminalis		N	C		2/2	1971-09-07
Plantae	Rosopsida	Myrtaceae	Melaleuca viridiflora		N	C		2/0	2011-07-05
Plantae	Rosopsida	Myrtaceae	Melaleuca viridiflora var. viridiflora		N	C		1/1	2000-05-19
Plantae	Rosopsida	Myrtaceae	Micromyrtus capricornia		N	C		9/9	2003-05-05
Plantae	Rosopsida	Myrtaceae	Myrtaceae		N	C		2/0	2011-06-05
Plantae	Rosopsida	Myrtaceae	Rhodamnia pauciovulata		N	NT		1/1	2011-05-04
Plantae	Rosopsida	Nyctaginaceae	Boerhavia		N	C		2/0	2001-10-19
Plantae	Rosopsida	Nyctaginaceae	Boerhavia burbidgeana		N	C		1/0	2010-05-27
Plantae	Rosopsida	Nyctaginaceae	Boerhavia coccinea		N			1/0	1997-05-01
Plantae	Rosopsida	Nyctaginaceae	Boerhavia dominii		N	C		16/4	2010-05-27
Plantae	Rosopsida	Nyctaginaceae	Boerhavia pubescens		N	C		1/0	2008-11-10
Plantae	Rosopsida	Nyctaginaceae	Boerhaviarepleta		N	C		1/1	1998-07-08
Plantae	Rosopsida	Nyctaginaceae	Boerhavia sp. (Bargara L.Pedley 5382)		N	C		2/2	2000-11-07
Plantae	Rosopsida	Nyctaginaceae	Boerhavia sp. (St George A.Hill AQ399299)		N	C		4/4	2002-04-24
Plantae	Rosopsida	Nyctaginaceae	Pisonia aculeata	thorny Pisonia	N	C		1/1	1993-09-02
Plantae	Rosopsida	Oleaceae	Jasminum didymum		N	C		5/0	2008-11-10
Plantae	Rosopsida	Oleaceae	Jasminum didymum subsp. didymum		N	C		2/0	1995-05-30
Plantae	Rosopsida	Oleaceae	Jasminum didymum subsp. lineare		N	C		11/4	2010-05-27
Plantae	Rosopsida	Oleaceae	Jasminum didymum subsp. racemosum		N	C		3/2	1993-02-26
Plantae	Rosopsida	Oleaceae	Jasminum simplicifolium		N			4/0	2012-04-12
Plantae	Rosopsida	Oleaceae	Jasminum simplicifolium subsp. australiense		N	C		2/2	1993-04-05
Plantae	Rosopsida	Oleaceae	Notelaea microcarpa		N	C		8/1	1997-10-01
Plantae	Rosopsida	Oleaceae	Notelaea microcarpa var. microcarpa		N	C		6/3	2009-12-11
Plantae	Rosopsida	Onagraceae	Ludwigia		N	C		2/2	1999-03-31
Plantae	Rosopsida	Onagraceae	Ludwigia octovalvis	willow primrose	N	C		3/0	2011-07-05
Plantae	Rosopsida	Onagraceae	Ludwigia peploides subsp. montevidensis		N	C		1/1	1971-09-28
Plantae	Rosopsida	Oxalidaceae	Oxalis		N	C		4/0	2001-10-19
Plantae	Rosopsida	Oxalidaceae	Oxalis chnoodes		N	C		4/3	2006-02-01
Plantae	Rosopsida	Oxalidaceae	Oxalis corniculata		I			1/0	1997-05-01
Plantae	Rosopsida	Oxalidaceae	Oxalis debilis		N			1/0	2012-04-12
Plantae	Rosopsida	Oxalidaceae	Oxalis perennans		N	C		2/1	2008-11-10
Plantae	Rosopsida	Oxalidaceae	Oxalis radicosa		N	C		6/3	2010-05-27
Plantae	Rosopsida	Oxalidaceae	Oxalis thompsoniae		N	C		1/1	1997-04-10

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Plantae	Rosopsida	Passifloraceae	Passiflora aurantia		N	C		1/0	1991-04-01
Plantae	Rosopsida	Passifloraceae	Passiflora aurantia var. aurantia		N	C		1/1	2006-01-31
Plantae	Rosopsida	Passifloraceae	Passiflora foetida		I			6/3	2012-04-12
Plantae	Rosopsida	Passifloraceae	Passiflora suberosa	corky passion flower	I			1/0	2007-11-21
Plantae	Rosopsida	Pedaliaceae	Josephinia eugeniae	josephinia burr	N	C		6/5	1997-05-01
Plantae	Rosopsida	Pentapetaceae	Melhania oblongifolia		N	C		11/4	2001-10-17
Plantae	Rosopsida	Phyllanthaceae	Breynia oblongifolia		N	C		20/3	2012-04-12
Plantae	Rosopsida	Phyllanthaceae	Bridelia leichhardtii		N	C		4/2	1997-09-30
Plantae	Rosopsida	Phyllanthaceae	Cleistanthus cunninghamii	omega	N	C		1/1	1991-09-15
Plantae	Rosopsida	Phyllanthaceae	Flueggea leucopyrus		N	C		7/3	1997-09-30
Plantae	Rosopsida	Phyllanthaceae	Flueggea virosa subsp. melanthesoides		N	C		2/2	2006-02-01
Plantae	Rosopsida	Phyllanthaceae	Glochidion ferdinandi		N	C		1/1	1978-11-15
Plantae	Rosopsida	Phyllanthaceae	Notoleptopus decaisnei var. decaisnei		N	C		12/11	2010-05-07
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus		N	C		6/1	2009-12-11
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus collinus		N	C		1/1	1990-11-13
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus fuernrohrii		N	C		7/2	2009-12-11
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus gunnii		N	C		1/0	1991-04-01
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus lacerosus		N	C		1/1	1984-12-31
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus lacunarius		N	C		2/2	1997-05-07
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus maderaspatensis		N	C		15/4	2012-04-12
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus maderaspatensis var. maderaspatensis		N	C		3/3	2003-03-28
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus mitchellii		N	C		1/0	2009-12-11
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus simplex		N	C		3/3	1995-03-12
Plantae	Rosopsida	Phyllanthaceae	Phyllanthus virgatus		N	C		42/1	2012-04-12
Plantae	Rosopsida	Phyllanthaceae	Sauropus ramosissimus		N	C		1/1	1993-02-05
Plantae	Rosopsida	Phyllanthaceae	Sauropus trachyspermus		N	C		1/1	1995-03-09
Plantae	Rosopsida	Picrodendraceae	Petalostigma pubescens	quinine tree	N	C		40/4	2012-04-12
Plantae	Rosopsida	Pittosporaceae	Auranticarpa rhombifolia		N	C		5/2	2007-11-21
Plantae	Rosopsida	Pittosporaceae	Bursaria		N	C		2/0	2001-10-18
Plantae	Rosopsida	Pittosporaceae	Bursaria incana		N	C		19/6	2012-04-12
Plantae	Rosopsida	Pittosporaceae	Bursaria spinosa subsp. spinosa		N	C		5/1	2009-05-11
Plantae	Rosopsida	Pittosporaceae	Pittosporum		N	C		1/0	1995-05-30
Plantae	Rosopsida	Pittosporaceae	Pittosporum angustifolium		N	C		7/2	2009-12-11
Plantae	Rosopsida	Pittosporaceae	Pittosporum spinescens		N	C		16/6	2012-04-12
Plantae	Rosopsida	Plantaginaceae	Plantago debilis	shade plantain	N	C		1/1	1992-07-08
Plantae	Rosopsida	Plumbaginaceae	Plumbago		N			2/0	2005-08-08
Plantae	Rosopsida	Plumbaginaceae	Plumbago zeylanica	native plumbago	N	C		3/2	2006-01-31
Plantae	Rosopsida	Polygalaceae	Polygala		N	C		2/0	2008-11-10
Plantae	Rosopsida	Polygalaceae	Polygala crassitesta		N	C		18/5	2010-05-27
Plantae	Rosopsida	Polygalaceae	Polygala linariifolia		N	C		2/2	1999-03-21
Plantae	Rosopsida	Polygonaceae	Acetosa vesicaria		I			1/1	1970-09-21
Plantae	Rosopsida	Polygonaceae	Duma florulenta		N	C		1/1	1962-06-25
Plantae	Rosopsida	Polygonaceae	Emex australis		I			7/0	2009-12-11
Plantae	Rosopsida	Polygonaceae	Fallopia convolvulus	black bindweed	I			2/2	1997-02-05
Plantae	Rosopsida	Polygonaceae	Muehlenbeckia zippelii		N	C		1/1	1996-01-09
Plantae	Rosopsida	Polygonaceae	Persicaria attenuata		N	C		2/1	2012-04-12
Plantae	Rosopsida	Polygonaceae	Persicaria lapathifolia	pale knotweed	N	C		3/3	2000-11-07
Plantae	Rosopsida	Polygonaceae	Persicaria orientalis	princes feathers	N	C		4/3	2008-11-10
Plantae	Rosopsida	Polygonaceae	Persicaria prostrata	creeping knotweed	N	C		1/1	1990-11-13
Plantae	Rosopsida	Polygonaceae	Polygonum aviculare	wireweed	I			1/1	1990-11-13
Plantae	Rosopsida	Polygonaceae	Polygonum plebeium	small knotweed	N	C		3/2	2008-11-10
Plantae	Rosopsida	Portulacaceae	Calandrinia pickeringii		N	C		3/1	2009-12-11
Plantae	Rosopsida	Portulacaceae	Grahamia australiana		N	C		1/1	1997-04-17

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Plantae	Rosopsida	Portulacaceae	Portulaca		N	C		2/1	1997-10-01
Plantae	Rosopsida	Portulacaceae	Portulaca australis		N	C		1/1	1997-04-17
Plantae	Rosopsida	Portulacaceae	Portulaca bicolor		N	C		2/2	2006-01-31
Plantae	Rosopsida	Portulacaceae	Portulaca filifolia		N	C		9/1	2009-12-11
Plantae	Rosopsida	Portulacaceae	Portulaca oleracea	pigweed	I			12/2	2012-04-12
Plantae	Rosopsida	Portulacaceae	Portulaca pilosa		I			4/0	2011-06-05
Plantae	Rosopsida	Portulacaceae	Portulaca pilosa subsp. pilosa		I			1/1	1998-07-10
Plantae	Rosopsida	Portulacaceae	Portulaca sp. (Blackall G.Le Gros AQ101965)		N	C		1/1	1966-10-12
Plantae	Rosopsida	Proteaceae	Grevillea		N	C		3/0	2011-06-05
Plantae	Rosopsida	Proteaceae	Grevillea helmsiae		N	C		1/0	1991-04-01
Plantae	Rosopsida	Proteaceae	Grevillea juncifolia	honeysuckle spider flower	N	C		1/0	2011-07-05
Plantae	Rosopsida	Proteaceae	Grevillea parallela		N	C		12/9	2012-04-12
Plantae	Rosopsida	Proteaceae	Grevillea pteridifolia	golden parrot tree	N	C		4/1	2006-05-10
Plantae	Rosopsida	Proteaceae	Grevillea striata	beefwood	N	C		9/1	2012-04-12
Plantae	Rosopsida	Proteaceae	Hakea		N	C		1/1	1962-07-22
Plantae	Rosopsida	Proteaceae	Hakea chordophylla		N	C		1/0	2011-07-05
Plantae	Rosopsida	Proteaceae	Hakea lorea		N	C		7/0	2012-04-12
Plantae	Rosopsida	Proteaceae	Hakea lorea subsp. lorea		N	C		5/4	2006-05-10
Plantae	Rosopsida	Proteaceae	Persoonia amaliae		N	C		9/6	2002-10-03
Plantae	Rosopsida	Proteaceae	Persoonia falcata		N	C		8/2	2001-10-19
Plantae	Rosopsida	Putranjivaceae	Drypetes deplanchei	grey boxwood	N	C		10/4	2001-10-18
Plantae	Rosopsida	Rhamnaceae	Alphitonia excelsa	soap tree	N	C		49/5	2009-12-11
Plantae	Rosopsida	Rhamnaceae	Pomaderris queenslandica		N	C		1/1	2009-05-11
Plantae	Rosopsida	Rhamnaceae	Ventilago viminalis	supplejack	N	C		29/6	2012-04-12
Plantae	Rosopsida	Rubiaceae	Antirhea putaminosa		N	C		11/8	2004-02-10
Plantae	Rosopsida	Rubiaceae	Asperula conferta		N	C		1/1	1951-06-23
Plantae	Rosopsida	Rubiaceae	Atractocarpus fitzalanii subsp. fitzalanii		N	C		1/1	1993-03-01
Plantae	Rosopsida	Rubiaceae	Canthium		N			6/0	2001-10-17
Plantae	Rosopsida	Rubiaceae	Coelospermum reticulatum		N	C		4/4	1999-02-07
Plantae	Rosopsida	Rubiaceae	Cyclophyllum coprosmoides var. coprosmoides		N	C		3/3	2006-02-02
Plantae	Rosopsida	Rubiaceae	Dentella repens	dentella	N	C		1/1	1927-03-01
Plantae	Rosopsida	Rubiaceae	Everistia vacciniifolia		N	C		1/0	1991-04-01
Plantae	Rosopsida	Rubiaceae	Everistia vacciniifolia forma vacciniifolia		N	C		3/3	1977-08-31
Plantae	Rosopsida	Rubiaceae	Larsenaikia ochreata		N	C		17/6	2010-12-03
Plantae	Rosopsida	Rubiaceae	Nauclea orientalis	Leichhardt tree	N	C		1/1	1995-12-20
Plantae	Rosopsida	Rubiaceae	Oldenlandia coerulescens		N	C		2/2	2011-03-31
Plantae	Rosopsida	Rubiaceae	Oldenlandia corymbosa var. caespitosa		I			1/1	2011-06-12
Plantae	Rosopsida	Rubiaceae	Oldenlandia mitrasacmoides subsp. trachymenoides		N	C		8/2	2010-05-27
Plantae	Rosopsida	Rubiaceae	Opercularia		N	C		1/0	2008-11-10
Plantae	Rosopsida	Rubiaceae	Pavetta australiensis		N	C		2/1	1993-04-05
Plantae	Rosopsida	Rubiaceae	Pavetta australiensis var. australiensis		N	C		1/1	2006-02-05
Plantae	Rosopsida	Rubiaceae	Pavetta australiensis var. australiensis - P.granitica		N	C		1/1	1990-08-27
Plantae	Rosopsida	Rubiaceae	Pavetta granitica		N	C		2/2	1999-02-15
Plantae	Rosopsida	Rubiaceae	Pogonolobus reticulatus		N	C		4/0	2001-10-17
Plantae	Rosopsida	Rubiaceae	Psychotria		N	C		1/1	1970-08-28
Plantae	Rosopsida	Rubiaceae	Psychotria daphnoides		N	C		3/2	2006-02-01
Plantae	Rosopsida	Rubiaceae	Psychotria daphnoides var. daphnoides		N	C		1/1	1992-08-17
Plantae	Rosopsida	Rubiaceae	Psydrax attenuata		N	C		5/0	2009-12-11
Plantae	Rosopsida	Rubiaceae	Psydrax attenuata forma megalantha		N	C		2/2	1990-11-13
Plantae	Rosopsida	Rubiaceae	Psydrax forsteri		N	C		7/7	1998-09-30
Plantae	Rosopsida	Rubiaceae	Psydrax johnsonii		N	C		7/6	2008-11-10
Plantae	Rosopsida	Rubiaceae	Psydrax longipes		N	C		2/2	1993-12-01

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Plantae	Rosopsida	Rubiaceae	Psydrax odorata		N	C		4/0	2012-04-12
Plantae	Rosopsida	Rubiaceae	Psydrax odorata forma buxifolia		N	C		7/0	2009-12-11
Plantae	Rosopsida	Rubiaceae	Psydrax odorata subsp. australiana		N	C		5/5	2006-02-02
Plantae	Rosopsida	Rubiaceae	Psydrax oleifolia		N	C		8/2	2012-04-12
Plantae	Rosopsida	Rubiaceae	Psydrax saligna forma saligna		N	C		5/5	2006-01-31
Plantae	Rosopsida	Rubiaceae	Richardia brasiliensis	white eye	I			2/2	2003-11-11
Plantae	Rosopsida	Rubiaceae	Spermacoce		N	C		1/0	2001-10-17
Plantae	Rosopsida	Rubiaceae	Spermacoce brachystema		N	C		8/6	2011-07-05
Plantae	Rosopsida	Rubiaceae	Spermacoce multicaulis		N	C		19/2	2009-12-11
Plantae	Rosopsida	Rubiaceae	Triflorensia ixoroides		N	C		5/5	1997-09-30
Plantae	Rosopsida	Rutaceae	Acronychia laevis	glossy acronychia	N	C		5/5	2009-05-11
Plantae	Rosopsida	Rutaceae	Acronychia pauciflora	soft acronychia	N	C		3/2	1993-09-02
Plantae	Rosopsida	Rutaceae	Boronia obovata		N	C		1/1	2009-05-11
Plantae	Rosopsida	Rutaceae	Citrus glauca		N	C		8/6	2012-04-12
Plantae	Rosopsida	Rutaceae	Coatesia paniculata		N	C		1/0	1991-04-01
Plantae	Rosopsida	Rutaceae	Dinosperma erythrococcum		N	C		1/0	1991-04-01
Plantae	Rosopsida	Rutaceae	Flindersia australis	crow's ash	N	C		7/5	2009-12-11
Plantae	Rosopsida	Rutaceae	Flindersia dissosperma		N	C		30/10	2012-04-12
Plantae	Rosopsida	Rutaceae	Geijera		N			1/0	1995-03-01
Plantae	Rosopsida	Rutaceae	Geijera parviflora	wilga	N	C		17/4	2012-04-12
Plantae	Rosopsida	Rutaceae	Geijera salicifolia	brush wilga	N	C		27/11	2011-05-31
Plantae	Rosopsida	Rutaceae	Murraya ovatifoliolata		N	C		7/7	2000-01-05
Plantae	Rosopsida	Rutaceae	Murraya paniculata		N	C		3/0	1997-09-30
Plantae	Rosopsida	Rutaceae	Phebalium glandulosum		N	C		1/1	2006-01-31
Plantae	Rosopsida	Rutaceae	Phebalium glandulosum subsp. glandulosum		N	C		6/6	2011-11-11
Plantae	Rosopsida	Rutaceae	Zieria aspalathoides subsp. aspalathoides		N	C		3/3	2006-01-31
Plantae	Rosopsida	Rutaceae	Zieria cytisoides	downy Zieria	N	C		2/2	1987-08-18
Plantae	Rosopsida	Santalaceae	Anthobolus leptomerioides		N	C		1/1	1962-07-08
Plantae	Rosopsida	Santalaceae	Exocarpos latifolius		N	C		7/3	2004-02-10
Plantae	Rosopsida	Santalaceae	Santalum acuminatum	sweet quandong	N	C		1/0	2012-04-12
Plantae	Rosopsida	Santalaceae	Santalum lanceolatum		N	C		16/2	2012-04-12
Plantae	Rosopsida	Sapindaceae	Alectryon connatus	grey birds-eye	N	C		8/3	2006-02-02
Plantae	Rosopsida	Sapindaceae	Alectryon diversifolius	scrub boonaree	N	C		18/6	2011-06-05
Plantae	Rosopsida	Sapindaceae	Alectryon oleifolius		N	C		4/0	2004-01-14
Plantae	Rosopsida	Sapindaceae	Alectryon oleifolius subsp. elongatus		N	C		11/6	2010-05-27
Plantae	Rosopsida	Sapindaceae	Alectryon pubescens		N	C		1/0	2008-11-10
Plantae	Rosopsida	Sapindaceae	Alectryon subdentatus		N	C		1/0	1991-04-01
Plantae	Rosopsida	Sapindaceae	Atalaya		N	C		5/0	2011-07-05
Plantae	Rosopsida	Sapindaceae	Atalaya hemiglauca		N	C		34/5	2012-04-12
Plantae	Rosopsida	Sapindaceae	Cardiospermum halicacabum		I			1/0	2003-10-30
Plantae	Rosopsida	Sapindaceae	Cardiospermum halicacabum var. halicacabum		I			4/4	2006-02-01
Plantae	Rosopsida	Sapindaceae	Cupaniopsis anacardioides	tuckeroo	N	C		2/2	1992-02-01
Plantae	Rosopsida	Sapindaceae	Diploglottis macrantha		N	C		1/0	2004-04-24
Plantae	Rosopsida	Sapindaceae	Dodonaea dodecandra		N	C		1/1	1997-07-31
Plantae	Rosopsida	Sapindaceae	Dodonaea filifolia		N	C		1/1	1990-08-23
Plantae	Rosopsida	Sapindaceae	Dodonaea lanceolata var. subsessilifolia		N	C		3/3	2006-01-31
Plantae	Rosopsida	Sapindaceae	Dodonaea stenophylla		N	C		11/11	2006-01-31
Plantae	Rosopsida	Sapindaceae	Dodonaea triangularis		N	C		2/2	1992-07-07
Plantae	Rosopsida	Sapindaceae	Dodonaea vestita		N	C		1/1	2002-10-03
Plantae	Rosopsida	Sapindaceae	Dodonaea viscosa		N	C		4/0	2012-04-12
Plantae	Rosopsida	Sapindaceae	Dodonaea viscosa subsp. burmanniana		N	C		2/2	1971-10-07
Plantae	Rosopsida	Sapindaceae	Dodonaea viscosa subsp. spatulata		N	C		1/1	1997-09-30

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Plantae	Rosopsida	Sapindaceae	Dodonaea viscosa subsp. viscosa		N	C		2/1	1995-05-30
Plantae	Rosopsida	Sapindaceae	Elattostachys xylocarpa	white tamarind	N	C		1/0	1991-04-01
Plantae	Rosopsida	Sapotaceae	Planchonella cotinifolia		N	C		3/0	1997-09-30
Plantae	Rosopsida	Sapotaceae	Planchonella myrsinoides		N	C		6/6	2004-02-10
Plantae	Rosopsida	Sapotaceae	Planchonella pohlmaniana		N	C		3/3	2004-11-27
Plantae	Rosopsida	Sapotaceae	Planchonella pohlmaniana var. (Gilbert River C.T.White 1409)		N	C		1/1	1991-09-15
Plantae	Rosopsida	Sapotaceae	Planchonella pubescens		N	C		1/0	1991-04-01
Plantae	Rosopsida	Scrophulariaceae	Glossostigma diandrum		N	C		1/1	2003-03-20
Plantae	Rosopsida	Scrophulariaceae	Limnophila		N	C		1/1	2011-06-01
Plantae	Rosopsida	Scrophulariaceae	Lindernia sp. (Bribie Island S.T.Blake 7089)		N	C		1/1	2003-03-20
Plantae	Rosopsida	Scrophulariaceae	Mecardonia procumbens		I			2/2	1995-01-27
Plantae	Rosopsida	Scrophulariaceae	Mimulus		N	C		1/1	1960-06-05
Plantae	Rosopsida	Scrophulariaceae	Mimulus gracilis	slender monkey flower	N	C		2/1	2012-04-12
Plantae	Rosopsida	Scrophulariaceae	Scoparia dulcis	Scoparia	I			9/6	2009-12-11
Plantae	Rosopsida	Scrophulariaceae	Stemodia glabella		N	C		6/4	2003-02-18
Plantae	Rosopsida	Scrophulariaceae	Stemodia pubescens		N	C		2/2	1945-04-30
Plantae	Rosopsida	Simaroubaceae	Ailanthus triphysa	white siris	N	C		1/0	1991-04-01
Plantae	Rosopsida	Solanaceae	Capsicum annuum var. glabriusculum		I			2/2	1999-06-07
Plantae	Rosopsida	Solanaceae	Datura ferox	fierce thornapple	I			1/0	1997-05-01
Plantae	Rosopsida	Solanaceae	Datura leichhardtii	native thornapple	I			3/3	2007-04-19
Plantae	Rosopsida	Solanaceae	Datura metel		I			1/0	1997-05-01
Plantae	Rosopsida	Solanaceae	Datura stramonium	common thornapple	I			3/0	2010-05-27
Plantae	Rosopsida	Solanaceae	Lycianthes shanesii		N	C		1/1	1993-03-01
Plantae	Rosopsida	Solanaceae	Nicotiana forsteri		N	C		1/1	1983-10-17
Plantae	Rosopsida	Solanaceae	Nicotiana megalosiphon subsp. megalosiphon		N	C		1/1	1995-03-11
Plantae	Rosopsida	Solanaceae	Physalis lanceifolia		I			2/2	2007-04-19
Plantae	Rosopsida	Solanaceae	Physalis minima	wild gooseberry	N			2/0	1997-05-01
Plantae	Rosopsida	Solanaceae	Solanum		N	C		1/0	1995-05-30
Plantae	Rosopsida	Solanaceae	Solanum adenophorum		N	E		2/2	1971-09-09
Plantae	Rosopsida	Solanaceae	Solanum densevestitum		N	C		1/0	1991-04-01
Plantae	Rosopsida	Solanaceae	Solanum elachophyllum		N	E		5/5	2011-05-31
Plantae	Rosopsida	Solanaceae	Solanum ellipticum	potato bush	N	C		18/8	2009-12-11
Plantae	Rosopsida	Solanaceae	Solanum esuriale	quena	N	C		14/3	2012-04-12
Plantae	Rosopsida	Solanaceae	Solanum furfuraceum		N	C		4/4	2004-02-10
Plantae	Rosopsida	Solanaceae	Solanum galbinum		N	C		2/2	1998-07-11
Plantae	Rosopsida	Solanaceae	Solanum lycopersicum var. cerasiforme		I			1/1	2006-02-01
Plantae	Rosopsida	Solanaceae	Solanum nodiflorum		I			2/1	2003-10-30
Plantae	Rosopsida	Solanaceae	Solanum opacum	green berry nightshade	N	C		1/1	1983-10-17
Plantae	Rosopsida	Solanaceae	Solanum orgadophilum		N	C		4/4	2010-05-06
Plantae	Rosopsida	Solanaceae	Solanum parvifolium subsp. parvifolium		N	C		14/11	2010-12-03
Plantae	Rosopsida	Solanaceae	Solanum pusillum		N	C		2/2	2002-10-05
Plantae	Rosopsida	Solanaceae	Solanum seaforthianum	Brazilian nightshade	I			4/4	2004-06-28
Plantae	Rosopsida	Solanaceae	Solanum stelligerum	devil's needles	N	C		2/0	2001-10-17
Plantae	Rosopsida	Solanaceae	Solanum torvum	devil's fig	I			2/2	2009-06-10
Plantae	Rosopsida	Sparrmanniaceae	Corchorus		N	C		1/0	1997-10-01
Plantae	Rosopsida	Sparrmanniaceae	Corchorus olitorius	jute	N	C		1/0	2012-04-12
Plantae	Rosopsida	Sparrmanniaceae	Corchorus trilocularis		N	C		22/10	2010-05-27

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Plantae	Rosopsida	Sparrmanniaceae	Grewia		N	C		1/0	2001-10-16
Plantae	Rosopsida	Sparrmanniaceae	Grewia latifolia	dysentery plant	N	C		38/6	2012-04-12
Plantae	Rosopsida	Sparrmanniaceae	Grewia retusifolia		N	C		18/7	2012-04-12
Plantae	Rosopsida	Sparrmanniaceae	Triumfetta rhomboidea	chinese burr	I			1/1	1971-09-30
Plantae	Rosopsida	Stackhousiaceae	Stackhousia intermedia		N	C		1/1	2006-01-31
Plantae	Rosopsida	Sterculiaceae	Brachychiton australis	broad-leaved bottle tree	N	C		8/4	2003-07-27
Plantae	Rosopsida	Sterculiaceae	Brachychiton bidwillii	little kurrajong	N	C		1/0	1991-04-01
Plantae	Rosopsida	Sterculiaceae	Brachychiton populneus		N	C		2/0	2007-11-21
Plantae	Rosopsida	Sterculiaceae	Brachychiton populneus subsp. trilobus		N	C		1/1	1991-09-15
Plantae	Rosopsida	Sterculiaceae	Brachychiton rupestris		N	C		6/1	2007-11-21
Plantae	Rosopsida	Sterculiaceae	Sterculia quadrifida	peanut tree	N	C		3/0	1997-10-01
Plantae	Rosopsida	Stylidiaceae	Stylidium eglandulosum		N	C		4/4	1999-06-08
Plantae	Rosopsida	Stylidiaceae	Stylidium eriorhizum		N	C		1/1	1992-07-08
Plantae	Rosopsida	Surianaceae	Cadellia pentastylis	ooline	N	V	V	1/0	1991-04-01
Plantae	Rosopsida	Thymelaeaceae	Pimelea		N	C		3/3	2009-05-11
Plantae	Rosopsida	Thymelaeaceae	Pimelea haematostachya		N	C		29/8	2010-05-27
Plantae	Rosopsida	Thymelaeaceae	Pimelea linifolia subsp. linifolia		N	C		4/1	2009-12-11
Plantae	Rosopsida	Thymelaeaceae	Pimelea microcephala		N	C		2/1	2010-05-27
Plantae	Rosopsida	Thymelaeaceae	Pimelea microcephala subsp. microcephala		N	C		4/4	2010-09-22
Plantae	Rosopsida	Thymelaeaceae	Wikstroemia indica	tie bush	N	C		1/0	2001-10-19
Plantae	Rosopsida	Ulmaceae	Aphananthe philippinensis		N	C		1/1	1993-04-05
Plantae	Rosopsida	Ulmaceae	Trema tomentosa		N	C		2/1	2006-02-02
Plantae	Rosopsida	Ulmaceae	Trema tomentosa var. aspera		N	C		2/2	2009-05-11
Plantae	Rosopsida	Urticaceae	Dendrocnide photinophylla	shiny-leaved stinging tree	N	C		2/1	1997-09-30
Plantae	Rosopsida	Urticaceae	Pouzolzia zeylanica		N	C		1/1	2009-06-07
Plantae	Rosopsida	Verbenaceae	Glandularia aristigera		I			1/0	2010-05-27
Plantae	Rosopsida	Verbenaceae	Lantana camara		I			2/1	2012-04-12
Plantae	Rosopsida	Verbenaceae	Lantana montevidensis	creeping lantana	I			2/0	1997-05-01
Plantae	Rosopsida	Verbenaceae	Lippia alba var. alba		I			1/1	1959-11-13
Plantae	Rosopsida	Verbenaceae	Stachytarpheta jamaicensis	Jamaica snakeweed	I			2/2	2006-02-03
Plantae	Rosopsida	Verbenaceae	Verbena africana		N	C		1/1	1997-04-10
Plantae	Rosopsida	Verbenaceae	Verbena halei		I			1/0	1995-05-29
Plantae	Rosopsida	Verbenaceae	Verbena macrostachya		N	C		11/10	2010-05-27
Plantae	Rosopsida	Verbenaceae	Verbena officinalis		N			2/1	1997-10-01
Plantae	Rosopsida	Verbenaceae	Verbena rigida		I			1/0	1997-10-01
Plantae	Rosopsida	Violaceae	Hybanthus enneaspermus		N	C		20/5	2012-04-12
Plantae	Rosopsida	Violaceae	Hybanthus monopetalus		N	C		2/0	1997-05-01
Plantae	Rosopsida	Violaceae	Hybanthus stellarioides		N	C		6/2	2009-12-11
Plantae	Rosopsida	Viscaceae	Viscum articulatum	flat mistletoe	N	C		2/2	2002-10-02
Plantae	Rosopsida	Vitaceae	Cayratia acris	hairy grape	N	C		1/0	1991-04-01
Plantae	Rosopsida	Vitaceae	Cayratia clematidea	slender grape	N	C		2/0	1997-09-30
Plantae	Rosopsida	Vitaceae	Cissus oblonga		N	C		4/1	1997-09-30
Plantae	Rosopsida	Vitaceae	Cissus reniformis		N	C		3/2	2006-02-05
Plantae	Rosopsida	Vitaceae	Cissus repens		N	C		1/0	1991-04-01
Plantae	Rosopsida	Vitaceae	Clematicissus opaca		N	C		7/3	2009-12-11
Plantae	Rosopsida	Zygophyllaceae	Roepera apiculata		N	C		2/2	1973-09-01
Plantae	Rosopsida	Zygophyllaceae	Tribulus eichlerianus	bull head	N	C		1/0	2010-05-27
Plantae	Rosopsida	Zygophyllaceae	Tribulus micrococcus	yellow vine	N	C		4/4	1998-07-10
Plantae	Rosopsida	Zygophyllaceae	Tribulus terrestris	caltrop	N	C		5/0	2008-11-10
Plantae	Magnoliopsida	Annonaceae	Melodorum leichhardtii		N	C		2/1	1991-04-01
Plantae	Magnoliopsida	Aristolochiaceae	Aristolochia meridionalis subsp. centralis		N	C		1/0	2008-11-10
Plantae	Magnoliopsida	Hernandiaceae	Gyrocarpus americanus		N	C		1/0	1991-04-01
Plantae	Magnoliopsida	Lauraceae	Cassytha filiformis	dodder laurel	N	C		1/0	2009-12-11

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Plantae	Magnoliopsida	Lauraceae	Cassytha pubescens	downy devil's twine	N	C		1/0	2001-10-18
Plantae	Magnoliopsida	Lauraceae	Endiandra discolor	domatia tree	N	C		1/1	1991-09-15
Plantae	Magnoliopsida	Menispermaceae	Hypserpa decumbens		N	C		1/1	1992-08-14
Plantae	Magnoliopsida	Menispermaceae	Tinospora smilacina	snakevine	N	C		7/1	2012-04-12
Plantae	Magnoliopsida	Papaveraceae	Argemone mexicana	prickly poppy	I			1/0	2005-08-08
Plantae	Magnoliopsida	Papaveraceae	Argemone ochroleuca		I			4/0	2007-11-21
Plantae	Magnoliopsida	Papaveraceae	Argemone ochroleuca subsp. ochroleuca	Mexican poppy	I			4/3	2004-11-08
Plantae	Magnoliopsida	Piperaceae	Peperomia blanda var. floribunda		N	C		2/1	1997-09-30
Plantae	Liliopsida	Amaryllidaceae	Crinum		N	C		3/0	2006-05-10
Plantae	Liliopsida	Amaryllidaceae	Crinum flaccidum	Murray lily	N	C		5/2	2009-12-11
Plantae	Liliopsida	Amaryllidaceae	Proiphys cunninghamii	Moreton Bay lily	N	C		1/1	1992-08-19
Plantae	Liliopsida	Arecaceae	Livistona		N	C		1/0	1991-04-01
Plantae	Liliopsida	Asphodelaceae	Bulbine bulbosa	golden lily	N	C		3/1	2010-05-27
Plantae	Liliopsida	Centrolepidaceae	Centrolepis exserta		N	C		1/1	2011-06-25
Plantae	Liliopsida	Colchicaceae	Iphigenia indica		N	C		1/1	1997-04-17
Plantae	Liliopsida	Commelinaceae	Commelina		N	C		1/0	2011-05-05
Plantae	Liliopsida	Commelinaceae	Commelina diffusa	wandering jew	N	C		13/1	2010-05-27
Plantae	Liliopsida	Commelinaceae	Commelina ensifolia	scurvy grass	N	C		7/4	2012-04-12
Plantae	Liliopsida	Commelinaceae	Commelina lanceolata		N	C		1/1	1998-07-10
Plantae	Liliopsida	Commelinaceae	Cyanotis axillaris		N	C		7/2	2009-12-11
Plantae	Liliopsida	Commelinaceae	Murdannia graminea	murdannia	N	C		9/2	2012-04-12
Plantae	Liliopsida	Cyperaceae	Abildgaardia ovata		N	C		6/2	2009-12-11
Plantae	Liliopsida	Cyperaceae	Abildgaardia vaginata		N	C		1/1	1993-12-15
Plantae	Liliopsida	Cyperaceae	Bulbostylis barbata		N	C		3/1	1997-05-01
Plantae	Liliopsida	Cyperaceae	Cyperus		N	C		8/0	2008-11-10
Plantae	Liliopsida	Cyperaceae	Cyperus alopecuroides		N	C		1/1	1997-10-31
Plantae	Liliopsida	Cyperaceae	Cyperus betchei		N	C		2/0	2010-05-27
Plantae	Liliopsida	Cyperaceae	Cyperus bifax	western nutgrass	N	C		10/5	2012-04-12
Plantae	Liliopsida	Cyperaceae	Cyperus bowmannii		N	C		3/3	1999-03-24
Plantae	Liliopsida	Cyperaceae	Cyperus concinnus		N	C		7/3	2011-05-05
Plantae	Liliopsida	Cyperaceae	Cyperus cristulatus		N	C		3/0	2009-12-11
Plantae	Liliopsida	Cyperaceae	Cyperus cunninghamii subsp. cunninghamii		N	C		1/1	2006-06-07
Plantae	Liliopsida	Cyperaceae	Cyperus cyperoides		N	C		3/0	2009-12-11
Plantae	Liliopsida	Cyperaceae	Cyperus dietrichiae		N	C		1/0	2001-10-17
Plantae	Liliopsida	Cyperaceae	Cyperus dietrichiae var. dietrichiae		N	C		1/1	2001-01-16
Plantae	Liliopsida	Cyperaceae	Cyperus difformis	rice sedge	N	C		6/2	2012-04-12
Plantae	Liliopsida	Cyperaceae	Cyperus digitatus		N	C		1/1	2002-07-21
Plantae	Liliopsida	Cyperaceae	Cyperus distans		N	C		1/1	2003-03-20
Plantae	Liliopsida	Cyperaceae	Cyperus eglobosus		N	C		1/0	1997-09-30
Plantae	Liliopsida	Cyperaceae	Cyperus esculentus	yellow nutgrass	I			1/1	1996-01-22
Plantae	Liliopsida	Cyperaceae	Cyperus exaltatus	tall flatsedge	N	C		10/1	2012-04-12
Plantae	Liliopsida	Cyperaceae	Cyperus flaccidus		N	C		1/1	2003-03-20
Plantae	Liliopsida	Cyperaceae	Cyperus fulvus		N	C		11/8	2012-04-12
Plantae	Liliopsida	Cyperaceae	Cyperus gilesii		N	C		27/2	2011-07-05
Plantae	Liliopsida	Cyperaceae	Cyperus gracilis		N	C		22/5	2009-12-11
Plantae	Liliopsida	Cyperaceae	Cyperus iria		N	C		3/1	2009-12-11
Plantae	Liliopsida	Cyperaceae	Cyperus isabellinus		N	C		3/3	2007-05-31
Plantae	Liliopsida	Cyperaceae	Cyperus javanicus		N	C		2/1	2012-04-12
Plantae	Liliopsida	Cyperaceae	Cyperus leiocaulon		N	C		3/3	2006-06-05
Plantae	Liliopsida	Cyperaceae	Cyperus lucidus		N	C		1/0	2012-04-12
Plantae	Liliopsida	Cyperaceae	Cyperus microcephalus subsp. microcephalus		N	C		1/1	2006-02-03
Plantae	Liliopsida	Cyperaceae	Cyperus nutans		N			1/0	2007-11-21
Plantae	Liliopsida	Cyperaceae	Cyperus perangustus		N	C		1/0	2009-12-11
Plantae	Liliopsida	Cyperaceae	Cyperus polystachyos		N	C		2/0	2012-04-12

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Plantae	Liliopsida	Cyperaceae	Cyperus polystachyos var. polystachyos		N	C		1/1	2004-02-29
Plantae	Liliopsida	Cyperaceae	Cyperus pygmaeus	dwarf sedge	N	C		2/2	2010-08-05
Plantae	Liliopsida	Cyperaceae	Cyperus rigidellus		N	C		9/0	2009-12-11
Plantae	Liliopsida	Cyperaceae	Cyperus rotundus	nutgrass	I			3/0	2007-11-21
Plantae	Liliopsida	Cyperaceae	Cyperus sanguinolentus		N	C		2/2	1960-06-05
Plantae	Liliopsida	Cyperaceae	Cyperus scariosus		N	C		1/0	2009-12-11
Plantae	Liliopsida	Cyperaceae	Cyperus sesquiflorus		I			1/1	1996-01-22
Plantae	Liliopsida	Cyperaceae	Cyperus squarrosus	bearded flatsedge	N	C		8/1	2009-12-11
Plantae	Liliopsida	Cyperaceae	Cyperus trinervis		N	C		2/2	2009-06-07
Plantae	Liliopsida	Cyperaceae	Cyperus tuberosus		I			1/1	1994-01-11
Plantae	Liliopsida	Cyperaceae	Eleocharis blakeana		N	NT		1/1	2011-05-31
Plantae	Liliopsida	Cyperaceae	Eleocharis cylindrostachys		N	C		1/1	2003-03-20
Plantae	Liliopsida	Cyperaceae	Eleocharis pallens	pale spikerush	N	C		1/1	1993-12-15
Plantae	Liliopsida	Cyperaceae	Eleocharis philippinensis		N	C		1/1	1999-02-15
Plantae	Liliopsida	Cyperaceae	Eleocharis plana	ribbed spikerush	N	C		1/1	1998-07-10
Plantae	Liliopsida	Cyperaceae	Fimbristylis aestivalis		N	C		1/1	2002-07-21
Plantae	Liliopsida	Cyperaceae	Fimbristylis aestivalis var. aestivalis		N	C		1/1	1971-09-07
Plantae	Liliopsida	Cyperaceae	Fimbristylis dichotoma	common fringe-rush	N	C		19/4	2012-04-12
Plantae	Liliopsida	Cyperaceae	Fimbristylis microcarya		N	C		2/2	2003-03-20
Plantae	Liliopsida	Cyperaceae	Fimbristylis nuda		N	C		1/0	2009-12-11
Plantae	Liliopsida	Cyperaceae	Fimbristylis nutans		N	C		1/0	2009-12-11
Plantae	Liliopsida	Cyperaceae	Fuirena incrassata		N	C		1/1	1960-06-05
Plantae	Liliopsida	Cyperaceae	Gahnia aspera		N	C		5/2	2001-10-18
Plantae	Liliopsida	Cyperaceae	Lipocarpha microcephala		N	C		5/3	2009-12-11
Plantae	Liliopsida	Cyperaceae	Schoenoplectus dissachanthus		N	C		3/0	2011-07-05
Plantae	Liliopsida	Cyperaceae	Schoenoplectus litoralis		N	C		2/0	2012-04-12
Plantae	Liliopsida	Cyperaceae	Schoenus vaginatus		N	C		1/1	2006-02-01
Plantae	Liliopsida	Cyperaceae	Scleria		N	C		1/0	2010-12-19
Plantae	Liliopsida	Cyperaceae	Scleria brownii		N	C		2/2	1999-03-22
Plantae	Liliopsida	Cyperaceae	Scleria mackaviensis		N	C		23/1	2009-12-11
Plantae	Liliopsida	Cyperaceae	Scleria sphacelata		N	C		9/5	2006-02-07
Plantae	Liliopsida	Dioscoreaceae	Dioscorea transversa	native yam	N	C		1/0	1991-04-01
Plantae	Liliopsida	Hemerocallidaceae	Dianella		N	C		7/0	2011-06-05
Plantae	Liliopsida	Hemerocallidaceae	Dianella brevipedunculata		N	C		1/1	1999-02-08
Plantae	Liliopsida	Hemerocallidaceae	Dianella caerulea		N	C		2/2	2006-02-01
Plantae	Liliopsida	Hemerocallidaceae	Dianella caerulea var. vannata		N	C		1/1	1978-03-16
Plantae	Liliopsida	Hemerocallidaceae	Dianella longifolia		N	C		8/0	2012-04-12
Plantae	Liliopsida	Hemerocallidaceae	Dianella longifolia var. stupata		N	C		2/2	1995-03-12
Plantae	Liliopsida	Hemerocallidaceae	Dianella nervosa		N	C		2/1	2001-10-18
Plantae	Liliopsida	Hemerocallidaceae	Dianella rara		N	C		1/1	2002-10-04
Plantae	Liliopsida	Hemerocallidaceae	Geitonoplesium cymosum	scrambling lily	N	C		2/1	1997-09-30
Plantae	Liliopsida	Hydrocharitaceae	Halophila spinulosa		N	C		1/1	2003-11-30
Plantae	Liliopsida	Hypoxidaceae	Hypoxis arillacea		N	C		3/3	2001-01-16
Plantae	Liliopsida	Hypoxidaceae	Hypoxis hygrometrica		N	C		1/0	1997-05-01
Plantae	Liliopsida	Hypoxidaceae	Hypoxis hygrometrica var. villosisepala		N	C		1/1	1997-04-17
Plantae	Liliopsida	Hypoxidaceae	Hypoxis pratensis var. pratensis		N	C		4/0	2009-12-11
Plantae	Liliopsida	Johnsoniaceae	Caesia parviflora var. parviflora		N	C		2/2	2006-04-22
Plantae	Liliopsida	Johnsoniaceae	Tricoryne elatior	yellow autumn lily	N	C		8/3	2009-12-11
Plantae	Liliopsida	Juncaceae	Juncus aridicola	tussock rush	N	C		3/1	2012-04-12

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Plantae	Liliopsida	Juncaceae	Juncus bufonius	toad rush	I			1/1	2008-08-31
Plantae	Liliopsida	Juncaceae	Juncus usitatus		N	C		1/0	2008-11-10
Plantae	Liliopsida	Laxmanniaceae	Eustrephus latifolius	wombat berry	N	C		21/5	2012-04-12
Plantae	Liliopsida	Laxmanniaceae	Laxmannia gracilis	slender wire lily	N	C		1/0	2001-10-18
Plantae	Liliopsida	Laxmanniaceae	Lomandra		N	C		4/0	1997-10-01
Plantae	Liliopsida	Laxmanniaceae	Lomandra confertifolia subsp. pallida		N	C		5/0	2001-10-19
Plantae	Liliopsida	Laxmanniaceae	Lomandra filiformis		N	C		2/1	2006-01-31
Plantae	Liliopsida	Laxmanniaceae	Lomandra longifolia		N	C		15/7	2012-04-12
Plantae	Liliopsida	Laxmanniaceae	Lomandra multiflora		N	C		5/0	2010-05-27
Plantae	Liliopsida	Laxmanniaceae	Lomandra multiflora subsp. multiflora		N	C		1/1	1995-03-08
Plantae	Liliopsida	Orchidaceae	Cymbidium canaliculatum		N	C		18/3	2011-06-05
Plantae	Liliopsida	Orchidaceae	Dockrillia bowmanii	scrub pencil orchid	N	C		2/1	1997-04-17
Plantae	Liliopsida	Orchidaceae	Dockrillia nugentii		N	C		1/1	1980-07-10
Plantae	Liliopsida	Orchidaceae	Oberonia complanata		N	C		1/1	1993-03-01
Plantae	Liliopsida	Orchidaceae	Phaius		N			1/0	2012-04-12
Plantae	Liliopsida	Orchidaceae	Sarcochilus		N	C		1/0	1997-09-30
Plantae	Liliopsida	Poaceae	Acrachne racemosa		N	C		1/1	1962-02-17
Plantae	Liliopsida	Poaceae	Alloteropsis cimicina		N	C		8/5	2009-12-11
Plantae	Liliopsida	Poaceae	Alloteropsis semialata	cockatoo grass	N	C		8/0	2011-06-05
Plantae	Liliopsida	Poaceae	Ancistrachne uncinulata	hooky grass	N	C		24/8	2012-04-12
Plantae	Liliopsida	Poaceae	Aristida		N	C		19/0	2011-11-02
Plantae	Liliopsida	Poaceae	Aristida acuta		N	C		1/1	1978-03-16
Plantae	Liliopsida	Poaceae	Aristida annua		N	V	V	1/1	1999-03-23
Plantae	Liliopsida	Poaceae	Aristida benthamii		N	C		5/0	2012-04-12
Plantae	Liliopsida	Poaceae	Aristida benthamii var. benthamii		N	C		3/1	2009-12-11
Plantae	Liliopsida	Poaceae	Aristida calycina		N	C		9/0	2012-04-12
Plantae	Liliopsida	Poaceae	Aristida calycina var. calycina		N	C		25/15	2009-12-11
Plantae	Liliopsida	Poaceae	Aristida caput-medusae		N	C		9/3	2012-04-12
Plantae	Liliopsida	Poaceae	Aristida echinata		N	C		1/1	1998-07-08
Plantae	Liliopsida	Poaceae	Aristida gracilipes		N	C		7/4	2001-10-17
Plantae	Liliopsida	Poaceae	Aristida holathera		N	C		3/0	2009-12-11
Plantae	Liliopsida	Poaceae	Aristida holathera var. holathera		N	C		16/10	2009-12-11
Plantae	Liliopsida	Poaceae	Aristida ingrata		N	C		1/1	1977-08-08
Plantae	Liliopsida	Poaceae	Aristida jerichoensis		N	C		2/1	2012-04-12
Plantae	Liliopsida	Poaceae	Aristida jerichoensis var. subspinulifera		N	C		17/9	2009-12-11
Plantae	Liliopsida	Poaceae	Aristida latifolia	feathertop wiregrass	N	C		45/9	2012-04-12
Plantae	Liliopsida	Poaceae	Aristida lazaridis		N	C		2/2	1997-04-17
Plantae	Liliopsida	Poaceae	Aristida leptopoda	white speargrass	N	C		34/8	2012-04-12
Plantae	Liliopsida	Poaceae	Aristida lignosa		N	C		5/5	2000-11-07
Plantae	Liliopsida	Poaceae	Aristida muricata		N	C		2/2	1997-04-17
Plantae	Liliopsida	Poaceae	Aristida perniciosa		N	C		1/1	1998-07-09
Plantae	Liliopsida	Poaceae	Aristida personata		N	C		26/17	2010-05-27
Plantae	Liliopsida	Poaceae	Aristida queenslandica		N	C		8/1	2006-01-31
Plantae	Liliopsida	Poaceae	Aristida queenslandica var. dissimilis		N	C		4/2	2011-06-05
Plantae	Liliopsida	Poaceae	Aristida queenslandica var. queenslandica		N	C		1/1	1998-07-10
Plantae	Liliopsida	Poaceae	Aristida ramosa	purple wiregrass	N	C		18/3	2012-04-12
Plantae	Liliopsida	Poaceae	Aristida schultzii		N	C		1/1	1981-02-28
Plantae	Liliopsida	Poaceae	Aristida spuria		N	C		2/2	2006-06-05
Plantae	Liliopsida	Poaceae	Arundinella nepalensis	reedgrass	N	C		5/2	2007-11-21
Plantae	Liliopsida	Poaceae	Astrebla		N	C		1/0	1995-03-01
Plantae	Liliopsida	Poaceae	Astrebla elymoides	hoop mitchell grass	N	C		11/3	2010-05-27
Plantae	Liliopsida	Poaceae	Astrebla lappacea	curly mitchell grass	N	C		15/8	2010-05-27
Plantae	Liliopsida	Poaceae	Astrebla pectinata	barley mitchell grass	N	C		1/0	2012-04-12
Plantae	Liliopsida	Poaceae	Astrebla squarrosa	bull mitchell grass	N	C		34/5	2011-07-05

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Plantae	Liliopsida	Poaceae	Austrostipa verticillata	slender bamboo grass	N	C		1/0	1991-04-01
Plantae	Liliopsida	Poaceae	Avena fatua x A.sativa		I			2/2	1987-07-08
Plantae	Liliopsida	Poaceae	Bothriochloa		N			10/0	2001-10-17
Plantae	Liliopsida	Poaceae	Bothriochloa bladhii		N	C		2/0	2012-04-12
Plantae	Liliopsida	Poaceae	Bothriochloa bladhii subsp. bladhii		N	C		17/11	2009-12-11
Plantae	Liliopsida	Poaceae	Bothriochloa decipiens		N	C		5/0	2012-04-12
Plantae	Liliopsida	Poaceae	Bothriochloa decipiens var. cloncurrensis		N	C		4/4	1979-05-18
Plantae	Liliopsida	Poaceae	Bothriochloa decipiens var. decipiens		N	C		19/11	2009-12-11
Plantae	Liliopsida	Poaceae	Bothriochloa erianthoides	satintop grass	N	C		7/3	2010-05-27
Plantae	Liliopsida	Poaceae	Bothriochloa ewartiana	desert bluegrass	N	C		49/12	2012-04-12
Plantae	Liliopsida	Poaceae	Bothriochloa pertusa		I			31/2	2012-04-12
Plantae	Liliopsida	Poaceae	Brachyachne convergens	common native couch	N	C		39/5	2012-04-12
Plantae	Liliopsida	Poaceae	Brachyachne tenella		N	C		3/3	1996-03-15
Plantae	Liliopsida	Poaceae	Bromus catharticus	prairie grass	I			1/1	1956-09-26
Plantae	Liliopsida	Poaceae	Calyptochloa gracillima		N	C		6/2	2011-03-31
Plantae	Liliopsida	Poaceae	Capillipedium parviflorum	scented top	N	C		1/1	1999-03-22
Plantae	Liliopsida	Poaceae	Capillipedium spicigerum	spicytop	N	C		3/0	2009-12-11
Plantae	Liliopsida	Poaceae	Cenchrus ciliaris		I			79/5	2011-11-02
Plantae	Liliopsida	Poaceae	Cenchrus pennisetiformis		I			4/1	2012-04-12
Plantae	Liliopsida	Poaceae	Cenchrus polystachios		I			1/1	2011-05-24
Plantae	Liliopsida	Poaceae	Cenchrus setigerus		I			1/1	1970-04-14
Plantae	Liliopsida	Poaceae	Chionachne cyathopoda	river grass	N	C		2/2	2006-02-01
Plantae	Liliopsida	Poaceae	Chionachne hubbardiana		N	C		3/3	1995-05-09
Plantae	Liliopsida	Poaceae	Chloris divaricata		N	C		3/0	2012-04-12
Plantae	Liliopsida	Poaceae	Chloris divaricata var. divaricata	slender chloris	N	C		16/13	1998-03-16
Plantae	Liliopsida	Poaceae	Chloris gayana	rhodes grass	I			1/0	2007-11-21
Plantae	Liliopsida	Poaceae	Chloris inflata	purpletop chloris	I			20/6	2012-04-12
Plantae	Liliopsida	Poaceae	Chloris pectinata	comb chloris	N	C		4/4	1998-03-16
Plantae	Liliopsida	Poaceae	Chloris truncata		N	C		7/0	2012-04-12
Plantae	Liliopsida	Poaceae	Chloris ventricosa	tall chloris	N	C		24/7	2012-04-12
Plantae	Liliopsida	Poaceae	Chloris virgata	feathertop rhodes grass	I			14/1	2012-04-12
Plantae	Liliopsida	Poaceae	Chrysopogon		N			1/0	1997-10-01
Plantae	Liliopsida	Poaceae	Chrysopogon fallax		N	C		40/10	2012-04-12
Plantae	Liliopsida	Poaceae	Chrysopogon filipes		N	C		1/0	2008-11-10
Plantae	Liliopsida	Poaceae	Cleistochloa subjuncea		N	C		5/2	2012-04-12
Plantae	Liliopsida	Poaceae	Cymbopogon		N	C		2/0	1997-10-01
Plantae	Liliopsida	Poaceae	Cymbopogon ambiguus	lemon grass	N	C		10/4	2001-10-19
Plantae	Liliopsida	Poaceae	Cymbopogon bombycinus	silky oilgrass	N	C		15/7	2012-04-12
Plantae	Liliopsida	Poaceae	Cymbopogon gratus		N	C		1/1	1999-03-23
Plantae	Liliopsida	Poaceae	Cymbopogon obtectus		N	C		3/2	2008-11-10
Plantae	Liliopsida	Poaceae	Cymbopogon queenslandicus		N	C		8/4	2006-02-03
Plantae	Liliopsida	Poaceae	Cymbopogon refractus	barbed-wire grass	N	C		17/3	2012-04-12
Plantae	Liliopsida	Poaceae	Cynodon dactylon		I			7/0	2012-04-12
Plantae	Liliopsida	Poaceae	Cynodon dactylon var. dactylon		I			3/3	2006-02-01
Plantae	Liliopsida	Poaceae	Dactyloctenium radulans	button grass	N	C		12/4	2011-07-05
Plantae	Liliopsida	Poaceae	Dichanthium annulatum	sheda grass	I			8/8	2001-12-17
Plantae	Liliopsida	Poaceae	Dichanthium aristatum	angleton grass	I			11/10	2011-05-31
Plantae	Liliopsida	Poaceae	Dichanthium fecundum	curly bluegrass	N	C		8/4	2011-07-05
Plantae	Liliopsida	Poaceae	Dichanthium queenslandicum		N	V	E	18/17	2011-10-06
Plantae	Liliopsida	Poaceae	Dichanthium sericeum		N	C		44/2	2012-04-12
Plantae	Liliopsida	Poaceae	Dichanthium sericeum subsp. humilius		N	C		1/1	1997-06-20
Plantae	Liliopsida	Poaceae	Dichanthium sericeum subsp. polystachyum		N	C		2/1	1998-12-10
Plantae	Liliopsida	Poaceae	Dichanthium sericeum subsp. sericeum		N	C		35/34	2011-11-10

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Plantae	Liliopsida	Poaceae	Dichanthium setosum		N	C	V	5/4	2012-04-12
Plantae	Liliopsida	Poaceae	Dichanthium tenue	small bluegrass	N	C		5/3	2009-12-11
Plantae	Liliopsida	Poaceae	Digitaria		N	C		5/1	2010-12-19
Plantae	Liliopsida	Poaceae	Digitaria ammophila	silky umbrella grass	N	C		16/2	2011-07-05
Plantae	Liliopsida	Poaceae	Digitaria bicornis		N	C		11/6	2011-06-05
Plantae	Liliopsida	Poaceae	Digitaria blakei		N	C		1/1	2007-11-14
Plantae	Liliopsida	Poaceae	Digitaria breviglumis		N	C		13/4	2007-11-21
Plantae	Liliopsida	Poaceae	Digitaria brownii		N	C		28/10	2012-04-12
Plantae	Liliopsida	Poaceae	Digitaria ciliaris	summer grass	I			2/1	2012-04-12
Plantae	Liliopsida	Poaceae	Digitaria didactyla	Queensland blue couch	I			1/0	2008-11-10
Plantae	Liliopsida	Poaceae	Digitaria diffusa		N	C		1/1	1997-04-17
Plantae	Liliopsida	Poaceae	Digitaria divaricatissima	spreading umbrella grass	N	C		11/5	2012-04-12
Plantae	Liliopsida	Poaceae	Digitaria divaricatissima var. divaricatissima		N	C		6/6	2000-11-07
Plantae	Liliopsida	Poaceae	Digitaria eriantha cv. Pangola		I			2/2	1994-01-11
Plantae	Liliopsida	Poaceae	Digitaria hystrichoides	umbrella grass	N	C		3/2	1997-10-03
Plantae	Liliopsida	Poaceae	Digitaria lanceolata		N	C		1/1	1979-02-20
Plantae	Liliopsida	Poaceae	Digitaria minima		N	C		1/1	2001-01-15
Plantae	Liliopsida	Poaceae	Digitaria orbata		N	C		2/0	2001-10-18
Plantae	Liliopsida	Poaceae	Digitaria parviflora		N	C		2/1	2006-01-31
Plantae	Liliopsida	Poaceae	Digitaria porrecta		N	NT	E	1/1	1997-04-30
Plantae	Liliopsida	Poaceae	Dinebra decipiens		N	C		1/1	2006-02-02
Plantae	Liliopsida	Poaceae	Dinebra decipiens var. asthenes		N	C		10/9	2009-12-11
Plantae	Liliopsida	Poaceae	Dinebra decipiens var. decipiens		N	C		10/4	2009-12-11
Plantae	Liliopsida	Poaceae	Dinebra decipiens var. peacockii		N	C		1/1	1998-01-24
Plantae	Liliopsida	Poaceae	Dinebra ligulata		N	C		3/3	1982-04-30
Plantae	Liliopsida	Poaceae	Diplachne fusca var. fusca		N	C		7/7	1998-07-10
Plantae	Liliopsida	Poaceae	Echinochloa colona	awnless barnyard grass	I			14/7	2012-04-12
Plantae	Liliopsida	Poaceae	Echinochloa inundata	marsh millet	N	C		1/1	1989-01-31
Plantae	Liliopsida	Poaceae	Eleusine indica	crowsfoot grass	I			1/0	2008-11-10
Plantae	Liliopsida	Poaceae	Elytrophorus spicatus		N	C		5/1	2011-07-05
Plantae	Liliopsida	Poaceae	Enneapogon		N	C		6/0	2001-10-17
Plantae	Liliopsida	Poaceae	Enneapogon gracilis	slender nineawn	N	C		8/6	1997-04-17
Plantae	Liliopsida	Poaceae	Enneapogon intermedius		N	C		7/7	1980-06-24
Plantae	Liliopsida	Poaceae	Enneapogon lindleyanus		N	C		15/8	2002-07-20
Plantae	Liliopsida	Poaceae	Enneapogon nigricans	niggerheads	N	C		4/0	2009-12-11
Plantae	Liliopsida	Poaceae	Enneapogon pallidus	conetop nineawn	N	C		8/1	2009-12-11
Plantae	Liliopsida	Poaceae	Enneapogon polyphyllus	leafy nineawn	N	C		6/6	2006-02-03
Plantae	Liliopsida	Poaceae	Enneapogon purpurascens		N	C		2/0	1997-05-01
Plantae	Liliopsida	Poaceae	Enneapogon robustissimus		N	C		3/3	1998-03-20
Plantae	Liliopsida	Poaceae	Enneapogon truncatus		N	C		53/15	2012-04-12
Plantae	Liliopsida	Poaceae	Enneapogon virens		N	C		5/3	2008-11-10
Plantae	Liliopsida	Poaceae	Enteropogon acicularis	curly windmill grass	N	C		12/3	2012-04-12
Plantae	Liliopsida	Poaceae	Enteropogon paucispiceus		N	C		2/2	1998-03-31
Plantae	Liliopsida	Poaceae	Enteropogon ramosus		N	C		13/10	2011-07-05
Plantae	Liliopsida	Poaceae	Enteropogon unispiceus		N	C		20/6	2009-12-11
Plantae	Liliopsida	Poaceae	Entolasia stricta	wiry panic	N	C		7/0	2001-10-19
Plantae	Liliopsida	Poaceae	Eragrostis		N	C		11/3	2011-07-05
Plantae	Liliopsida	Poaceae	Eragrostis alveiformis		N	C		2/2	1999-03-31
Plantae	Liliopsida	Poaceae	Eragrostis brownii	Brown's lovegrass	N	C		16/6	2012-04-12
Plantae	Liliopsida	Poaceae	Eragrostis cilianensis		I			2/2	1999-03-21
Plantae	Liliopsida	Poaceae	Eragrostis elongata		N	C		21/7	2009-12-11
Plantae	Liliopsida	Poaceae	Eragrostis exigua		N	C		1/1	1998-05-31
Plantae	Liliopsida	Poaceae	Eragrostis falcata	sickle lovegrass	N	C		2/2	1998-05-31
Plantae	Liliopsida	Poaceae	Eragrostis lacunaria	purple lovegrass	N	C		26/9	2009-12-11
Plantae	Liliopsida	Poaceae	Eragrostis leptocarpa	drooping lovegrass	N	C		5/0	2009-12-11
Plantae	Liliopsida	Poaceae	Eragrostis leptostachya		N	C		28/11	2012-04-12

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Plantae	Liliopsida	Poaceae	Eragrostis longipedicellata		N	C		3/3	1999-05-23
Plantae	Liliopsida	Poaceae	Eragrostis megalosperma		N	C		6/6	2006-06-05
Plantae	Liliopsida	Poaceae	Eragrostis minor	smaller stinkgrass	I			1/1	2001-12-17
Plantae	Liliopsida	Poaceae	Eragrostis parviflora	weeping lovegrass	N	C		14/7	2011-07-05
Plantae	Liliopsida	Poaceae	Eragrostis setifolia		N	C		1/1	1927-03-02
Plantae	Liliopsida	Poaceae	Eragrostis sororia		N	C		23/12	2011-07-05
Plantae	Liliopsida	Poaceae	Eragrostis spartinoides		N	C		6/5	2012-04-12
Plantae	Liliopsida	Poaceae	Eragrostis speciosa		N	C		8/7	2004-02-29
Plantae	Liliopsida	Poaceae	Eragrostis tenellula	delicate lovegrass	N	C		12/1	2011-07-05
Plantae	Liliopsida	Poaceae	Eremochloa bimaculata	poverty grass	N	C		3/2	2001-10-19
Plantae	Liliopsida	Poaceae	Eriachne mucronata		N	C		2/0	2009-12-11
Plantae	Liliopsida	Poaceae	Eriachne mucronata forma (Alpha C.E.Hubbard 7882)		N	C		9/9	2006-05-10
Plantae	Liliopsida	Poaceae	Eriachne obtusa		N	C		5/2	2011-07-05
Plantae	Liliopsida	Poaceae	Eriachne pallescens		N	C		1/1	2006-01-31
Plantae	Liliopsida	Poaceae	Eriachne rara		N	C		8/4	2009-12-11
Plantae	Liliopsida	Poaceae	Eriochloa		N	C		3/0	2012-04-12
Plantae	Liliopsida	Poaceae	Eriochloa crebra	spring grass	N	C		39/7	2012-04-12
Plantae	Liliopsida	Poaceae	Eriochloa fatmensis		N	C		1/1	1979-02-22
Plantae	Liliopsida	Poaceae	Eriochloa procera	slender cupgrass	N	C		13/9	2011-07-05
Plantae	Liliopsida	Poaceae	Eriochloa pseudoacrotricha		N	C		51/12	2011-05-31
Plantae	Liliopsida	Poaceae	Eulalia aurea	silky browntop	N	C		18/4	2009-12-11
Plantae	Liliopsida	Poaceae	Heteropogon contortus	black speargrass	N	C		75/7	2012-04-12
Plantae	Liliopsida	Poaceae	Heteropogon triticeus	giant speargrass	N	C		6/1	2012-04-12
Plantae	Liliopsida	Poaceae	Holcolemma dispar		N	C		3/3	2003-03-20
Plantae	Liliopsida	Poaceae	Hyparrhenia rufa subsp. rufa		I			12/12	2012-07-31
Plantae	Liliopsida	Poaceae	Imperata cylindrica	blady grass	N	C		1/0	2009-12-11
Plantae	Liliopsida	Poaceae	Iseilema macratherum		N	C		5/5	1998-09-15
Plantae	Liliopsida	Poaceae	Iseilema membranaceum	small flinders grass	N	C		2/1	2012-04-12
Plantae	Liliopsida	Poaceae	Iseilema membranaceum x I.vaginiflorum		N	C		1/1	1935-03-16
Plantae	Liliopsida	Poaceae	Iseilema vaginiflorum	red flinders grass	N	C		41/6	2010-05-27
Plantae	Liliopsida	Poaceae	Leptochloa		N	C		2/0	1997-10-01
Plantae	Liliopsida	Poaceae	Leptochloa digitata		N	C		8/4	2012-04-12
Plantae	Liliopsida	Poaceae	Lolium perenne	perennial ryegrass	I			1/1	2008-08-31
Plantae	Liliopsida	Poaceae	Megathyrsus maximus		I			2/0	2012-04-12
Plantae	Liliopsida	Poaceae	Megathyrsus maximus var. maximus		I			2/1	2001-10-18
Plantae	Liliopsida	Poaceae	Megathyrsus maximus var. pubiglumis		I			3/0	2009-12-11
Plantae	Liliopsida	Poaceae	Melinis repens	red natal grass	I			50/1	2012-04-12
Plantae	Liliopsida	Poaceae	Microlaena stipoides var. stipoides		N	C		1/1	1997-04-17
Plantae	Liliopsida	Poaceae	Mnesithea rottboellioides		N	C		1/1	1996-02-22
Plantae	Liliopsida	Poaceae	Moorochloa eruciformis		I			19/11	2010-05-27
Plantae	Liliopsida	Poaceae	Ophiuros exaltatus		N	C		8/5	2010-05-27
Plantae	Liliopsida	Poaceae	Oplismenus aemulus	creeping shade grass	N	C		1/0	1997-09-30
Plantae	Liliopsida	Poaceae	Panicum		N	C		7/0	1995-05-30
Plantae	Liliopsida	Poaceae	Panicum antidotale	giant panic	I			1/1	1949-03-31
Plantae	Liliopsida	Poaceae	Panicum buncei		N	C		8/7	2012-04-12
Plantae	Liliopsida	Poaceae	Panicum coloratum		I			1/1	2010-05-07
Plantae	Liliopsida	Poaceae	Panicum decompositum		N	C		5/0	2012-04-12
Plantae	Liliopsida	Poaceae	Panicum decompositum var. decompositum		N	C		29/6	2010-05-27
Plantae	Liliopsida	Poaceae	Panicum decompositum var. tenuius		N	C		13/3	2009-12-11
Plantae	Liliopsida	Poaceae	Panicum effusum		N	C		36/7	2009-12-11
Plantae	Liliopsida	Poaceae	Panicum laevinode	pepper grass	N	C		2/1	2012-04-12
Plantae	Liliopsida	Poaceae	Panicum larcomianum		N	C		7/6	2009-12-11
Plantae	Liliopsida	Poaceae	Panicum paludosum	swamp panic	N	C		1/1	1997-04-13
Plantae	Liliopsida	Poaceae	Panicum queenslandicum		N	C		18/0	2012-04-12

Kingdom	Class	Family	Scientific Name	Common Name	I	NCA	EPBC	No.	Last Seen
Plantae	Liliopsida	Poaceae	Panicum queenslandicum var. acuminatum		N	C		1/1	2010-10-05
Plantae	Liliopsida	Poaceae	Panicum queenslandicum var. queenslandicum		N	C		11/10	2000-11-07
Plantae	Liliopsida	Poaceae	Panicum simile		N	C		4/3	2008-11-10
Plantae	Liliopsida	Poaceae	Paspalidium		N	C		1/0	2001-10-17
Plantae	Liliopsida	Poaceae	Paspalidium albovillosum		N	C		2/2	1978-08-19
Plantae	Liliopsida	Poaceae	Paspalidium caespitosum	brigalow grass	N	C		24/8	2012-04-12
Plantae	Liliopsida	Poaceae	Paspalidium constrictum		N	C		21/4	2009-12-11
Plantae	Liliopsida	Poaceae	Paspalidium criniforme		N	C		5/2	2001-10-19
Plantae	Liliopsida	Poaceae	Paspalidium distans	shotgrass	N	C		9/2	2012-04-12
Plantae	Liliopsida	Poaceae	Paspalidium globoideum	sago grass	N	C		34/7	2010-05-27
Plantae	Liliopsida	Poaceae	Paspalidium gracile	slender panic	N	C		21/14	2006-02-03
Plantae	Liliopsida	Poaceae	Paspalidium jubiflorum	warrego grass	N	C		5/2	2012-04-12
Plantae	Liliopsida	Poaceae	Paspalidium rarum		N	C		4/2	1997-10-01
Plantae	Liliopsida	Poaceae	Paspalidium scabrifolium		N	NT		1/1	1998-07-11
Plantae	Liliopsida	Poaceae	Paspalum		N	C		1/0	1995-03-01
Plantae	Liliopsida	Poaceae	Paspalum dilatatum	paspalum	I			1/0	2012-04-12
Plantae	Liliopsida	Poaceae	Paspalum mandiocanum		I			1/1	2011-03-31
Plantae	Liliopsida	Poaceae	Perotis rara	comet grass	N	C		7/4	2012-04-12
Plantae	Liliopsida	Poaceae	Phalaris paradoxa	paradoxa grass	I			1/1	1989-08-25
Plantae	Liliopsida	Poaceae	Poaceae		N	C		4/0	2011-06-05
Plantae	Liliopsida	Poaceae	Pseudoraphis spinescens	spiny mudgrass	N	C		1/1	1994-01-02
Plantae	Liliopsida	Poaceae	Sarga leiocladum		N	C		3/3	2006-02-08
Plantae	Liliopsida	Poaceae	Sarga plumosum		N	C		2/1	2001-10-16
Plantae	Liliopsida	Poaceae	Schizachyrium		N	C		1/0	2001-10-17
Plantae	Liliopsida	Poaceae	Schizachyrium fragile	firegrass	N	C		2/2	1998-07-11
Plantae	Liliopsida	Poaceae	Sehima nervosum		N	C		1/1	1982-04-21
Plantae	Liliopsida	Poaceae	Setaria australiensis	scrub pigeon grass	N	C		2/2	2006-01-31
Plantae	Liliopsida	Poaceae	Setaria oplismenoides		N	C		1/1	2010-12-03
Plantae	Liliopsida	Poaceae	Setaria palmifolia	palm grass	I			1/1	1989-04-20
Plantae	Liliopsida	Poaceae	Setaria paspalidioides		N	C		3/3	2006-06-05
Plantae	Liliopsida	Poaceae	Setaria sphacelata		I			2/0	2012-04-12
Plantae	Liliopsida	Poaceae	Setaria surgens		N	C		12/3	2012-04-12
Plantae	Liliopsida	Poaceae	Sorghum arundinaceum	Rhodesian Sudan grass	I			1/1	2001-11-02
Plantae	Liliopsida	Poaceae	Sorghum bicolor	forage sorghum	I			1/1	2001-11-02
Plantae	Liliopsida	Poaceae	Sorghum halepense	Johnson grass	I			1/0	1995-05-30
Plantae	Liliopsida	Poaceae	Sorghum nitidum		N	C		1/0	1997-09-30
Plantae	Liliopsida	Poaceae	Sorghum nitidum forma aristatum		N	C		1/1	1999-03-23
Plantae	Liliopsida	Poaceae	Sorghum x almum		I			4/4	1978-05-03
Plantae	Liliopsida	Poaceae	Sporobolus		N	C		1/0	1997-10-01
Plantae	Liliopsida	Poaceae	Sporobolus actinocladus	katoora grass	N	C		5/1	2012-04-12
Plantae	Liliopsida	Poaceae	Sporobolus australasicus		N	C		4/2	1997-05-01
Plantae	Liliopsida	Poaceae	Sporobolus caroli	fairy grass	N	C		20/4	2012-04-12
Plantae	Liliopsida	Poaceae	Sporobolus creber		N	C		16/0	2010-05-27
Plantae	Liliopsida	Poaceae	Sporobolus diandrus		N			1/0	2008-11-10
Plantae	Liliopsida	Poaceae	Sporobolus disjunctus		N	C		2/2	1998-07-10
Plantae	Liliopsida	Poaceae	Sporobolus elongatus		N	C		3/3	2003-03-17
Plantae	Liliopsida	Poaceae	Sporobolus fertilis	giant Parramatta grass	I			1/1	1991-06-12
Plantae	Liliopsida	Poaceae	Sporobolus jacquemontii		I			1/1	1998-07-13
Plantae	Liliopsida	Poaceae	Sporobolus mitchellii	rat's tail couch	N	C		3/1	2007-11-21
Plantae	Liliopsida	Poaceae	Sporobolus pyramidalis		I			1/1	2005-05-05
Plantae	Liliopsida	Poaceae	Sporobolus scabridus		N	C		7/7	1998-03-11
Plantae	Liliopsida	Poaceae	Sporobolus sessilis		N	C		5/4	2011-07-05
Plantae	Liliopsida	Poaceae	Thellungia advena	coolibah grass	N	C		15/7	2010-05-27
Plantae	Liliopsida	Poaceae	Themeda avenacea		N	C		6/4	2011-07-05
Plantae	Liliopsida	Poaceae	Themeda quadrivalvis	grader grass	I			15/13	2012-04-12
Plantae	Liliopsida	Poaceae	Themeda triandra	kangaroo grass	N	C		61/8	2012-04-12
Plantae	Liliopsida	Poaceae	Thyridolepis		N	C		1/0	2001-10-17
Plantae	Liliopsida	Poaceae	Thyridolepis mitchelliana	mulga mitchell grass	N	C		3/1	2012-04-12

Kingdom	Class	Family	Scientific Name	Common Name	I	NCA	EPBC	No.	Last Seen
Plantae	Liliopsida	Poaceae	Thyridolepis xerophila		N	C		3/3	1998-07-11
Plantae	Liliopsida	Poaceae	Tragus australianus	small burr grass	N	C		10/3	2009-12-11
Plantae	Liliopsida	Poaceae	Triodia mitchellii	buck spinifex	N	C		2/2	2001-01-15
Plantae	Liliopsida	Poaceae	Triodia pungens		N	C		1/1	2006-01-31
Plantae	Liliopsida	Poaceae	Tripogon loliiformis	five minute grass	N	C		6/3	2009-12-11
Plantae	Liliopsida	Poaceae	Triraphis mollis	purple plumegrass	N	C		3/3	1979-01-11
Plantae	Liliopsida	Poaceae	Urochloa		N	C		2/0	2001-10-19
Plantae	Liliopsida	Poaceae	Urochloa foliosa		N	C		10/8	2006-06-07
Plantae	Liliopsida	Poaceae	Urochloa gilesii var. gilesii		N	C		5/5	2006-02-08
Plantae	Liliopsida	Poaceae	Urochloa holosericea		N	C		2/2	2006-02-02
Plantae	Liliopsida	Poaceae	Urochloa holosericea subsp. holosericea		N	C		3/0	2009-12-11
Plantae	Liliopsida	Poaceae	Urochloa mosambicensis	sabi grass	I			11/4	2009-12-11
Plantae	Liliopsida	Poaceae	Urochloa panicoides		I			1/0	2007-11-21
Plantae	Liliopsida	Poaceae	Urochloa panicoides var. panicoides		I			1/1	1998-04-03
Plantae	Liliopsida	Poaceae	Urochloa piligera		N	C		4/2	2011-07-05
Plantae	Liliopsida	Poaceae	Urochloa praetervisa		N	C		3/1	2009-12-11
Plantae	Liliopsida	Poaceae	Urochloa pubigera		N	C		9/1	2009-12-11
Plantae	Liliopsida	Poaceae	Urochloa reptans		N	C		1/0	1995-03-01
Plantae	Liliopsida	Poaceae	Urochloa subquadripara		I			1/1	1927-03-01
Plantae	Liliopsida	Poaceae	Urochloa whiteana		N	C		1/1	1979-02-21
Plantae	Liliopsida	Poaceae	Vacoparis laxiflorum		N	C		1/1	1978-04-12
Plantae	Liliopsida	Poaceae	Walwhalleya subxerophila		N	C		6/4	2012-04-12
Plantae	Liliopsida	Poaceae	Whiteochloa airoides		N	C		3/1	2009-12-11
Plantae	Liliopsida	Pontederiaceae	Monochoria cyanea		N	C		9/3	2011-07-05
Plantae	Liliopsida	Potamogetonaceae	Lepilaena bilocularis		N	C		1/1	1995-09-30
Plantae	Liliopsida	Potamogetonaceae	Potamogeton octandrus		N	C		1/1	1971-09-28
Plantae	Liliopsida	Potamogetonaceae	Potamogeton tepperi		N	C		1/1	1986-06-05
Plantae	Liliopsida	Typhaceae	Typhadomingensis		N	C		1/0	2012-04-12
Plantae	Liliopsida	Xanthorrhoeaceae	Xanthorrhoea johnsonii		N	C		1/0	1991-04-01
Plantae	Musci	Orthotrichaceae	Macromitrium aurescens		N	C		1/1	1990-08-27
Plantae	Musci	Pottiaceae	Trichostomum brachydontium		N	C		1/1	1993-07-05
Plantae	Musci	Ptychomitriaceae	Ptychomitrium australe		N	C		2/2	1990-08-24
Plantae	Isoetopsida	Isoetaceae	Isoetes muelleri	quillwort	N	C		1/1	1997-04-16
Plantae	Incertae sedis	Indet.	Indet.		N	C		7/0	2012-04-12
Plantae		Streptophyceae	Chara		N	C		1/1	2002-07-21
Protista	Xanthophyceae	Xanthophyceae	Phyllosiphon		N	C		1/0	1995-05-30

CODES
I - Y indicates that the taxon is introduced to Queensland and has naturalised.
NCA - Indicates the Queensland conservation status of each taxon under the Nature Conservation Act 1992. The codes are Presumed Extinct (PE), Endangered (E), Vulnerable (V), Rare (R), Common (C) or Not Protected ( ).
EPBC - Indicates the Australian conservation status of each taxon under the Environment Protection and Biodiversity Conservation Act 1999. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).
No. - The first number indicates the total number of records of the taxon. The second number located after the / indicates the number of specimen records for
* Please note that for areas less than 4 square kilometres, rare and threatened species have been removed from the results.
For large queries please visit Wildlife Online at www.derm.qld.gov.au/wildlife-ecosystems/wildlife/wildlife_online.

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Fauna Species List

Kingdom	Class	Family	Scientific Name	Common Name	I	NCA	EPBC	No.	Last Seen
Animalia	Incertae sedis	Indeterminate	Indeterminate	Unknown or Code Pending	N	C		1/0	2010-03-19
Animalia	Mammalia	Bovidae	Bos taurus	European cattle	I			89/0	2010-11-02

Kingdom	Class	Family	Scientific Name	Common Name	I	NCA	EPBC	No.	Last Seen
Animalia	Mammalia	Bovidae	Capra hircus	goat	I			1/0	1998-07-17
Animalia	Mammalia	Suidae	Sus scrofa	pig	I			18/0	2010-12-19
Animalia	Mammalia	Equidae	Equus caballus	horse	I			23/0	2005-04-04
Animalia	Mammalia	Leporidae	Lepus europaeus	European brown hare	I			2/0	2007-11-21
Animalia	Mammalia	Leporidae	Oryctolagus cuniculus	rabbit	I			113/0	2011-07-08
Animalia	Mammalia	Felidae	Felis catus	cat	I			28/0	2010-11-02
Animalia	Mammalia	Canidae	Canis lupus dingo	dingo	N			15/0	2010-11-02
Animalia	Mammalia	Canidae	Canis lupus familiaris	dog	I			13/1	2010-11-02
Animalia	Mammalia	Canidae	Canis sp.		N			3/0	2001-07-31
Animalia	Mammalia	Canidae	Vulpes vulpes	red fox	I			12/0	2010-05-05
Animalia	Mammalia	Muridae	Hydromys chrysogaster	water rat	N	C		5/0	2011-07-08
Animalia	Mammalia	Muridae	Leggadina forresti	Forrest's mouse	N	C		7/0	2000-12-05
Animalia	Mammalia	Muridae	Mus musculus	house mouse	I			95/0	2010-05-05
Animalia	Mammalia	Muridae	Pseudomys delicatulus	delicate mouse	N	C		34/0	2005-04-04
Animalia	Mammalia	Muridae	Pseudomys desertor	desert mouse	N	C		1/0	1999-06-04
Animalia	Mammalia	Muridae	Pseudomys patrius	eastern pebble-mound mouse	N	C		22/1	1998-10-15
Animalia	Mammalia	Muridae	Rattus fuscipes	bush rat	N	C		1/0	1979-12-31
Animalia	Mammalia	Muridae	Rattus rattus	black rat	I			1/0	2009-12-31
Animalia	Mammalia	Muridae	Rattus sordidus	canefield rat	N	C		9/1	2002-04-15
Animalia	Mammalia	Muridae	Rattus sp.		N			3/2	2004-04-03
Animalia	Mammalia	Vespertilionidae	Chalinolobus gouldii	Gould's wattled bat	N	C		33/0	2011-07-08
Animalia	Mammalia	Vespertilionidae	Chalinolobus morio	chocolate wattled bat	N	C		13/2	2011-07-08
Animalia	Mammalia	Vespertilionidae	Chalinolobus nigrogriseus	hoary wattled bat	N	C		10/0	2010-11-02
Animalia	Mammalia	Vespertilionidae	Chalinolobus picatus	little pied bat	N	NT		32/2	2010-11-02
Animalia	Mammalia	Vespertilionidae	Miniopterus australis	little bent-wing bat	N	C		10/0	2010-11-02
Animalia	Mammalia	Vespertilionidae	Miniopterus schreibersii oceanensis	eastern bent-wing bat	N	C		3/0	2010-11-02
Animalia	Mammalia	Vespertilionidae	Myotis macropus	large-footed myotis	N	C		1/0	2007-11-21
Animalia	Mammalia	Vespertilionidae	Nyctophilus geoffroyi	lesser long-eared bat	N	C		1/0	2001-12-06
Animalia	Mammalia	Vespertilionidae	Nyctophilus gouldi	Gould's long-eared bat	N	C		9/2	2004-11-30
Animalia	Mammalia	Vespertilionidae	Nyctophilus sp.		N			4/0	2010-11-02
Animalia	Mammalia	Vespertilionidae	Scoteanax rueppellii	greater broad-nosed bat	N	C		1/0	2009-12-31
Animalia	Mammalia	Vespertilionidae	Scotorepens balstoni	inland broad-nosed bat	N	C		18/0	2011-07-08
Animalia	Mammalia	Vespertilionidae	Scotorepens greyii	little broad-nosed bat	N	C		42/1	2010-05-05
Animalia	Mammalia	Vespertilionidae	Scotorepens sanborni	northern broad-nosed bat	N	C		1/0	2010-05-05
Animalia	Mammalia	Vespertilionidae	Scotorepens sp.		N			10/0	2005-04-04
Animalia	Mammalia	Vespertilionidae	Scotorepens sp. (Parnaby)	central-eastern broad-nosed bat	N	C		2/0	2002-10-05
Animalia	Mammalia	Vespertilionidae	Vespadelus baverstocki	inland forest bat	N	C		15/0	2011-07-08
Animalia	Mammalia	Vespertilionidae	Vespadelus troughtoni	eastern cave bat	N	C		8/0	2010-05-05
Animalia	Mammalia	Molossidae	Chaerephon jobensis	northern freetail bat	N	C		18/0	2011-07-08
Animalia	Mammalia	Molossidae	Mormopterus beccarii	Beccari's freetail bat	N	C		18/0	2011-07-08
Animalia	Mammalia	Molossidae	Mormopterus loriae ridei	little north-eastern freetail bat	N	C		2/0	2010-11-02
Animalia	Mammalia	Molossidae	Mormopterus sp.		N			4/0	2011-07-08
Animalia	Mammalia	Molossidae	Mormopterus sp. 2	eastern freetail bat	N	C		11/0	2009-12-31
Animalia	Mammalia	Molossidae	Tadarida australis	white-striped freetail bat	N	C		6/0	2010-05-05
Animalia	Mammalia	Emballonuridae	Saccolaimus flaviventris	yellow-bellied sheathtail bat	N	C		25/0	2012-04-12
Animalia	Mammalia	Emballonuridae	Taphozous troughtoni	Troughton's sheathtail bat	N	C		6/0	2010-05-05
Animalia	Mammalia	Rhinolophidae	Rhinolophus megaphyllus	eastern horseshoe-bat	N	C		1/0	1996-02-12
Animalia	Mammalia	Pteropodidae	Pteropus alecto	black flying-fox	N	C		1/0	1960-12-31
Animalia	Mammalia	Pteropodidae	Pteropus scapulatus	little red flying-fox	N	C		5/0	2007-11-21
Animalia	Mammalia	Macropodidae	Lagorchestes conspicillatus	spectacled hare-wallaby	N	C		9/0	2004-11-28
Animalia	Mammalia	Macropodidae	Macropus agilis	agile wallaby	N	C		2/0	1980-04-21
Animalia	Mammalia	Macropodidae	Macropus dorsalis	black-striped wallaby	N	C		15/0	2010-11-02
Animalia	Mammalia	Macropodidae	Macropus giganteus	eastern grey kangaroo	N	C		175/0	2012-04-12
Animalia	Mammalia	Macropodidae	Macropus parryi	whiptail wallaby	N	C		9/0	2001-10-18
Animalia	Mammalia	Macropodidae	Macropus robustus	common wallaroo	N	C		36/14	2005-08-08
Animalia	Mammalia	Macropodidae	Macropus rufogriseus	red-necked wallaby	N	C		1/0	2001-10-18
Animalia	Mammalia	Macropodidae	Macropus rufus	red kangaroo	N	C		1/0	2004-06-17
Animalia	Mammalia	Macropodidae	Petrogale herberti	Herbert's rock-wallaby	N	C		4/0	1995-12-31

Kingdom	Class	Family	Scientific Name	Common Name	I	NCA	EPBC	No.	Last Seen
Animalia	Mammalia	Macropodidae	Petrogale inornata	unadorned rock-wallaby	N	C		3/2	2010-05-05
Animalia	Mammalia	Macropodidae	Petrogale sp.		N	C		3/0	1979-12-31
Animalia	Mammalia	Macropodidae	Wallabia bicolor	swamp wallaby	N	C		23/0	2010-12-19
Animalia	Mammalia	Potoroidae	Aepyprymnus rufescens	rufous bettong	N	C		56/1	2010-11-02
Animalia	Mammalia	Phalangeridae	Trichosurus vulpecula	common brushtail possum	N	C		37/0	2012-04-12
Animalia	Mammalia	Acrobatidae	Acrobates pygmaeus	feathertail glider	N	C		4/0	1998-12-01
Animalia	Mammalia	Pseudocheiridae	Petauroides volans	greater glider	N	C		25/0	2012-04-12
Animalia	Mammalia	Petauridae	Petaurus breviceps	sugar glider	N	C		21/1	2010-11-02
Animalia	Mammalia	Petauridae	Petaurus norfolcensis	squirrel glider	N	C		5/0	2005-04-04
Animalia	Mammalia	Petauridae	Petaurus sp.		N			1/0	2001-10-18
Animalia	Mammalia	Vombatidae	Lasiorhinus krefftii	northern hairy-nosed wombat	N	E	E	2/0	1930-12-31
Animalia	Mammalia	Phascolarctidae	Phascolarctos cinereus	koala	N	C	V	53/0	2011-08-01
Animalia	Mammalia	Peramelidae	Isoodon macrourus	northern brown bandicoot	N	C		4/0	2009-12-31
Animalia	Mammalia	Dasyuridae	Dasyurus hallucatus	northern quoll	N	C	E	6/0	1993-12-31
Animalia	Mammalia	Dasyuridae	Phascogale tapoatafa	brush-tailed phascogale	N	C		2/0	1979-12-31
Animalia	Mammalia	Dasyuridae	Planigale ingrami	long-tailed planigale	N	C		3/0	2004-04-16
Animalia	Mammalia	Dasyuridae	Planigale maculata	common planigale	N	C		14/0	2005-04-04
Animalia	Mammalia	Dasyuridae	Planigale sp.		N			2/0	1995-12-31
Animalia	Mammalia	Dasyuridae	Planigale tenuirostris	narrow-nosed planigale	N	C		3/1	2001-11-30
Animalia	Mammalia	Dasyuridae	Sminthopsis crassicaudata	fat-tailed dunnart	N	C		1/0	2004-04-05
Animalia	Mammalia	Dasyuridae	Sminthopsis macroura	stripe-faced dunnart	N	C		23/0	2004-07-04
Animalia	Mammalia	Dasyuridae	Sminthopsis murina	common dunnart	N	C		1/0	1979-12-31
Animalia	Mammalia	Tachyglossidae	Tachyglossus aculeatus	short-beaked echidna	N	C		33/0	2010-05-05
Animalia	Mammalia	Ornithorhynchidae	Ornithorhynchus anatinus	platypus	N	C		2/0	2001-06-07
Animalia	Aves	Motacillidae	Anthus novaeseelandiae	Australasian pipit	N	C		68/0	2012-04-12
Animalia	Aves	Passeridae	Passer domesticus	house sparrow	I			25/0	2006-09-01
Animalia	Aves	Estrildidae	Lonchura castaneothorax	chestnut-breasted mannikin	N	C		45/0	2008-04-18
Animalia	Aves	Estrildidae	Lonchura punctulata	nutmeg mannikin	I			1/0	1993-08-03
Animalia	Aves	Estrildidae	Neochmia modesta	plum-headed finch	N	C		27/0	2009-12-31
Animalia	Aves	Estrildidae	Neochmia phaeton	crimson finch	N	C		10/0	2007-11-02
Animalia	Aves	Estrildidae	Neochmia phaeton phaeton	crimson finch	N	C		1/0	2001-05-04
Animalia	Aves	Estrildidae	Neochmia ruficauda	star finch	N	C		4/0	1985-05-31
Animalia	Aves	Estrildidae	Neochmia ruficauda ruficauda	star finch (eastern subspecies)	N	E	E	2/0	1996-12-31
Animalia	Aves	Estrildidae	Neochmia temporalis	red-browed finch	N	C		6/0	2007-11-21
Animalia	Aves	Estrildidae	Taeniopygia bichenovii	double-barred finch	N	C		194/0	2012-04-12
Animalia	Aves	Estrildidae	Taeniopygia guttata	zebra finch	N	C		29/0	2010-05-05
Animalia	Aves	Nectariniidae	Dicaeum hirundinaceum	mistletoebird	N	C		115/0	2010-12-19
Animalia	Aves	Sturnidae	Sturnus vulgaris	common starling	I			4/0	1981-10-14
Animalia	Aves	Turdidae	Zoothera heinei	russet-tailed thrush	N	C		1/0	1981-08-04
Animalia	Aves	Hirundinidae	Hirundo neoxena	welcome swallow	N	C		63/0	2012-04-12
Animalia	Aves	Hirundinidae	Petrochelidon ariel	fairy martin	N	C		76/0	2010-12-19
Animalia	Aves	Hirundinidae	Petrochelidon nigricans	tree martin	N	C		69/0	2010-05-05
Animalia	Aves	Timaliidae	Zosterops lateralis	silvereye	N	C		24/0	2009-03-18
Animalia	Aves	Megaluridae	Cincloramphus cruralis	brown songlark	N	C		9/0	2009-03-18
Animalia	Aves	Megaluridae	Cincloramphus mathewsi	rufous songlark	N	C		17/0	2010-05-05
Animalia	Aves	Megaluridae	Megalurus gramineus	little grassbird	N	C		1/0	2000-07-26
Animalia	Aves	Megaluridae	Megalurus timoriensis	tawny grassbird	N	C		8/0	2009-03-18
Animalia	Aves	Acrocephalidae	Acrocephalus australis	Australian reed-warbler	N	C		42/0	2007-03-10
Animalia	Aves	Cisticolidae	Cisticola exilis	golden-headed cisticola	N	C		48/0	2010-12-19
Animalia	Aves	Alaudidae	Mirafra javanica	Horsfield's bushlark	N	C		47/0	2010-05-05
Animalia	Aves	Petroicidae	Eopsaltria australis	eastern yellow robin	N	C		18/0	2005-04-04
Animalia	Aves	Petroicidae	Melanodryas cucullata	hooded robin	N	C		2/0	2007-11-21
Animalia	Aves	Petroicidae	Microeca fascinans	jacky winter	N	C		38/0	2010-05-05
Animalia	Aves	Petroicidae	Petroica goodenovii	red-capped robin	N	C		24/0	2002-04-15
Animalia	Aves	Petroicidae	Petroica rosea	rose robin	N	C		1/0	1993-12-31
Animalia	Aves	Corcoracidae	Corcorax melanorhamphos	white-winged chough	N	C		37/0	2010-11-02
Animalia	Aves	Corcoracidae	Struthidea cinerea	apostlebird	N	C		276/0	2012-04-12

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Animalia	Aves	Monarchidae	Carterornis leucotis	white-eared monarch	N	C		1/0	1988-06-07
Animalia	Aves	Monarchidae	Grallina cyanoleuca	magpie-lark	N	C		446/0	2012-04-12
Animalia	Aves	Monarchidae	Monarcha melanopsis	black-faced monarch	N	C		5/0	2000-04-27
Animalia	Aves	Monarchidae	Myiagra cyanoleuca	satin flycatcher	N	C		4/0	1993-12-31
Animalia	Aves	Monarchidae	Myiagra inquieta	restless flycatcher	N	C		44/0	2009-12-31
Animalia	Aves	Monarchidae	Myiagra rubecula	leaden flycatcher	N	C		80/0	2010-12-19
Animalia	Aves	Monarchidae	Symposiarchus trivirgatus	spectacled monarch	N	C		2/0	2005-04-04
Animalia	Aves	Corvidae	Corvus bennetti	little crow	N	C		9/0	2000-05-24
Animalia	Aves	Corvidae	Corvus coronoides	Australian raven	N	C		36/0	2010-12-19
Animalia	Aves	Corvidae	Corvus orru	Torresian crow	N	C		479/1	2012-04-12
Animalia	Aves	Corvidae	Corvus sp.		N			4/0	2006-08-21
Animalia	Aves	Rhipiduridae	Rhipidura albiscapa	grey fantail	N	C		146/0	2011-07-08
Animalia	Aves	Rhipiduridae	Rhipidura leucophrys	willie wagtail	N	C		326/0	2012-04-12
Animalia	Aves	Rhipiduridae	Rhipidura rufifrons	rufous fantail	N	C		7/0	2007-11-21
Animalia	Aves	Dicruridae	Dicrurus bracteatus	spangled drongo	N	C		40/0	2010-11-02
Animalia	Aves	Artamidae	Artamus cinereus	black-faced woodswallow	N	C		44/0	2011-07-08
Animalia	Aves	Artamidae	Artamus cyanopterus	dusky woodswallow	N	C		13/0	2001-03-19
Animalia	Aves	Artamidae	Artamus leucorynchus	white-breasted woodswallow	N	C		64/0	2010-05-05
Animalia	Aves	Artamidae	Artamus minor	little woodswallow	N	C		23/0	2002-07-20
Animalia	Aves	Artamidae	Artamus personatus	masked woodswallow	N	C		19/0	2005-04-04
Animalia	Aves	Artamidae	Artamus superciliosus	white-browed woodswallow	N	C		16/0	2005-04-04
Animalia	Aves	Artamidae	Cracticus nigrogularis	pied butcherbird	N	C		462/0	2012-04-12
Animalia	Aves	Artamidae	Cracticus tibicen	Australian magpie	N	C		531/0	2012-04-12
Animalia	Aves	Artamidae	Cracticus torquatus	grey butcherbird	N	C		243/0	2011-07-08
Animalia	Aves	Artamidae	Strepera graculina	pied currawong	N	C		102/0	2010-05-05
Animalia	Aves	Oriolidae	Oriolus sagittatus	olive-backed oriole	N	C		87/0	2011-07-08
Animalia	Aves	Oriolidae	Sphecotheres vieilloti	Australasian figbird	N	C		68/0	2010-12-19
Animalia	Aves	Pachycephalidae	Colluricincla harmonica	grey shrike-thrush	N	C		114/0	2011-07-08
Animalia	Aves	Pachycephalidae	Colluricincla megarhyncha	little shrike-thrush	N	C		4/0	2002-07-20
Animalia	Aves	Pachycephalidae	Oreoica gutturalis	crested bellbird	N	C		6/0	1997-03-22
Animalia	Aves	Pachycephalidae	Pachycephala pectoralis	golden whistler	N	C		8/0	2008-07-30
Animalia	Aves	Pachycephalidae	Pachycephala rufiventris	rufous whistler	N	C		211/0	2011-07-08
Animalia	Aves	Campephagidae	Coracina maxima	ground cuckoo-shrike	N	C		46/0	2010-11-02
Animalia	Aves	Campephagidae	Coracina novaehollandiae	black-faced cuckoo-shrike	N	C		330/0	2011-07-08
Animalia	Aves	Campephagidae	Coracina papuensis	white-bellied cuckoo-shrike	N	C		45/0	2009-03-18
Animalia	Aves	Campephagidae	Coracina tenuirostris	cicadabird	N	C		21/0	2010-05-05
Animalia	Aves	Campephagidae	Lalage leucomela	varied triller	N	C		6/0	2009-03-18
Animalia	Aves	Campephagidae	Lalage sueurii	white-winged triller	N	C		32/0	2010-05-05
Animalia	Aves	Neosittidae	Daphoenositta chrysoptera	varied sittella	N	C		48/1	2009-12-31
Animalia	Aves	Psophodidae	Cinclosoma punctatum	spotted quail-thrush	N	C		1/0	1991-10-01
Animalia	Aves	Pomatostomidae	Pomatostomus temporalis	grey-crowned babbler	N	C		206/0	2012-04-12
Animalia	Aves	Meliphagidae	Acanthagenys rufogularis	spiny-cheeked honeyeater	N	C		60/0	2010-12-19
Animalia	Aves	Meliphagidae	Acanthorhynchus tenuirostris	eastern spinebill	N	C		1/0	1980-06-19
Animalia	Aves	Meliphagidae	Anthochaera chrysoptera	little wattlebird	N	C		1/0	2007-11-21
Animalia	Aves	Meliphagidae	Caligavis chrysops	yellow-faced honeyeater	N	C		16/0	2008-04-02
Animalia	Aves	Meliphagidae	Entomyzon cyanotis	blue-faced honeyeater	N	C		283/0	2012-04-12
Animalia	Aves	Meliphagidae	Epthianura aurifrons	orange chat	N	C		1/0	1902-06-03
Animalia	Aves	Meliphagidae	Epthianura tricolor	crimson chat	N	C		1/0	1905-12-31
Animalia	Aves	Meliphagidae	Gavicalis virescens	singing honeyeater	N	C		147/0	2011-07-08
Animalia	Aves	Meliphagidae	Lichmera indistincta	brown honeyeater	N	C		96/0	2010-12-19
Animalia	Aves	Meliphagidae	Manorina flavigula	yellow-throated miner	N	C		261/1	2010-11-02
Animalia	Aves	Meliphagidae	Manorina melanocephala	noisy miner	N	C		170/0	2012-04-12

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Animalia	Aves	Meliphagidae	Meliphaga lewinii	Lewin's honeyeater	N	C		43/0	2008-07-30
Animalia	Aves	Meliphagidae	Meliphaga notata	yellow-spotted honeyeater	N	C		1/0	1993-06-26
Animalia	Aves	Meliphagidae	Melithreptus albogularis	white-throated honeyeater	N	C		169/0	2010-12-19
Animalia	Aves	Meliphagidae	Melithreptus brevirostris	brown-headed honeyeater	N	C		1/0	1993-12-31
Animalia	Aves	Meliphagidae	Melithreptus gularis	black-chinned honeyeater	N	NT		2/0	2007-06-04
Animalia	Aves	Meliphagidae	Melithreptus lunatus	white-naped honeyeater	N	C		10/0	2001-10-20
Animalia	Aves	Meliphagidae	Myzomela erythrocephala	red-headed honeyeater	N	C		1/0	1945-02-12
Animalia	Aves	Meliphagidae	Myzomela obscura	dusky honeyeater	N	C		2/0	1999-08-26
Animalia	Aves	Meliphagidae	Myzomela sanguinolenta	scarlet honeyeater	N	C		10/0	2002-08-22
Animalia	Aves	Meliphagidae	Nesoptilotis leucotis	white-eared honeyeater	N	C		3/0	1993-12-31
Animalia	Aves	Meliphagidae	Philemon buceroides	helmeted friarbird	N	C		5/0	1999-12-12
Animalia	Aves	Meliphagidae	Philemon citreogularis	little friarbird	N	C		162/0	2012-04-12
Animalia	Aves	Meliphagidae	Philemon corniculatus	noisy friarbird	N	C		204/0	2010-12-19
Animalia	Aves	Meliphagidae	Plectorhyncha lanceolata	striped honeyeater	N	C		138/0	2010-12-19
Animalia	Aves	Meliphagidae	Ptilotula flavescens	yellow-tinted honeyeater	N	C		1/0	1937-10-31
Animalia	Aves	Meliphagidae	Ptilotula fuscus	fuscous honeyeater	N	C		14/0	2002-07-20
Animalia	Aves	Meliphagidae	Ptilotula penicillatus	white-plumed honeyeater	N	C		37/0	2003-06-06
Animalia	Aves	Meliphagidae	Ptilotula plumulus	grey-fronted honeyeater	N	C		2/0	1980-09-14
Animalia	Aves	Meliphagidae	Stomiopera flavus	yellow honeyeater	N	C		9/0	2002-07-21
Animalia	Aves	Meliphagidae	Sugomel niger	black honeyeater	N	C		1/0	1945-02-12
Animalia	Aves	Pardalotidae	Pardalotus punctatus	spotted pardalote	N	C		6/0	2007-11-21
Animalia	Aves	Pardalotidae	Pardalotus rubricatus	red-browed pardalote	N	C		3/0	1979-01-01
Animalia	Aves	Pardalotidae	Pardalotus striatus	striated pardalote	N	C		350/0	2011-07-08
Animalia	Aves	Acanthizidae	Acanthiza apicalis	inland thornbill	N	C		8/0	2010-11-02
Animalia	Aves	Acanthizidae	Acanthiza chrysorrhoa	yellow-rumped thornbill	N	C		34/1	2009-03-18
Animalia	Aves	Acanthizidae	Acanthiza lineata	striated thornbill	N	C		2/0	2005-04-04
Animalia	Aves	Acanthizidae	Acanthiza nana	yellow thornbill	N	C		35/0	2010-05-05
Animalia	Aves	Acanthizidae	Acanthiza pusilla	brown thornbill	N	C		3/0	1996-02-12
Animalia	Aves	Acanthizidae	Acanthiza reguloides	buff-rumped thornbill	N	C		24/0	2011-07-08
Animalia	Aves	Acanthizidae	Chthonicola sagittata	speckled warbler	N	C		34/0	2009-03-18
Animalia	Aves	Acanthizidae	Gerygone albogularis	white-throated gerygone	N	C		128/0	2012-04-12
Animalia	Aves	Acanthizidae	Gerygone fusca	western gerygone	N	C		9/0	2011-07-08
Animalia	Aves	Acanthizidae	Gerygone palpebrosa	fairy gerygone	N	C		4/0	2005-08-08
Animalia	Aves	Acanthizidae	Sericornis frontalis	white-browed scrubwren	N	C		9/0	2005-04-04
Animalia	Aves	Acanthizidae	Smicrornis brevirostris	weebill	N	C		222/0	2012-04-12
Animalia	Aves	Maluridae	Malurus cyaneus	superb fairy-wren	N	C		13/0	2001-09-21
Animalia	Aves	Maluridae	Malurus lamberti	variegated fairy-wren	N	C		90/0	2010-05-05
Animalia	Aves	Maluridae	Malurus leucopterus	white-winged fairy-wren	N	C		3/0	1984-12-31
Animalia	Aves	Maluridae	Malurus melanocephalus	red-backed fairy-wren	N	C		252/0	2012-04-12
Animalia	Aves	Maluridae	Malurus splendens	splendid fairy-wren	N	C		1/0	2011-07-08
Animalia	Aves	Ptilonorhynchidae	Ptilonorhynchus maculatus	spotted bowerbird	N	C		103/0	2010-12-19
Animalia	Aves	Ptilonorhynchidae	Ptilonorhynchus nuchalis	great bowerbird	N	C		6/0	2000-11-14
Animalia	Aves	Ptilonorhynchidae	Sericulus chrysocephalus	regent bowerbird	N	C		4/0	1973-12-31
Animalia	Aves	Climacteridae	Climacteris affinis	white-browed treecreeper	N	C		1/0	2012-04-12
Animalia	Aves	Climacteridae	Climacteris picumnus	brown treecreeper	N	C		27/0	2009-12-31
Animalia	Aves	Coraciidae	Eurystomus orientalis	dollarbird	N	C		117/0	2012-04-12
Animalia	Aves	Meropidae	Merops ornatus	rainbow bee-eater	N	C		130/0	2010-12-19
Animalia	Aves	Halcyonidae	Dacelo leachii	blue-winged kookaburra	N	C		106/0	2010-12-19
Animalia	Aves	Halcyonidae	Dacelo novaeguineae	laughing kookaburra	N	C		318/1	2012-04-12
Animalia	Aves	Halcyonidae	Todiramphus macleayii	forest kingfisher	N	C		76/0	2011-07-08
Animalia	Aves	Halcyonidae	Todiramphus pyrrhopygius	red-backed kingfisher	N	C		30/0	2010-11-02
Animalia	Aves	Halcyonidae	Todiramphus sanctus	sacred kingfisher	N	C		78/0	2012-04-12
Animalia	Aves	Alcedinidae	Ceyx azureus	azure kingfisher	N	C		8/0	2005-04-04
Animalia	Aves	Tytonidae	Tyto javanica	easternbarn owl	N	C		42/0	2010-11-02
Animalia	Aves	Tytonidae	Tyto longimembris	eastern grass owl	N	C		2/0	2002-04-15
Animalia	Aves	Tytonidae	Tyto novaehollandiae	masked owl	N	C		5/0	2001-10-18
Animalia	Aves	Strigidae	Ninox boobook	southern boobook	N	C		80/0	2010-11-02
Animalia	Aves	Strigidae	Ninox connivens	barking owl	N	C		11/0	2005-08-08

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Animalia	Aves	Strigidae	Ninox rufa queenslandica	rufous owl (southern subspecies)	N	V		1/0	2002-08-22
Animalia	Aves	Cuculidae	Cacomantis flabelliformis	fan-tailed cuckoo	N	C		16/0	2010-03-19
Animalia	Aves	Cuculidae	Cacomantis pallidus	pallid cuckoo	N	C		38/0	2010-11-02
Animalia	Aves	Cuculidae	Cacomantis variolosus	brush cuckoo	N	C		7/0	2010-11-02
Animalia	Aves	Cuculidae	Centropus phasianinus	pheasant coucal	N	C		164/0	2012-04-12
Animalia	Aves	Cuculidae	Chalcites basalis	Horsfield's bronze-cuckoo	N	C		27/0	2010-11-02
Animalia	Aves	Cuculidae	Chalcites lucidus	shining bronze-cuckoo	N	C		17/0	2005-04-04
Animalia	Aves	Cuculidae	Chalcites minutillus minutillus	little bronze-cuckoo	N	C		4/0	2009-03-18
Animalia	Aves	Cuculidae	Chalcites osculans	black-eared cuckoo	N	C		5/0	2003-06-06
Animalia	Aves	Cuculidae	Eudynamys orientalis	eastern koel	N	C		33/0	2012-04-12
Animalia	Aves	Cuculidae	Scythrops novaehollandiae	channel-billed cuckoo	N	C		69/0	2010-12-19
Animalia	Aves	Psittacidae	Alisterus scapularis	Australian king-parrot	N	C		1/0	1999-08-07
Animalia	Aves	Psittacidae	Aprosmictus erythropterus	red-winged parrot	N	C		220/0	2011-07-08
Animalia	Aves	Psittacidae	Glossopsitta pusilla	little lorikeet	N	C		3/0	2000-01-31
Animalia	Aves	Psittacidae	Melopsittacus undulatus	budgerigar	N	C		20/0	2008-05-06
Animalia	Aves	Psittacidae	Neophema pulchella	turquoise parrot	N	NT		3/0	1973-12-31
Animalia	Aves	Psittacidae	Northiella haematogaster	blue bonnet	N	C		1/0	1998-12-18
Animalia	Aves	Psittacidae	Platycercus adscitus	pale-headed rosella	N	C		395/0	2012-04-12
Animalia	Aves	Psittacidae	Platycercus adscitus palliceps	pale-headed rosella (southern form)	N	C		5/0	2004-07-02
Animalia	Aves	Psittacidae	Trichoglossus chlorolepidotus	scaly-breasted lorikeet	N	C		58/0	2010-05-05
Animalia	Aves	Psittacidae	Trichoglossus haematodus moluccanus	rainbow lorikeet	N	C		353/0	2012-04-12
Animalia	Aves	Cacatuidae	Cacatua galerita	sulphur-crested cockatoo	N	C		376/0	2012-04-12
Animalia	Aves	Cacatuidae	Cacatua pastinator	western corella	N	C		2/0	1980-08-27
Animalia	Aves	Cacatuidae	Cacatua sanguinea	little corella	N	C		34/0	2010-03-19
Animalia	Aves	Cacatuidae	Calyptorhynchus banksii	red-tailed black-cockatoo	N	C		16/0	2008-04-18
Animalia	Aves	Cacatuidae	Calyptorhynchus funereus	yellow-tailed black-cockatoo	N	C		12/0	2005-04-04
Animalia	Aves	Cacatuidae	Calyptorhynchus lathami	glossy black-cockatoo	N	V		8/0	2005-04-04
Animalia	Aves	Cacatuidae	Eolophus roseicapillus	galah	N	C		183/0	2012-04-12
Animalia	Aves	Cacatuidae	Nymphicus hollandicus	cockatiel	N	C		161/0	2010-05-05
Animalia	Aves	Laridae	Anous minutus	black noddy	N	C		2/2	1976-01-23
Animalia	Aves	Laridae	Chlidonias hybrida	whiskered tern	N	C		12/0	2000-10-10
Animalia	Aves	Laridae	Chlidonias leucopterus	white-winged black tern	N	C		1/0	2001-08-19
Animalia	Aves	Laridae	Chroicocephalus novaehollandiae	silver gull	N	C		13/0	2008-07-06
Animalia	Aves	Laridae	Gelochelidon nilotica	gull-billed tern	N	C		4/0	1999-02-27
Animalia	Aves	Laridae	Hydroprogne caspia	Caspian tern	N	C		6/0	1999-12-13
Animalia	Aves	Stercorariidae	Stercorarius pomarinus	pomarine jaeger	N	C		1/1	1976-01-23
Animalia	Aves	Turnicidae	Turnix pyrrhothorax	red-chested button-quail	N	C		9/0	2002-04-15
Animalia	Aves	Turnicidae	Turnix varius	painted button-quail	N	C		15/0	2009-03-18
Animalia	Aves	Turnicidae	Turnix velox	little button-quail	N	C		9/0	2010-11-02
Animalia	Aves	Scolopacidae	Actitis hypoleucos	common sandpiper	N	C		1/0	1981-11-30
Animalia	Aves	Scolopacidae	Calidris acuminata	sharp-tailed sandpiper	N	C		1/0	2001-11-21
Animalia	Aves	Scolopacidae	Gallinago hardwickii	Latham's snipe	N	C		6/0	2000-01-03
Animalia	Aves	Scolopacidae	Numenius minutus	little curlew	N	C		2/0	1901-12-31
Animalia	Aves	Scolopacidae	Numenius phaeopus	whimbrel	N	C		1/0	1978-07-31
Animalia	Aves	Scolopacidae	Tringa glareola	wood sandpiper	N	C		1/0	1985-12-31
Animalia	Aves	Scolopacidae	Tringa nebularia	common greenshank	N	C		7/0	2004-11-27
Animalia	Aves	Scolopacidae	Tringa stagnatilis	marsh sandpiper	N	C		3/0	2001-11-21
Animalia	Aves	Rostratulidae	Rostratula australis	Australian painted snipe	N	V	V	7/0	2007-11-21
Animalia	Aves	Jacanidae	Irediparra gallinacea	comb-crested jacana	N	C		15/0	2005-07-24
Animalia	Aves	Charadriidae	Charadrius veredus	oriental plover	N	C		4/0	1984-12-31
Animalia	Aves	Charadriidae	Elseyornis melanops	black-fronted dotterel	N	C		54/0	2010-05-05
Animalia	Aves	Charadriidae	Erythrogonys cinctus	red-kneed dotterel	N	C		3/0	1985-12-31
Animalia	Aves	Charadriidae	Vanellus miles	masked lapwing	N	C		31/0	2012-04-12
Animalia	Aves	Charadriidae	Vanellus miles miles	masked lapwing (northern subspecies)	N	C		59/0	2010-03-18

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Animalia	Aves	Charadriidae	Vanellus miles novaehollandiae	masked lapwing (southern subspecies)	N	C		18/0	2000-12-15
Animalia	Aves	Charadriidae	Vanellus tricolor	banded lapwing	N	C		9/0	2004-06-17
Animalia	Aves	Recurvirostridae	Himantopus himantopus	black-winged stilt	N	C		36/0	2010-12-19
Animalia	Aves	Burhinidae	Burhinus grallarius	bush stone-curlew	N	C		19/0	2009-03-18
Animalia	Aves	Otididae	Ardeotis australis	Australian bustard	N	C		144/0	2012-04-12
Animalia	Aves	Rallidae	Fulica atra	Eurasian coot	N	C		68/0	2007-06-30
Animalia	Aves	Rallidae	Gallinula tenebrosa	dusky moorhen	N	C		110/0	2011-07-08
Animalia	Aves	Rallidae	Gallirallus philippensis	buff-banded rail	N	C		7/0	2010-05-05
Animalia	Aves	Rallidae	Porphyrio porphyrio	purple swamphen	N	C		34/0	2008-08-01
Animalia	Aves	Rallidae	Porzana fluminea	Australian spotted crake	N	C		1/0	2001-08-28
Animalia	Aves	Rallidae	Porzana pusilla	Baillon's crake	N	C		1/0	1946-12-31
Animalia	Aves	Rallidae	Tribonyx ventralis	black-tailed native-hen	N	C		3/0	1985-12-31
Animalia	Aves	Gruidae	Grus rubicunda	brolga	N	C		109/0	2012-04-12
Animalia	Aves	Falconidae	Falco berigora	brown falcon	N	C		108/0	2010-11-02
Animalia	Aves	Falconidae	Falco cenchroides	nankeen kestrel	N	C		258/0	2012-04-12
Animalia	Aves	Falconidae	Falco longipennis	Australian hobby	N	C		26/0	2010-11-02
Animalia	Aves	Falconidae	Falco peregrinus	peregrine falcon	N	C		11/0	2010-03-19
Animalia	Aves	Falconidae	Falco subniger	black falcon	N	C		3/0	2002-07-20
Animalia	Aves	Accipitridae	Accipiter cirrocephalus	collared sparrowhawk	N	C		22/0	2010-11-02
Animalia	Aves	Accipitridae	Accipiter fasciatus	brown goshawk	N	C		29/0	2010-11-02
Animalia	Aves	Accipitridae	Accipiter novaehollandiae	grey goshawk	N	NT		2/0	1978-07-31
Animalia	Aves	Accipitridae	Aquila audax	wedge-tailed eagle	N	C		136/0	2010-11-02
Animalia	Aves	Accipitridae	Aviceda subcristata	Pacific baza	N	C		19/0	2009-12-31
Animalia	Aves	Accipitridae	Circus assimilis	spotted harrier	N	C		12/0	2004-07-18
Animalia	Aves	Accipitridae	Elanus axillaris	black-shouldered kite	N	C		54/0	2009-03-18
Animalia	Aves	Accipitridae	Elanus scriptus	letter-winged kite	N	C		6/0	1988-05-03
Animalia	Aves	Accipitridae	Erythrotriorchis radiatus	red goshawk	N	E	V	5/1	2001-06-07
Animalia	Aves	Accipitridae	Haliaeetus leucogaster	white-bellied sea-eagle	N	C		16/0	2007-11-02
Animalia	Aves	Accipitridae	Haliastur indus	brahminy kite	N	C		1/0	1999-09-29
Animalia	Aves	Accipitridae	Haliastur sphenurus	whistling kite	N	C		198/0	2012-04-12
Animalia	Aves	Accipitridae	Hamirostra melanosternon	black-breasted buzzard	N	C		6/0	2009-12-31
Animalia	Aves	Accipitridae	Hieraaetus morphnoides	little eagle	N	C		13/0	2010-03-16
Animalia	Aves	Accipitridae	Lophoictinia isura	square-tailed kite	N	NT		13/0	2005-01-01
Animalia	Aves	Accipitridae	Milvus migrans	black kite	N	C		107/0	2012-04-12
Animalia	Aves	Accipitridae	Pandion cristatus	eastern osprey	N	C		2/0	2000-11-03
Animalia	Aves	Threskiornithidae	Platalea flavipes	yellow-billed spoonbill	N	C		52/0	2011-07-08
Animalia	Aves	Threskiornithidae	Platalea regia	royal spoonbill	N	C		50/0	2009-12-31
Animalia	Aves	Threskiornithidae	Plegadis falcinellus	glossy ibis	N	C		6/0	2001-11-21
Animalia	Aves	Threskiornithidae	Threskiornis molucca	Australian white ibis	N	C		52/0	2011-07-08
Animalia	Aves	Threskiornithidae	Threskiornis spinicollis	straw-necked ibis	N	C		91/0	2011-07-08
Animalia	Aves	Ardeidae	Ardea ibis	cattle egret	N	C		3/0	2011-07-08
Animalia	Aves	Ardeidae	Ardea intermedia	intermediate egret	N	C		62/0	2011-07-08
Animalia	Aves	Ardeidae	Ardea modesta	eastern great egret	N	C		105/0	2011-07-08
Animalia	Aves	Ardeidae	Ardea pacifica	white-necked heron	N	C		97/0	2012-04-12
Animalia	Aves	Ardeidae	Egretta garzetta	little egret	N	C		13/0	2002-07-22
Animalia	Aves	Ardeidae	Egretta novaehollandiae	white-faced heron	N	C		110/0	2012-04-12
Animalia	Aves	Ardeidae	Egretta picata	pied heron	N	C		1/0	1999-10-24
Animalia	Aves	Ardeidae	Ixobrychus flavicollis	black bittern	N	C		5/0	2002-08-22
Animalia	Aves	Ardeidae	Nycticorax caledonicus	Nankeen night-heron	N	C		29/0	2012-04-12
Animalia	Aves	Ciconiidae	Ephippiorhynchus asiaticus	black-necked stork	N	NT		25/0	2005-04-04
Animalia	Aves	Pelecanidae	Pelecanus conspicillatus	Australian pelican	N	C		79/0	2010-12-19
Animalia	Aves	Phalacrocoracidae	Microcarbo melanoleucos	little pied cormorant	N	C		95/0	2011-07-08
Animalia	Aves	Phalacrocoracidae	Phalacrocorax carbo	great cormorant	N	C		16/0	2012-04-12
Animalia	Aves	Phalacrocoracidae	Phalacrocorax sulcirostris	little black cormorant	N	C		86/0	2011-07-08

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Animalia	Aves	Phalacrocoracidae	Phalacrocorax varius	pied cormorant	N	C		28/0	2003-01-17
Animalia	Aves	Anhingidae	Anhinga novaehollandiae	Australasian darter	N	C		134/0	2011-07-08
Animalia	Aves	Apodidae	Apus pacificus	fork-tailed swift	N	C		3/0	1985-12-31
Animalia	Aves	Apodidae	Hirundapus caudacutus	white-throated needletail	N	C		10/0	1997-03-22
Animalia	Aves	Aegothelidae	Aegotheles cristatus	Australian owlet-nightjar	N	C		84/0	2010-11-02
Animalia	Aves	Caprimulgidae	Caprimulgus macrurus	large-tailed nightjar	N	C		2/0	2001-08-27
Animalia	Aves	Eurostopodidae	Eurostopodus argus	spotted nightjar	N	C		2/0	1997-03-22
Animalia	Aves	Eurostopodidae	Eurostopodus mystacalis	white-throated nightjar	N	C		14/0	2010-11-02
Animalia	Aves	Podargidae	Podargus strigoides	tawny frogmouth	N	C		93/1	2010-12-19
Animalia	Aves	Columbidae	Columba livia	rock dove	I			5/0	2001-09-21
Animalia	Aves	Columbidae	Geopelia cuneata	diamond dove	N	C		22/0	2009-03-18
Animalia	Aves	Columbidae	Geopelia humeralis	bar-shouldered dove	N	C		107/0	2010-11-02
Animalia	Aves	Columbidae	Geopelia striata	peaceful dove	N	C		186/0	2012-04-12
Animalia	Aves	Columbidae	Geophaps scripta	squatter pigeon	N	C		1/0	2011-11-02
Animalia	Aves	Columbidae	Geophaps scripta scripta	squatter pigeon (southern subspecies)	N	V	V	65/0	2012-04-12
Animalia	Aves	Columbidae	Leucosarcia picata	wonga pigeon	N	C		2/0	1991-10-01
Animalia	Aves	Columbidae	Ocyphaps lophotes	crested pigeon	N	C		315/0	2012-04-12
Animalia	Aves	Columbidae	Phaps chalcoptera	common bronzewing	N	C		86/0	2010-12-19
Animalia	Aves	Columbidae	Phaps histrionica	flock bronzewing	N	C		2/0	1905-12-31
Animalia	Aves	Podicipedidae	Podiceps cristatus	great crested grebe	N	C		20/0	2002-07-22
Animalia	Aves	Podicipedidae	Poliocephalus poliocephalus	hoary-headed grebe	N	C		4/0	2005-07-24
Animalia	Aves	Podicipedidae	Tachybaptus novaehollandiae	Australasian grebe	N	C		113/0	2011-07-08
Animalia	Aves	Phaethontidae	Phaethon rubricauda	red-tailed tropicbird	N	V		1/0	1997-01-07
Animalia	Aves	Anatidae	Anas gracilis	grey teal	N	C		105/0	2012-04-12
Animalia	Aves	Anatidae	Anas platyrhynchos	northern mallard	I			7/0	2005-08-10
Animalia	Aves	Anatidae	Anas rhynchotis	Australasian shoveler	N	C		6/0	2009-12-31
Animalia	Aves	Anatidae	Anas superciliosa	Pacific black duck	N	C		178/0	2012-04-12
Animalia	Aves	Anatidae	Aythya australis	hardhead	N	C		84/0	2011-07-08
Animalia	Aves	Anatidae	Chenonetta jubata	Australian wood duck	N	C		95/0	2012-04-12
Animalia	Aves	Anatidae	Cygnus atratus	black swan	N	C		49/0	2009-03-18
Animalia	Aves	Anatidae	Dendrocygna arcuata	wandering whistling-duck	N	C		20/0	2008-05-02
Animalia	Aves	Anatidae	Dendrocygna eytoni	plumed whistling-duck	N	C		53/0	2012-04-12
Animalia	Aves	Anatidae	Malacorhynchus membranaceus	pink-eared duck	N	C		5/0	2009-03-18
Animalia	Aves	Anatidae	Nettapus coromandelianus	cotton pygmy-goose	N	NT		43/0	2008-08-02
Animalia	Aves	Anatidae	Nettapus pulchellus	green pygmy-goose	N	C		4/0	2001-08-19
Animalia	Aves	Anatidae	Oxyura australis	blue-billed duck	N	C		1/0	2007-06-28
Animalia	Aves	Anatidae	Tadorna radjah	radjah shelduck	N	NT		1/0	1984-12-31
Animalia	Aves	Anseranatidae	Anseranas semipalmata	magpie goose	N	C		1/0	2000-07-10
Animalia	Aves	Phasianidae	Coturnix pectoralis	stubble quail	N	C		8/0	2010-05-05
Animalia	Aves	Phasianidae	Coturnix ypsilophora	brown quail	N	C		51/0	2010-11-02
Animalia	Aves	Phasianidae	Excalfactoria chinensis	king quail	N	C		1/0	2007-11-21
Animalia	Aves	Megapodiidae	Alectura lathami	Australian brush-turkey	N	C		16/0	2005-04-04
Animalia	Aves	Casuariidae	Dromaius novaehollandiae	emu	N	C		112/0	2010-12-19
Animalia	Reptilia	Elapidae	Acanthophis antarcticus	common death adder	N	NT		3/0	1979-12-31
Animalia	Reptilia	Elapidae	Brachyurophis australis	coral snake	N	C		6/1	2010-11-02
Animalia	Reptilia	Elapidae	Cacophis krefftii	dwarf crowned snake	N	C		1/1	2004-05-26
Animalia	Reptilia	Elapidae	Cacophis squamulosus	golden crowned snake	N	C		1/0	1971-10-31
Animalia	Reptilia	Elapidae	Cryptophis boschmai	Carpentaria whip snake	N	C		22/2	2010-12-19
Animalia	Reptilia	Elapidae	Cryptophis nigrescens	eastern small-eyed snake	N	C		2/0	2005-04-04
Animalia	Reptilia	Elapidae	Cryptophis nigrostriatus	black-striped snake	N	C		1/0	2005-04-04
Animalia	Reptilia	Elapidae	Demansia psammophis	yellow-faced whip snake	N	C		20/2	2006-11-15
Animalia	Reptilia	Elapidae	Demansia sp.		N			1/0	2005-04-04
Animalia	Reptilia	Elapidae	Demansia vestigiata	black whip snake	N	C		3/0	2010-03-16
Animalia	Reptilia	Elapidae	Denisonia maculata	ornamental snake	N	V	V	15/0	2012-04-12
Animalia	Reptilia	Elapidae	Furina diadema	red-naped snake	N	C		6/2	2012-04-12
Animalia	Reptilia	Elapidae	Furina dunmalli	Dunmall's snake	N	V	V	1/1	1999-02-28
Animalia	Reptilia	Elapidae	Furina ornata	orange-naped snake	N	C		3/0	2010-11-02

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Animalia	Reptilia	Elapidae	Hemiaspis damelii	grey snake	N	E		3/2	1985-12-31
Animalia	Reptilia	Elapidae	Hoplocephalus bitorquatus	pale-headed snake	N	C		10/1	2010-05-05
Animalia	Reptilia	Elapidae	Oxyuranus scutellatus	coastal taipan	N	C		1/0	2006-05-05
Animalia	Reptilia	Elapidae	Pseudechis australis	king brown snake	N	C		1/0	2007-11-21
Animalia	Reptilia	Elapidae	Pseudechis porphyriacus	red-bellied black snake	N	C		3/0	1979-12-31
Animalia	Reptilia	Elapidae	Pseudonaja textilis	eastern brown snake	N	C		19/1	2009-12-31
Animalia	Reptilia	Elapidae	Suta suta	myall snake	N	C		45/3	2010-11-02
Animalia	Reptilia	Elapidae	Vermicella annulata	bandy-bandy	N	C		7/3	2004-04-15
Animalia	Reptilia	Colubridae	Boiga irregularis	brown tree snake	N	C		6/0	2012-04-12
Animalia	Reptilia	Colubridae	Dendrelaphis punctulata	common tree snake	N	C		14/0	2010-03-16
Animalia	Reptilia	Colubridae	Tropidonophis mairii	freshwater snake	N	C		5/0	2010-05-05
Animalia	Reptilia	Boidae	Antaresia maculosa	spotted python	N	C		38/1	2010-12-19
Animalia	Reptilia	Boidae	Antaresia stimsoni	Stimson's python	N	C		1/1	2003-01-17
Animalia	Reptilia	Boidae	Aspidites melanocephalus	black-headed python	N	C		17/0	2010-12-19
Animalia	Reptilia	Boidae	Morelia spilota	carpet python	N	C		6/1	2009-12-15
Animalia	Reptilia	Typhlopidae	Ramphotyphlops affinis		N	C		2/1	2004-11-26
Animalia	Reptilia	Typhlopidae	Ramphotyphlops ligatus		N	C		7/0	2006-11-21
Animalia	Reptilia	Typhlopidae	Ramphotyphlops proximus		N	C		1/0	1997-01-07
Animalia	Reptilia	Typhlopidae	Ramphotyphlops sp.		N			1/0	2004-04-03
Animalia	Reptilia	Typhlopidae	Ramphotyphlops unguirostris		N	C		1/0	2004-12-03
Animalia	Reptilia	Scincidae	Anomalopus brevicollis		N	C		8/2	2010-03-17
Animalia	Reptilia	Scincidae	Bellatorias frerei	major skink	N	C		1/0	2010-05-05
Animalia	Reptilia	Scincidae	Carlia munda		N	C		15/0	2010-11-02
Animalia	Reptilia	Scincidae	Carlia pectoralis sensu lato		N	C		100/10	2012-04-12
Animalia	Reptilia	Scincidae	Carlia schmeltzii		N	C		12/2	2002-10-05
Animalia	Reptilia	Scincidae	Carlia sp.		N			10/0	2004-11-30
Animalia	Reptilia	Scincidae	Carlia vivax		N	C		6/0	2010-12-19
Animalia	Reptilia	Scincidae	Cryptoblepharus metallicus	metallic snake-eyed skink	N	C		2/2	2005-04-04
Animalia	Reptilia	Scincidae	Cryptoblepharus pannosus	ragged snake-eyed skink	N	C		104/5	2012-04-12
Animalia	Reptilia	Scincidae	Cryptoblepharus pulcher pulcher	elegant snake-eyed skink	N	C		1/0	2009-12-31
Animalia	Reptilia	Scincidae	Cryptoblepharus sp.		N			2/1	2001-10-18
Animalia	Reptilia	Scincidae	Cryptoblepharus virgatus	striped snake-eyed skink	N	C		1/0	2011-07-08
Animalia	Reptilia	Scincidae	Cryptoblepharus virgatus sensu lato		N	C		32/0	2010-11-02
Animalia	Reptilia	Scincidae	Ctenotus allotropis		N	C		1/0	1997-03-22
Animalia	Reptilia	Scincidae	Ctenotus ingrami		N	C		2/0	2004-12-01
Animalia	Reptilia	Scincidae	Ctenotus leonhardii		N	C		1/0	2010-11-02
Animalia	Reptilia	Scincidae	Ctenotus robustus		N	C		79/3	2012-04-12
Animalia	Reptilia	Scincidae	Ctenotus sp.		N			2/0	2002-10-03
Animalia	Reptilia	Scincidae	Ctenotus strauchii		N	C		14/1	2007-11-21
Animalia	Reptilia	Scincidae	Ctenotus taeniolatus	copper-tailed skink	N	C		48/2	2010-11-02
Animalia	Reptilia	Scincidae	Egernia rugosa	yakka skink	N	V	V	1/0	1996-12-31
Animalia	Reptilia	Scincidae	Egernia striolata	tree skink	N	C		10/4	2005-04-04
Animalia	Reptilia	Scincidae	Eremiascincus fasciolatus	narrow-banded sand swimmer	N	C		1/0	2004-04-23
Animalia	Reptilia	Scincidae	Eulamprus brachysoma		N	C		5/1	1997-09-30
Animalia	Reptilia	Scincidae	Eulamprus martini		N	C		4/0	2005-04-04
Animalia	Reptilia	Scincidae	Eulamprus quoyii	eastern water skink	N	C		1/0	1996-02-19
Animalia	Reptilia	Scincidae	Eulamprus sokosoma		N	C		1/0	1995-12-31
Animalia	Reptilia	Scincidae	Eulamprus sp.		N			2/0	2010-05-05
Animalia	Reptilia	Scincidae	Eulamprus tenuis		N	C		3/0	2005-04-04
Animalia	Reptilia	Scincidae	Glaphyromorphuspunctulatus		N	C		16/3	2010-11-02
Animalia	Reptilia	Scincidae	Lampropholis adonis		N	C		1/0	1998-12-01
Animalia	Reptilia	Scincidae	Lerista allanae	Allan's lerista	N	E	E	10/7	2010-03-17
Animalia	Reptilia	Scincidae	Lerista fragilis		N	C		83/5	2010-11-02
Animalia	Reptilia	Scincidae	Lerista punctatovittata		N	C		17/1	2004-11-26
Animalia	Reptilia	Scincidae	Lygisaurus foliorum		N	C		21/5	2011-07-08
Animalia	Reptilia	Scincidae	Menetia greyii		N	C		51/2	2009-12-31
Animalia	Reptilia	Scincidae	Menetia timlowi		N	C		17/3	2010-05-05

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Animalia	Reptilia	Scincidae	Morethia boulengeri		N	C		104/11	2010-11-02
Animalia	Reptilia	Scincidae	Morethia sp.		N			2/0	1995-12-31
Animalia	Reptilia	Scincidae	Morethia taeniopleura	fire-tailed skink	N	C		14/1	2009-12-31
Animalia	Reptilia	Scincidae	Tiliqua rugosa aspera	shingle-back (eastern subspecies)	N	C		3/1	1996-12-31
Animalia	Reptilia	Scincidae	Tiliqua scincoides	eastern blue-tongued lizard	N	C		13/1	2010-11-02
Animalia	Reptilia	Varanidae	Varanus gouldii	sand monitor	N	C		4/0	1996-12-31
Animalia	Reptilia	Varanidae	Varanus sp.	goanna	N			1/0	2004-04-03
Animalia	Reptilia	Varanidae	Varanus tristis	black-tailed monitor	N	C		18/1	2010-05-05
Animalia	Reptilia	Varanidae	Varanus varius	lace monitor	N	C		4/1	2005-04-04
Animalia	Reptilia	Agamidae	Amphibolurus burnsi		N	C		8/1	2010-03-19
Animalia	Reptilia	Agamidae	Amphibolurus gilberti	Gilbert's dragon	N	C		5/3	1999-02-18
Animalia	Reptilia	Agamidae	Chlamydosaurus kingii	frilled lizard	N	C		5/0	2005-04-04
Animalia	Reptilia	Agamidae	Diporiphora australis		N	C		36/8	2010-11-02
Animalia	Reptilia	Agamidae	Diporiphora nobbi	nobbi	N	C		6/2	2009-12-31
Animalia	Reptilia	Agamidae	Intellagama lesueurii	eastern water dragon	N	C		1/0	1998-12-01
Animalia	Reptilia	Agamidae	Pogona barbata	bearded dragon	N	C		45/3	2010-05-05
Animalia	Reptilia	Agamidae	Tympanocryptis lineata	lined earless dragon	N	C		5/4	2002-04-15
Animalia	Reptilia	Pygopodidae	Delma tincta		N	C		3/2	2001-12-03
Animalia	Reptilia	Pygopodidae	Lialis burtonis	Burton's legless lizard	N	C		27/4	2010-11-02
Animalia	Reptilia	Pygopodidae	Paradelma orientalis	brigalow scaly-foot	N	V	V	12/4	2010-11-02
Animalia	Reptilia	Pygopodidae	Pygopus lepidopodus	common scaly-foot	N	C		1/0	2000-01-31
Animalia	Reptilia	Pygopodidae	Pygopus schraderi	eastern hooded scaly-foot	N	C		3/0	2000-01-24
Animalia	Reptilia	Carphodactylidae	Nephrurus asper	spiny knob-tailed gecko	N	C		27/6	2012-04-12
Animalia	Reptilia	Diplodactylidae	Amolosia rhombifer	zig-zag gecko	N	C		2/0	1999-05-27
Animalia	Reptilia	Diplodactylidae	Diplodactylus conspicillatus	fat-tailed diplodactylus	N	C		24/2	2006-10-27
Animalia	Reptilia	Diplodactylidae	Diplodactylus vittatus	wood gecko	N	C		12/1	2010-11-02
Animalia	Reptilia	Diplodactylidae	Lucasium steindachneri	Steindachner's gecko	N	C		49/3	2010-05-05
Animalia	Reptilia	Diplodactylidae	Oedura monilis		N	C		73/14	2010-12-19
Animalia	Reptilia	Diplodactylidae	Oedura sp.		N			2/0	2005-04-04
Animalia	Reptilia	Diplodactylidae	Strophurus taenicauda	golden-tailed gecko	N	NT		1/0	1996-12-31
Animalia	Reptilia	Diplodactylidae	Strophurus williamsi	soft-spined gecko	N	C		38/5	2010-11-02
Animalia	Reptilia	Gekkonidae	Gehyra catenata		N	C		96/3	2010-11-02
Animalia	Reptilia	Gekkonidae	Gehyra dubia		N	C		68/18	2012-04-12
Animalia	Reptilia	Gekkonidae	Gehyra sp.		N			3/2	2004-04-01
Animalia	Reptilia	Gekkonidae	Gehyra variegata	tree dtella	N	C		5/3	2012-04-12
Animalia	Reptilia	Gekkonidae	Hemidactylus frenatus	house gecko	I			1/0	2010-03-19
Animalia	Reptilia	Gekkonidae	Heteronotia binoei	Bynoe's gecko	N	C		221/30	2012-04-12
Animalia	Reptilia	Chelidae	Chelodina expansa	broad-shelled river turtle	N	C		1/0	1995-12-14
Animalia	Reptilia	Chelidae	Chelodina longicollis	eastern snake-necked turtle	N	C		6/3	1996-12-31
Animalia	Reptilia	Chelidae	Elseya albagula	southern snapping turtle	N	C		2/0	1998-12-31
Animalia	Reptilia	Chelidae	Emydura macquarii krefftii	Krefft's river turtle	N	C		11/0	2010-02-26
Animalia	Reptilia	Chelidae	Emydura sp.		N			1/0	2010-05-05
Animalia	Reptilia	Chelidae	Rheodytes leukops	Fitzroy River turtle	N	V	V	5/0	2002-08-22
Animalia	Amphibia	Bufonidae	Rhinella marina	cane toad	I			165/0	2012-04-12
Animalia	Amphibia	Hylidae	Cyclorana alboguttata	greenstripe frog	N	C		24/1	2012-04-12
Animalia	Amphibia	Hylidae	Cyclorana brevipes	superb collared frog	N	C		20/11	2010-11-02
Animalia	Amphibia	Hylidae	Cyclorana cultripes	grassland collared frog	N	C		2/0	2009-03-18
Animalia	Amphibia	Hylidae	Cyclorana novaehollandiae	eastern snapping frog	N	C		49/14	2012-04-12
Animalia	Amphibia	Hylidae	Cyclorana platycephala	water holding frog	N	C		4/0	2010-11-02
Animalia	Amphibia	Hylidae	Cyclorana sp.		N			1/0	1979-12-31
Animalia	Amphibia	Hylidae	Cyclorana verrucosa	rough collared frog	N	NT		7/0	2010-11-02
Animalia	Amphibia	Hylidae	Litoria bicolor	northern sedgefrog	N	C		1/1	1967-12-02
Animalia	Amphibia	Hylidae	Litoria caerulea	common green treefrog	N	C		106/14	2012-04-12
Animalia	Amphibia	Hylidae	Litoria fallax	eastern sedgefrog	N	C		4/2	2007-11-21
Animalia	Amphibia	Hylidae	Litoria inermis	bumpy rocketfrog	N	C		30/10	2012-04-12
Animalia	Amphibia	Hylidae	Litoria latopalmata	broad palmed rocketfrog	N	C		29/1	2012-04-12
Animalia	Amphibia	Hylidae	Litoria nasuta	striped rocketfrog	N	C		3/0	2011-07-05
Animalia	Amphibia	Hylidae	Litoria rothii	northern laughing treefrog	N	C		10/3	2010-11-02

Kingdom	Class	Family	Scientific Name	Common Name	I	NCA	EPBC	No.	Last Seen
Animalia	Amphibia	Hylidae	Litoria rubella	ruddy treefrog	N	C		49/20	2012-04-12
Animalia	Amphibia	Hylidae	Litoria sp.		N			1/0	1986-12-31
Animalia	Amphibia	Hylidae	Litoria wilcoxii	eastern stony creek frog	N	C		2/0	1997-04-16
Animalia	Amphibia	Myobatrachidae	Crinia deserticola	chirping froglet	N	C		2/0	2004-12-01
Animalia	Amphibia	Myobatrachidae	Crinia parinsignifera	beeping froglet	N	C		1/0	2010-12-19
Animalia	Amphibia	Myobatrachidae	Uperoleia rugosa	chubby gungan	N	C		3/0	2010-11-02
Animalia	Amphibia	Myobatrachidae	Uperoleia trachyderma	orange shouldered gungan	N	C		1/0	2010-11-02
Animalia	Amphibia	Limnodynastidae	Limnodynastes peronii	striped marshfrog	N	C		4/0	2010-11-02
Animalia	Amphibia	Limnodynastidae	Limnodynastes salmini	salmon striped frog	N	C		13/3	2010-12-19
Animalia	Amphibia	Limnodynastidae	Limnodynastes tasmaniensis	spotted grassfrog	N	C		25/3	2012-04-12
Animalia	Amphibia	Limnodynastidae	Limnodynastes terraereginae	scarlet sided pobblebonk	N	C		10/1	2010-05-05
Animalia	Amphibia	Limnodynastidae	Platyplectrum ornatum	ornate burrowing frog	N	C		128/41	2012-04-12
Animalia	Osteichthyes	Eleotridae	Hypseleotris compressa	empire gudgeon	N			3/0	1995-12-31
Animalia	Osteichthyes	Eleotridae	Hypseleotris galii	firetail gudgeon	N			3/0	1979-05-31
Animalia	Osteichthyes	Eleotridae	Hypseleotris klunzingeri	western carp gudgeon	N			1/0	1995-12-31
Animalia	Osteichthyes	Eleotridae	Hypseleotris species 1	Midgley's carp gudgeon	N			5/0	1995-12-31
Animalia	Osteichthyes	Eleotridae	Mogurnda adspersa	southern purplespotted gudgeon	N			2/0	1995-12-31
Animalia	Osteichthyes	Eleotridae	Oxyeleotris lineolata	sleepy cod	N			4/0	1995-12-31
Animalia	Osteichthyes	Eleotridae	Philypnodon grandiceps	flathead gudgeon	N			2/0	1995-12-31
Animalia	Osteichthyes	Apogonidae	Glossamia aprion	mouth almighty	N			7/0	1995-12-31
Animalia	Osteichthyes	Terapontidae	Amniataba percoides	barred grunter	N			6/0	1995-12-31
Animalia	Osteichthyes	Terapontidae	Bidyanus bidyanus	silver perch	N			1/0	1990-12-31
Animalia	Osteichthyes	Terapontidae	Hephaestus fuliginosus	sooty grunter	N			1/0	1979-12-31
Animalia	Osteichthyes	Terapontidae	Leiopotherapon unicolor	spangled perch	N			5/0	1995-12-31
Animalia	Osteichthyes	Terapontidae	Scortum hillii	leathery grunter	N			5/0	1995-12-31
Animalia	Osteichthyes	Percichthyidae	Macquaria ambigua	golden perch	N			8/0	1995-12-31
Animalia	Osteichthyes	Ambassidae	Ambassis agassizii	Agassiz's glassfish	N			6/0	1995-12-31
Animalia	Osteichthyes	Hemiramphidae	Arrhamphus sclerolepis	snubnose garfish	N			2/0	1989-12-31
Animalia	Osteichthyes	Belonidae	Strongylura krefftii	freshwater longtom	N			5/0	1995-12-31
Animalia	Osteichthyes	Atherinidae	Craterocephalus stercusmuscarum	flyspecked hardyhead	N			9/0	1995-12-31
Animalia	Osteichthyes	Pseudomugilidae	Pseudomugil signifer	Pacific blue eye	N			3/0	1979-05-31
Animalia	Osteichthyes	Melanotaeniidae	Melanotaenia splendida splendida	eastern rainbowfish	N			8/0	1995-12-31
Animalia	Osteichthyes	Plotosidae	Neosilurus hyrtlii	Hyrtl's catfish	N			7/0	1995-12-31
Animalia	Osteichthyes	Plotosidae	Tandanus tandanus	freshwater catfish	N			8/0	2002-08-22
Animalia	Osteichthyes	Ariidae	Neoarius graeffei	blue catfish	N			6/0	1995-12-31
Animalia	Osteichthyes	Clupeidae	Nematalosa erebi	bony bream	N			9/0	1995-12-31
Animalia	Osteichthyes	Anguillidae	Anguilla reinhardtii	longfin eel	N			5/0	2002-08-22
Animalia	Osteichthyes	Osteoglossidae	Scleropages leichardti	southern saratoga	N			10/0	2002-08-22
Animalia	Insecta	Lycaenidae	Jalmenus eubulus	pale imperial hairstreak	N	V		2/0	1995-12-31
Animalia	Insecta	Lycaenidae	Lampides boeticus	long-tailed pea-blue	N			1/0	2010-03-18
Animalia	Insecta	Lycaenidae	Zizina labradus labradus	common grass-blue (Australian subspecies)	N			3/0	2010-03-18
Animalia	Insecta	Nymphalidae	Acraea andromacha andromacha	glasswing	N			2/0	2004-07-02
Animalia	Insecta	Nymphalidae	Danaus chrysippus petilia	lesser wanderer	N			7/0	2010-03-19
Animalia	Insecta	Nymphalidae	Euploea core corinna	common crow	N			11/0	2010-03-18
Animalia	Insecta	Nymphalidae	Hypolimnas bolina nerina	varied eggfly	N			4/0	2010-03-18
Animalia	Insecta	Nymphalidae	Junonia orithya albicincta	blue argus	N			6/0	2010-03-17
Animalia	Insecta	Nymphalidae	Junonia villida calybe	meadow argus	N			10/0	2010-03-18
Animalia	Insecta	Nymphalidae	Melanitis leda bankia	common evening-brown	N			2/0	2010-03-18
Animalia	Insecta	Nymphalidae	Tirumala hamata hamata	blue tiger	N			6/0	2010-03-19
Animalia	Insecta	Pieridae	Belenois java teutonia	caper white	N			18/0	2010-03-19
Animalia	Insecta	Pieridae	Catopsilia gorgophone gorgophone	yellow migrant	N			1/0	2010-03-16
Animalia	Insecta	Pieridae	Catopsilia pomona pomona	lemon migrant	N			7/0	2004-12-03

Kingdom	Class	Family	Scientific Name	Common Name	I	NCA	EPBC	No.	Last Seen
Animalia	Insecta	Pieridae	Catopsilia pyranthe crokera	white migrant	N			1/0	2010-03-16
Animalia	Insecta	Pieridae	Cepora perimale scyllara	caper gull (Australian subspecies)	N			2/0	2004-07-03
Animalia	Insecta	Pieridae	Delias argenthona argenthona	scarlet jezebel	N			1/0	2010-03-16
Animalia	Insecta	Pieridae	Elodina padusa	narrow-winged pearl-white	N			1/0	2010-03-16
Animalia	Insecta	Pieridae	Elodina parthia	striated pearl-white	N			1/0	2004-11-29
Animalia	Insecta	Pieridae	Eurema hecabe phoebus	large grass-yellow	N			1/0	2010-03-16
Animalia	Insecta	Pieridae	Eurema smilax	small grass-yellow	N			9/0	2010-03-19
Animalia	Insecta	Papilionidae	Cressida cressida cressida	greasy swallowtail	N			1/0	2004-05-27
Animalia	Insecta	Papilionidae	Graphium sarpedon choredon	blue triangle	N			1/0	2010-03-17
Animalia	Insecta	Papilionidae	Papilio aegeus aegeus	orchard swallowtail (Australian subspecies)	N			3/0	2010-03-18
Animalia	Insecta	Papilionidae	Papilio anactus	dingy swallowtail	N			2/0	2004-12-03
Animalia	Insecta	Papilionidae	Papilio demoleus sthenelus	chequered swallowtail	N			7/0	2010-03-18

Appendix B Flora Species List

Family	Species Name	Common Name	Conservation Status		Wetland Indicator Species	Opps	FT1	FT2	FT3	FT4	FT5	LVW	Wetland 1	Dam Opps
			NCWR / LP Act	EPBC Act										
Apocynaceae	*Alstonia constricta*	Bitterbark	LC	NL					X		X			
Aponyanceae	*Parsonsia sp.*		U	NL							X			
Asteraceae	*Aster subulatus*	Wild Aster	I	NL							X		X	
Apocynaceae	*Carissa ovata*	Currant Bush	LC	NL			X				X			
Asteraceae	*Bidens bipinnata*	Bipinnate Beggar's Ticks	I	NL							x			
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	I	NL				X						
Asteraceae	*Conyza bonariensis*	Flaxleaf fleabane	I	NL							X		X	
Asteraceae	*Eclipta prostrata*	White Eclipta	LC	NL	X						X	X	X	
Asteraceae	*Emilia sonchifolia*	Emilia	I	NL							X			
Asteraceae	*Parthenium hysterophorus*	Parthenium Weed	I/C2	NL				X						
Asteraceae	*Peripleura hispidula*	Fuzzweed	LC	NL							X			
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	I	NL							x			
Asteraceae	*Xanthium occidentale*	Noogoora Burr	I	NL		X								
Boraginaceae	*Ehretia membranifolia*	Weeping Koda	LC	NL							X			
Cactaceae	*Opuntia stricta*	Prickly Pear	I/C2	NL							X			
Casuarinaceae	*Casuarina cunninghamiana*	River She-oak	LC	NL	X		X		X	X				
Caesalpiniaceae	*Cassia brewsteri*	Leichardt Bean	LC	NL				X		X	X	X		
Caesalpiniaceae	*Lysiphyllum hookeri*	White Bauhinia	LC	NL			X	X	X	X	X			
Capparaceae	*Capparis lasiantha*	Wait-a-while	LC	NL				X						
Celastraceae	*Denhamia oleaster*	Stiff Denhamia	LC	NL							X			
Chenopodiaceae	*Enchylaena tomentosa*	Ruby Saltbush	LC	NL	X									
Convolvulaceae	*Ipomoea lonchophylla*	Common Cow-vine	LC	NL			X				X			
Cucurbitaceae	*Cucumis myriocarpus subsp. myriocarpus*	Prickly Pademelon	I	NL			X							
Cyperaceae	*Cyperus difformis*	Dirty Dora	LC	NL	X							X		
Cyperaceae	*Cyperus distans*	Slender Cyperus	LC	NL								X		
Cyperaceae	*Cyperus exaltatus*	Tall Flatsedge	LC	NL	X							X	X	
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	LC	NL							X			
Cyperaceae	*Cyperus victoriensis*	Flat Sedge	LC	NL									X	
Cyperaceae	*Eleocharis atropurpurea*	Purple Spike Rush	LC	NL								X		

Family	Species Name	Common Name	Conservation Status		Wetland Indicator Species	Opps	FT1	FT2	FT3	FT4	FT5	LVW	Wetland 1	Dam Opps
			NCWR / LP Act	EPBC Act										
Cyperaceae	*Eleocharis pallens*	Pale Spike Rush	LC	NL									X	
Cyperaceae	*Eleocharis sphacelata*	Tall Spike Rush	LC	NL	X								X	
Cyperaceae	*Schoenoplectus dissachanthus*	Blunt Club-sedge	LC	NL								X		
Cyperaceae	*Schoenoplectus lateriflorus*		LC	NL								X		
Ebenaceae	*Diospyros humilis*	Small-leaved Ebony	LC	NL				X			X			
Euphorbiaceae	*Bridelia leichhardtii*	Small-leaved Scrub Ironbark	LC	NL							X			
Euphorbiaceae	*Euphorbia hirta*	Asthma Plant	I	NL							X			
Euphorbiaceae	*Euphorbia drummondii*	Caustic Weed	LC	NL									X	
Euphorbiaceae	*Ricinus communis*	Castor Oil Bush	I	NL					X					
Fabaceae	*Macroptilium lathyroides*	Phasey Bean	I	NL							X			
Fabaceae	*Rhynchosia minima*	Rhynco	LC	NL			X				X			
Fabaceae	*Sesbania cannabina*	Sesbania Pea	LC	NL	X						X			
Hydrocharitaceae	*Ottelia ovalifolia*	Swamp Lily	LC	NL	X							X	X	
Hydrocharitaceae	*Vallisneria sp.*	Eelgrass	U	NL										x
Juncaceae	*Juncus aridicola*	Tussock Rush	LC	NL	X									x
Juncaceae	*Juncus polyanthemus*		LC	NL								X		
Lamiaceae	*Basilicum polystachyon*	Musk Basil	LC	NL								X	X	
Laxmanniaceae	*Lomandra longifolia*	Spiny-headed Mat-rush	LC	NL						X				
Luzuriagazeae	*Eustrephus latifolius*	Wombat Berry	LC	NL							X			
Lythraceae	*Ammannia multiflora*	Jerry Jerry	LC	NL								X		
Malvaceae	*Hibiscus meraukensis*	Merauke Hibiscus	LC	NL							X			
Malvaceae	*Sida hackettiana subsp. hackettiana*		LC	NL				X			X			
Malvaceae	*Sida cordifolia*	Flannel Weed	I	NL				X			X			
Malvaceae	*Sida spinosa*	Spiny Sida	I	NL							X			
Menyanthaceae	*Nymphoides indica*	Water Snowflake	LC	NL	X							X		X
Menyanthaceae	*Nymphoides crenata*	Wavy Marshwort	LC	NL	X								X	
Mimosaceae	*Acacia salicina*	Doolan	LC	NL				X			X			
Mimosaceae	*Albizia canescens*	Sleeping Tree	LC	NL					X					

Family	Species Name	Common Name	Conservation Status		Wetland Indicator Species	Opps	FT1	FT2	FT3	FT4	FT5	LVW	Wetland 1	Dam Opps
			NCWR / LP Act	EPBC Act										
Mimosaceae	*Vachellia farnesiana*	Mimosa Bush	I	NL							X			
Moraceae	*Ficus opposita*	Sandpaper Fig	LC	NL			X	X	X	X	X			
Myrtaceae	*Corymbia tessellaris*	Moreton Bay Ash	LC	NL			X	X	X	X	X		X	
Myrtaceae	*Eucalyptus camaldulensis*	River Red Gum	LC	NL	X		X	X	X	X	X	X	X	
Myrtaceae	*Eucalyptus coolabah*	Coolabah	LC	NL	X				X		X			
Myrtaceae	*Eucalyptus populnea*	Poplar Box	LC	NL								X		
Myrtaceae	*Melaleuca bracteata*	Black Tea Tree	LC	NL	X						X			
Oleaceae	*Jasminum didymum*	Jasmine	LC	NL							X			
Onagraceae	*Ludwigia peploides*	Water Primrose	LC	NL	X							X	X	X
Onagraceae	*Ludwigia octovalvis*	Willow Primrose	LC	NL								X	X	X
Orchidaceae	*Cymbidium canaliculatum*	Black Tree Orchid	LC	NL							X			
Papaveraceae	*Argemone ochroleuca* subsp. *ochroleuca*	Mexican Poppy	I	NL								X		
Passifloraceae	*Passiflora foetida*	Stinking Passionfruit	I	NL							X		X	
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush	LC	NL							X			
Poaceae	*Aristida holathera*	Erect Kerosene Grass	LC	NL		X					X			
Poaceae	*Bothriochloa bladhii*	Australian Bluestem	LC	NL							X		X	
Poaceae	*Bothriochloa ewartiana*	Desert bluegrass	LC	NL			X							
Poaceae	*Cenchrus ciliaris*	Buffel Grass	I	NL			X				X			
Poaceae	*Cynodon dactylon*	Couch	I	NL	X							X	X	
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass	LC	NL							X			
Poaceae	*Enteropogon ramosus*	Curly Windmill Grass	LC	NL							X			
Poaceae	*Eragrostis elongata*	Clustered Lovegrass	LC	NL								X		
Poaceae	*Eragrostis lacunaria*	Purple Lovegrass	LC	NL									X	
Poaceae	*Heteropogon contortus*	Black Spear Grass	LC	NL							X			
Poaceae	*Leptochloa digitata*	Umbrella Cane Grass	LC	NL	X								X	
Poaceae	*Megathyrsus maximus* var. *maximus*	Giant Panic Grass	LC	NL			X	X	X	X	X			
Poaceae	*Pseudoraphis spinescens*	Mud Grass	LC	NL	X							X		
Poaceae	*Sorghum halepense*	Johnson Grass	I	NL			X		X		X			

Family	Species Name	Common Name	Conservation Status		Wetland Indicator Species	Opps	FT1	FT2	FT3	FT4	FT5	LVW	Wetland 1	Dam Opps
			NCWR / LP Act	EPBC Act										
Poaceae	*Themeda triandra*	Kangaroo Grass	LC	NL							X			
Poaceae	*Urochloa mosambicensis*	Sabi Grass	I	NL							X			
Polygonaceae	*Persicaria attenuata*	Smartweed	LC	NL								X	X	X
Pontederiaceae	*Monochoria cyanea*	Monochoria	LC	NL	X								X	
Portulacaceae	*Portulaca oleracea*	Pig Weed	I	NL								X		
Rutaceae	*Citrus glauca*	Limebush	LC	NL								X		
Rutaceae	*Geijera salicifolia*	Bush Wilga	LC	NL							X			
Sapindaceae	*Alectryon diversifolius*	Scrub Boonaree	LC	NL							X	X		
Sapindaceae	*Alectryon oleifolius* subsp. *elongatus*	Western Rosewood	LC	NL							X			
Scrophulariaceae	*Gratiola pedunculata*	Stalked Brooklime	LC	NL								X		
Scrophulariaceae	*Scoparia dulcis*	Scoparia	LC	NL			X							
Solanaceae	*Physalis lanceifolia*	Gooseberry	I	NL								X		
Solanaceae	*Solanum nigrum*	Blackberry Nightshade	I	NL							X			
Sparrmanniaceae	*Grewia retusifolia*	Dogs Balls	LC	NL							X			
Verbenaceae	*Lantana camara*	Lantana	I/C3	NL						X				
Vitaceae	*Clematicissus opaca*	Pepper Vine	LC	NL							X			
Zygophyllaceae	*Tribulus terrestris*	Caltrop	LC	NL								X		

Key:

NL	-	species is not Listed under the EPBC Act
LC	-	species is listed as Least Concern under the NCWR
I	-	denotes an introduced species
U	-	the origin and conservation status is unknown as the plant has not been identified to species level
C2	-	denotes a Class 2 Pest species as declared under the LP Act.

Appendix C Fauna Species List

Class	Scientific Name	Common Name	EPBC Act	NCWR	Opps	AQ1	MP4	Dam	LVW	Wetland 1
Reptiles	*Chelodina longicollis*	Eastern Snake-neck Turtle	NL	LC				X		
	Tropidonophis mairii	Keelback	NL	LC	X					
Birds	*Acrocephalus australis*	Australian Reed-Warbler	NL	LC	X			X		
	Anas gracilis	Grey Teal	NL	LC	X			X	X	X
	Anas rhynchotis	Australasian Shoveler	NL	LC	X				X	
	Anas superciliosa	Pacific Black Duck	NL	LC	X			X	X	X
	Anhinga novaehollandiae	Australasian Darter	NL	LC	X					
	Ardea ibis	Cattle Egret	Mi, Ma	LC	X					
	Ardea intermedia	Intermediate Egret	Ma	LC	X			X	X	
	Ardea modesta	Eastern Great Egret	Mi, Ma	LC	X		X	X	X	
	Ardea pacifica	White-necked Heron	NL	LC	X			X	X	X
	Aythya australis	Hardhead	NL	LC	X			X	X	
	Centropus phasianinus	Pheasant Coucal	NL	LC	X		X			
	Chenonetta jubata	Australian Wood Duck	NL	LC	X			X	X	
	Circus approximans	Swamp Harrier	Ma	LC	X			X	X	
	Cygnus atratus	Black Swan	NL	LC	X			X	X	
	Dendrocygna arcuata	Wandering Whistling-duck	Ma	LC	X			X		
	Dendrocygna eytoni	Plumed Whistling Duck	NL	LC	X			X		
	Egretta garzetta	Little Egret	Ma	LC	X				X	
	Egretta novaehollandiae	White-faced Heron	NL	LC	X			X	X	
	Elseyornis melanops	Black-fronted Dotterel	NL	LC	X					
	Ephippiorhynchus asiaticus	Black-necked Stork	NL	NT	X				X	
	Erythrogonys cinctus	Red-kneed Dotterel	NL	LC	X			X	X	
	Fulica atra	Eurasian Coot	NL	LC	X			X	X	
	Gallinula tenebrosa	Dusky Moorhen	NL	LC	X			X	X	
	Gallinula ventralis	Black-tailed Native Hen	NL	LC	X				X	
	Grus rubicunda	Brolga	NL	LC	X		X		X	
	Haliaeetus leucogaster	White-bellied Sea-Eagle	Mi, Ma	LC	X				X	
	Himantopus himantopus	Black-winged Stilt	Ma	LC	X				X	
	Hydroprogne caspia	Caspian Tern	Ma	LC	X			X		
	Irediparra gallinacea	Comb-crested Jacana	NL	LC	X			X	X	

Class	Scientific Name	Common Name	EPBC Act	NCWR	Opps	AQ1	MP4	Dam	LVW	Wetland 1
	Malacorhynchus membranaceus	Pink-eared Duck	NL	LC	X			X	X	
	Microcarbo melanoleucos	Little Pied Cormorant	NL	LC	X			X	X	X
	Nettapus coromandelianus	Cotton Pygmy-Goose	NL	NT	X				X	
	Nettapus pulchellus	Green Pygmy-Goose	Ma	LC	X			X		
	Pelecanus conspicillatus	Australian Pelican	Ma	LC	X				X	
	Phalacrocorax carbo	Great Cormorant	NL	LC	X			X	X	
	Phalacrocorax sulcirostris	Little Black Cormorant	NL	LC	X				X	
	Phalacrocorax varius	Pied Cormorant	NL	LC	X				X	
	Platalea flavipes	Yellow-billed Spoonbill	NL	LC	X				X	
	Platalea regia	Royal Spoonbill	NL	LC	X				X	
	Podiceps cristatus	Great Crested Grebe	NL	LC	X			X	X	
	Porphyrio porphyrio	Purple Swamphen	NL	LC	X			X		
	Porzana pusilla	Baillon's Crake	Ma	LC	X			X		
	Strictonetta naevosa	Freckled Duck	NL	NT	X			X	X	
	Tachybaptus novaehollandiae	Australasian Grebe	NL	LC	X			X	X	
	Threskiornis molucca	Australian White Ibis	Ma	LC	X			X		
	Threskiornis spinicollis	Straw-necked Ibis	Ma	LC	X			X	X	X
	Vanellus miles	Masked Lapwing	NL	LC	X			x	x	
	Limnodynastes salmini	Salmon-striped Frog	NL	LC	X		X		X	
	Limnodynastes tasmaniensis	Spotted Marsh Frog	NL	LC	X		X		X	X
Amphibians	*Litoria rubella*	Desert Treefrog	NL	LC			X			
	Rhinella marina	Cane Toad	I	I	X		X		X	
	Litoria inermis	Bumpy Rocketfrog	NL	LC					X	
Mammals	*Hydromys chrysogaster*	Water Rat	NL	LC	X		X		X	
	Mogurnda adspersa	Southern Purple-spotted Gudgeon	NL	LC				X	X	
	Craterocephalus stercusmuscarum	Flyspecked hardyhead	NL	LC				X		
Fish	*Hypseleotris species 1*	Midgley's carp gudgeon	NL	LC				X	X	
	Ambassis agassizii	Agassiz's Glassfish	NL	LC				X	X	
	Leiopotherapon unicolor	Spangled Perch	NL	LC					X	
Crustacean	*Paratya australiensis*	Freshwater shrimp	NL	LC				X		

Key:
I - denotes an introduced species

NL	-	species is not Listed under the EPBC Act
Ma	-	species is listed under the EPBC Act as a marine species
Mi	-	species is listed under the EPBC Act as a migratory species
LC	-	species is listed as Least Concern under the NCWR
NT	-	species is listed as Near Threatened under the NCWR

Appendix D Pest Species Fact Sheet

Fact sheet

PEST ANIMAL

Cane toads

Bufo marinus

The cane toad is not a declared pest in Queensland, so there is no legal requirement to control them.

Their original introduction in 1935 was to control agricultural pests, but they proved ineffective.

For the past 60 years, cane toads have been expanding their territory in Australia, and are capable of colonising at least four of the mainland Australian states.

As the toad's geographical range continues to expand, concern has increased about their detrimental environmental effects, particularly on the wetlands of the Northern Territory.

Studies into the feasibility of biological control have commenced.

History of introduction and spread

The cane toad or giant toad is an amphibian, native to Central and South America. Cane toads been introduced throughout the world as a biological control for insect pests of agriculture, most notably sugarcane.

A consignment of cane toads from Hawaii was released into Queensland cane fields in 1935. The introduction was surrounded by controversy as to the potential costs and benefits to Australia.

It was hoped that the toad would control Frenchi and greyback beetles—pests of economic importance to the sugarcane industry.

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Queensland Government

By 1941, however, it had become evident that the cane toad was exerting only limited control over its intended prey. There were two main reasons for this:

- Greyback beetles are only rarely in contact with the ground and Frenchi beetles invade cane fields at a time when the toads are absent due to a lack of protective cover.
- The cane toad has a wide-ranging and indiscriminate diet, and it was not solely dependant upon its intended prey.

The unlimited food source, suitable environment and low rates of predation allowed dynamic reproduction and spread. Toads were recorded in Brisbane only 10 years after release. The toad continues to thrive and has now invaded the Northern Territory and New South Wales (see Figure 1).

Figure 1 Current distribution of the cane toad

The cane toad's advance is only limited by environmental factors, such as the availability of water for breeding, tolerable temperatures, suitable shelter and an abundance of food.

Toads at the frontier of their range of expansion may be larger than those in established populations. This is most probably due to greater food supply, combined with a lower incidence of disease.

Description and general information

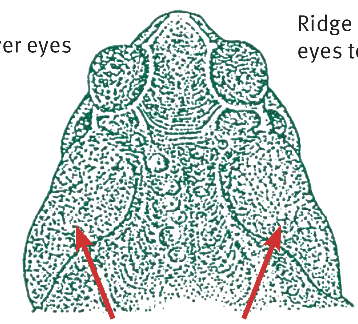
In comparison with native frog and toad species, adult cane toads have a distinctive head and face, and are large and heavily built creatures (adults may grow to 20 cm).

Following their aquatic larval stages (eggs and tadpoles), cane toads are generally encountered at night near any source of light. Cane toads are ground-dwelling—they are poor climbers and unable to jump very high.

A definite visor or awning extends over each eye and a high angular bony ridge extends from the eyes to the nose.

The parotid glands (see Figure 2) are perhaps the most characteristic feature of the adult cane toad. These glands are large, protuberant, and are situated on the head behind each ear. These glands carry a toxin.

Figure 2 Distinguishing features of the cane toad



The cane toad's hands and feet are relatively small and lack discs at the tips of the digits. Webbing is absent between the fingers but is distinct and leathery between the toes.

Colouring on the dorsal (upper) surface may be brown, olive-brown or reddish-brown. The ventral (under) surface varies from white to yellow and is usually mottled with brown.

Warts are present on all cane toads; however, males possess more than females. Warts are dark brown at the caps.

Mating

Mating can occur at any time of the year and depends only on available food and permanent water. The mating call is a continuous purring trill that sounds like a running motor.

In situations where females are scarce or absent, male cane toads may have the ability to undergo a sex change to become fertile females; however, this has not been proved.

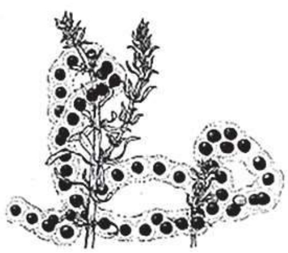
Eggs

Both cane toads and native frogs spawn in slow-moving or still water, but their eggs can be easily distinguished.

Cane toad eggs are laid in long, gelatinous 'strings' with the developing tadpoles appearing as a row of small black dots along the length. The strings are unique to cane toads, with native frogs eggs laid in clusters, generally appearing as blobs of jelly attached to water plants or debris. Native frogs generally produce egg clusters as mounds of foam floating on the water surface.

Compared with native species, cane toad egg production is dynamic and a single clutch can contain up to 35 000 eggs. Remove any cane toad eggs found in the water and allow to dry out.

Figure 3 Drawing of toad spawn from *Wildlife of greater Brisbane*



Tadpoles

The cane toad is the only species in Australia that has a pure black tadpole. Native frogs have lighter-coloured undersides with a great range of colours and markings—cane toad tadpoles may turn paler colours to almost transparent at night.

Cane toad tadpoles are small and usually congregate in vast, slow-moving shoals. This 'shoaling' behaviour is uncharacteristic of most native species.

Unlike cane toad tadpoles, native species develop lungs at an early stage and periodically rise to the surface in order to exchange their lung gasses. Large groupings of tadpoles that do not break the water surface for air indicate cane toads.

Young toads

Following emergence from the water, the young toadlets usually congregate around the moist perimeter of the water body for about a week before they eventually disperse.

Young toads are very difficult to distinguish from the native *Uperoleiea* species, which also have parotid glands, but all *Uperolelea* species have bright red patches in the groin area.

Under ideal conditions toadlets may reach adult size within a year.

Toxicity

Bufo marinus produce venom in glands occurring in most of the skin on their upper surface. The venom is concentrated in the parotid glands as a creamy-white solution, which is released when the animal experiences extreme provocation or direct localised pressure (e.g. grasped by the mouth of a predator).

The parotid solution is highly toxic and when ingested it produces drastic acceleration of the heartbeat, shortness of breath, salivation and prostration. It is extremely painful if accidentally rubbed into the eye.

Ingestion of toads by domestic and most native animals can result in death. In some recorded cases, death has occurred within 15 minutes.

Field observations suggest that some predatory Australian species have learned how to feed safely on cane toads.

Birds have been observed flipping toads over to avoid the parotid glands. Predatory reptiles may have more trouble adapting, being unable to remove a toad from the mouth once they start feeding.

Effects on wildlife

The cane toad is poisonous at all stages of its life cycle and most native frog larvae and many aquatic invertebrates are dramatically affected by their presence.

Cane toads are voracious feeders that consume a wide variety of insects, frogs, small reptiles, mammals and even birds. Perhaps the only limiting factor to the prey taken is the width of the cane toad's mouth.

It has been suggested that cane toad competition for food and breeding grounds has been responsible for reducing the populations of some native frogs. However, many native frogs are arboreal (tree-dwelling) and occupy different niches. Cane toads don't have the native frogs' ability to 'shut down' during dry seasons when resources are limited.

Pressure from cane toads may displace native animals (frogs and other species) where they already suffer due to manipulation of their habitat by humans and grazing animals. Animals that use waterholes as retreat sites during the dry season are especially vulnerable—toads will congregate here in large numbers.

Public health

Cane toads readily eat animal and human faecal material and, in areas of poor hygiene, they have been known to transmit disease such as salmonella.

Control

Control of cane toads is not enforced as there is currently no available effective broad scale control. Individuals and community groups have carried out removal campaigns to decrease numbers and slow the invasion front.

Fencing is recommended to keep toads out of ponds intended for native fish and frogs; a height of 50 cm is sufficient. Bird wire with 1 cm holes may keep toads out of an area.

Research indicates that spread can be delayed in semi-arid areas by blocking access to water holes.

Individual toads may be killed relatively humanely using a commercial spray available from hardware stores or may be stunned and decapitated (only by experienced operators). The removal of eggs from small water bodies such as frog ponds can be effective

Researchers have successfully mitigated impacts in recently colonised areas by 'training' predators however, large scale application of this technique is difficult.

Injured or 'lost' frogs

Brisbane Forest Park	07 3300 4855
Wildlife Preservation Society of Queensland	07 3221 0194
Queensland Museum	07 3840 7555

WILVO's Wildlife Volunteer's Organistaion (check your local phone directory to see if a group operates in your area).

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland (call 13 25 23 or visit our website at www.biosecurity.qld.gov.au).

This fact sheet is developed with funding support from the Land Protection Fund.

Fact sheets are available from Department of Agriculture, Fisheries and Forestry (DAFF) service centres and our Customer Service Centre (telephone 13 25 23). Check our website at www.biosecurity.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this fact sheet should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, DAFF does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

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Appendix E Macro-invertebrate Sampling Results

Project	Jellinbah – Lake Vermont	
Date Collected		**15/5/2013 MP3**
Platyhelminthes		
Annelida	Oligochaeta	
Hirudinea	Glossiphoniidae	
Hirudinea	Richardsonianidae	
Cnidaria	Hydridae	
Gastropoda	Lymnaeidae	
	Planorbidae	
	Viviparidae	
	Ancylidae	
Bivalvia	Hyriidae	
Crustacea	Isopoda	
Cladocera	Cladocera	
Copepoda	Copepoda	1
Isopoda	Isopoda	
Ostracoda	Ostracoda	
Amphipoda		
Conchostraca	Conchostraca	
Decapoda	Atyidae	1
	Palaemonidae	1
	Parastacidae	
	Sundathelphusidae	
Acarina	Hydracarina	2
Coleoptera	Dytiscidae	18
	Hydrophilidae	
	Hydrochidae	
	Gyrinidae	
	Noteridae	
	Scirtidae	
	Elmidae	
	Hydraenidae	
	Haliplidae	
	Chrysomeliidae	
	Staphylinidae	
	Spercheidae	
Collembola	Collembola	
Diptera		
Chironomidae	Chironominae	
	Tanypodiinae	1
	Orthocladiinae	
	Ceratopogonidae	1
	Simuliidae	
	Tabanidae	
	Stratiomyidae	1
	Chaoboridae	
	Culicidae	
Ephemeroptera	Baetidae	16
	Caenidae	39
	Leptophlebiidae	

Project	Jellinbah – Lake Vermont	
Date Collected		15/5/2013 MP3
Hemiptera		
	Corixidae	3
	Gerridae	
	Mesoveliidae	
	Nepidae	
	Notonectidae	20
	Pleidae	1
	Veliidae	
	Naucoridae	
	Hydrometridae	
	Belastomatidae	
Odonata	Gomphidae	2
	Lindeniidae	
	Libellulidae	1
	Urothemistidae	
	Hemicorduliidae	
	Undiff HUL	
	Aeshnidae	
Zygoptera	Protoneuridae	
	Coenagrionidae	
	Isostictidae	
	Undiff.	
Trichoptera	Leptoceridae	3
	Ecnomidae	1
	Hydroptilidae	
	Hydropsychidae	
Lepidoptera	Pyralidae	

Appendix F AUSRIVAS Habitat Assessment Proforma

No.	Reference Condition Selection Criteria	Level of impact *
1	Influence of intensive agriculture upstream.* Intensive agriculture is that which involves irrigation, widespread soil disturbance, use of agrochemicals and pine plantations. Dry-land grazing does not fall into this category.	
2	Influence of major extractive industry (current or historical) upstream.* This includes mines, quarries and sand/gravel extraction.	
3	Influence of major urban area upstream. This will be relative to population size, river size and distance between the site and the impact.	
4	Influence of significant point-source waste water discharge upstream.* Exceptions can be made for small discharges into large rivers.	
5	Influence of dam or major weir* Sites within the ponded area of impoundments also fail. Sites failing this criterion automatically fail the overall assessment.	
6	Influence of alteration to seasonal flow regime This may be due to abstraction or regulation further upstream than the coverage by Criterion 5. Includes either an increase or decrease in seasonal flow.	
7	Influence of alteration to riparian zone Riparian vegetation should be intact and dominated by native species.	
8	Influence of erosion and damage by stock on riparian zone and banks. Stock damage to the stream bed may be included in this category.	
9	Influence of major geomorphological change on stream channel Geomorphological change includes bank slumping, shallowing, braiding and unnatural aggradation or degradation.	
10	Influence of alteration to instream conditions and habitats This may be due to excessive algal and macrophyte growth, by sedimentation and siltation, by reduction in habitat diversity by drowning or drying out of habitats (e.g. riffles) or by direct access of stock into the river	
	SITE ASSESSMENT	/50

* Note: the level of impact at a site will generally decrease as the distance from the source of impact increases.

Each criterion relates to an aspect of human activity that impacts on freshwater ecosystems, where impact is defined as a 'change from natural condition'. Each criterion is given a score according to the following categories:

1. Very major impact
2. Major impact
3. Moderate impact
4. Minor impact
5. Indiscernible impact

Sites are assessed using the total score for the ten criteria. Those sites that have a total greater than 44 are deemed to be reference sites. Sites that are given a score of '1', '2' or '3' for Criterion 5 (no dam or major weir upstream) cannot be reference sites.

River Bioassessment Program

MACROINVERTEBRATE SAMPLING FIELD SHEET

NATURAL RESOURCES
Queensland Government

SITE NUMBER: [| | | | | |] **SITE NAME:** ____________

Project Name: ____________ **Date:** __/__/__ **Time (24 hrs):** [| | |] **GPS:** ____________

EDGE/BACKWATER: Y [ ] N [ ] Collected by: [| |] Picked By: [| |] No. vials: [ ]

Velocity (m/sec): max [|•| |] min [|•| |]

Mean Depth: [|•| |] m

Mean Channel Width: [| | |•|] m

Method: 10 m sweep [ ]
60 min random pick [ ]
Other ____________ [ ]

Canopy Cover: [| |]%

Width of Riparian Zone: LB[| |]m RB[| |]m

Composition of Riparian Zone:

Native [| |] % Exotic [| |]%

***Riparian Vegetation:**

Grass [| |]% Trees <10 m high[| |]%
Shrubs [| |]% Trees >10 m high[| |]%

Substrate Description:

Bedrock [| |]% Gravel (4 - 16 mm) [| |]%
Boulder (> 256 mm) [| |]% Sand (1 - 4 mm) [| |]%
Cobble (64 - 256 mm) [| |]% Silt/Clay (< 1mm) [| |]%
Pebble (16 - 64 mm) [| |]%

Substrate Cover:

Periphyton	0	1	2	3	4
Moss	0	1	2	3	4
Filamentous algae	0	1	2	3	4
Macrophytes	0	1	2	3	4
Detritus	0	1	2	3	4

0 = <10% 1 = 10-35% 2 = 35-65% 3 = 65-90% 4 = >90%

Bank Overhang Vegetation:
extensive [ ] moderate [ ] slight [ ] nil [ ]

Trailing Bank Vegetation:
extensive [ ] moderate [ ] slight [ ] nil [ ]

BED: Y [ ] N [ ] Collected by: [| |] Picked By: [| |] No. vials: [ ]
TYPE: Riffle [ ] Rocky/Gravel Bed [ ] Sandy/Silty [ ]

Velocity (m/sec): max [|•| |] min [|•| |]

Mean Depth: [|•| |] m

Mean Channel Width: [| | |•|] m

Method: 10 m kick only [ ]
10 m kick & gleaning rocks of different sizes (5) [ ]
60 min random pick [ ]
Other ____________ [ ]

Canopy Cover: [| |]%

Width of Riparian Zone: LB[| |]m RB[| |]m

Composition of Riparian Zone:

Native [| |] % Exotic [| |]%

***Riparian Vegetation:**

Grass [| |]% Trees <10 m high[| |]%
Shrubs [| |]% Trees >10 m high[| |]%

Substrate Description:

Bedrock [| |]% Gravel (4 - 16 mm) [| |]%
Boulder (> 256 mm) [| |]% Sand (1 - 4 mm) [| |]%
Cobble (64 - 256 mm) [| |]% Silt/Clay (< 1mm) [| |]%
Pebble (16 - 64 mm) [| |]%

Substrate Cover:

Periphyton	0	1	2	3	4
Moss	0	1	2	3	4
Filamentous algae	0	1	2	3	4
Macrophytes	0	1	2	3	4
Detritus	0	1	2	3	4

0 = <10% 1 = 10-35% 2 = 35-65% 3 = 65-90% 4 = >90%

Bank Overhang Vegetation:
extensive [ ] moderate [ ] slight [ ] nil [ ]

Trailing Bank Vegetation:
extensive [ ] moderate [ ] slight [ ] nil [ ]

* Can add to > 100%

Adjacent Landuse:

Upstream Landuse:

****Percent of habitat types in 100 m reach:**

Riffle [| |]% Run [| |]% Macrophytes [| |]%
Pool (rocky) [| |]% Pool (sandy) [| |]% Dry [| |]% Edge [| |]%

** Riffle + Run + Pool + Macrophyte + Dry = 100%; Edge is % of habitat available to sample from L and R banks

TOTAL NO. VIALS: **OTHERS:**

DU502676RSC.P65 (LM3883) 20/8/98

1. LONGITUDINAL PROFILE SKETCH OF STREAM REACH

Scale: ____________________

Please indicate
1. Biological sampling sites for each habitat type and % of reach.
2. Water quality measurement and water sample collection sites.
3. Location from where photograph(s) taken.
4. Location of cross-sectional profile sketch.

2. CROSS-SECTIONAL PROFILE SKETCH OF STREAM REACH

Scale: ____________________

Please indicate
1. Approx. bank height/bank width (overflow), stream width and depth.
2. Approx. riparian vegetation height.

3. COMMENTS

(Office use only) **Entered into Hydsys on** ___/___/___ **By** ____________________

Checked on ___/___/___ **By** ____________________

River Bioassessment Program

HABITAT ASSESSMENT FIELD SHEET

NATURAL RESOURCES Queensland Government

SITE NUMBER: [| | | | | |] **SITE NAME:**________________________________

Date: ____/____/____ **Time (24 hrs): [| | |]** **GPS:**________________ **Project Name:**________________

Habitat Variable	CATEGORY			
	Excellent	**Good**	**Fair**	**Poor**
1. Bottom substrate/available cover	Greater than 50% rubble, gravel, submerged logs, undercut banks or other stable habitat. 20, 19, 18, 17, 16	30-50% rubble, gravel or other stable habitat. Adequate habitat. 15, 14, 13, 12, 11	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. 10, 9, 8, 7, 6	Less than 10% rubble, gravel or stable habitat. Lack of habitat is obvious. 5, 4, 3, 2, 1, 0
2. Embeddedness	Gravel, cobble and boulder particles are between 0 & 25% surrounded by fine sediment. 20, 19, 18, 17, 16	Gravel, cobble and boulder particles are between 25% & 50% surrounded by fine sediment. 15, 14, 13, 12, 11	Gravel, cobble and boulder particles are between 50 & 75% surrounded by fine sediment. 10, 9, 8, 7, 6	Gravel, cobble and boulder particles are over 75% surrounded by fine sediment. 5, 4, 3, 2, 1, 0
3. Velocity/depth category	Slow deep (<0.3 m/s & >0.5 m); slow shallow; fast deep; fast shallow; habitats all present. 20, 19, 18, 17, 16	Only 3 of the four habitat categories present (missing riffles or runs receive lower score than missing pools). 15, 14, 13, 12, 11	Only two of the four habitat categories present (missing riffles/runs receive lower score). 10, 9, 8, 7, 6	Dominating by one velocity/depth category (usually pool). 5, 4, 3, 2, 1, 0
4. Channel alteration	Little or no enlargement of islands or point bars and/or no channelisation. 15, 14, 13, 12	Some new increase in bar formation, mostly from coarse gravel; and/or some channelisation present. 11, 10, 9, 8	Moderate deposition of new gravel, coarse sand, on old and new bars; pools partly filled with silt; and/or embankments on both banks. 7, 6, 5, 4	Heavy deposits of fine materials, increased bar development; most pools filled with silt; and/or extensive channelisation. 3, 2, 1, 0
5. Bottom scouring and deposition	Less than 5% of the bottom affected by scouring and deposition. 15, 14, 13, 12	5-30% affected. Scours at constrictions and where grades steepen, some deposition in pools. 11, 10, 9, 8	30-50% affected. Deposits and scours at obstructions and bends. Some deposition in pools. 7, 6, 5, 4	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. Only large rocks in riffle exposed. 3, 2, 1, 0

DU503400RSC.P65 (LM3883) 20/8/98

River Bioassessment Program

HABITAT ASSESSMENT FIELD SHEET cont.

Habitat Variable	CATEGORY Excellent	Good	Fair	Poor
6. Pool/riffle, run/bend ratio. *(Distance between riffles divided by stream width)*	0-7 Variety of habitat. Deep riffles and pools. 15, 14, 13, 12	7-15 Adequate depth in pools and riffles. Bends provide habitat. 11, 10, 9, 8	15-25 Occasional riffle or bend. Bottom contours provide some habitat. 7, 6, 5, 4	>25 Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 3, 2, 1, 0
7. Bank stability	Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problem. 10, 9	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods. 8, 7, 6	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme/high flows. 5, 4, 3	Unstable. Many eroded areas. Side slopes > 60% common. 'Raw' areas frequent along straight sections and bends. 2, 1, 0
8. Bank vegetative stability	Over 80% of the streambank surfaces covered by vegetation or boulders and cobble. 10, 9	50-79% of the streambank surfaces covered by vegetation, gravel or larger material. 8, 7, 6	25-49% of the streambank covered by vegetation, gravel or larger material. 5, 4, 3	Less than 25% of the streambank surfaces covered by vegetation, gravel or larger material. 2, 1, 0
9. Streamside cover	Dominant vegetation is of tree form. 10, 9	Dominant vegetation shrub. 8, 7, 6	Dominant vegetation is grass, sedge, ferns. 5, 4, 3	Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings. 2, 1, 0

Column Totals				

Score

Appendix G Stream Morphology Assessment Data

Stream Morphology Site 1 (SM1)

Location	Located on Phillips Creek in the central region of the Project site.
Co-ordinates	22.39121° S 148.41896° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 9 m
Channel Width	7 m
Flow Direction	North-east
Bank Slope	North Bank: 70° South Bank: 60°
Bank Stability	Very Poor – Extensive erosion occurs on the northern bank; erosion on the southern bank occurs in patches that are mostly healed. Lack of stability influenced by previous clearing in some areas, the construction of a gravel access road crossing creek, and stock access tracks.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Occurs on the northern embankment; lower terrace occurs to a height of 1 m and width of 4 m, while upper bank extends to 9 m in height.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Slight channelisation was observed along the edges of the stream.
Habitat Features	Some fallen woody debris occurs throughout the stream reach. Stream edges consist of occasional exposed tree roots and small areas of undercut bank.
Width of Riparian Zone	North Bank: 20 m South Bank: 20 m
Canopy Cover	North Bank: 5 % South Bank: 15 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) with associated River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM1 – Facing Downstream

Stream Morphology Site 2 (SM2)

Location	Located on Phillips Creek in the central region of the Project site.
Co-ordinates	22.39185° S 148.41415° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 7 m
Channel Width	7.5 m
Flow Direction	North-east
Bank Slope	North Bank: 60° South Bank: 75°
Bank Stability	Poor **–** A high level of erosion occurs on the northern bank. The southern bank consists of moderate extent of erosion and minor bank slumping. Reduced bank stability is most likely attributable to livestock accessing small pools of water in this section of the creek.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Occurs along the northern embankment; lower terrace occurs to a height of 1.5 m and width of 3 m, while upper bank extends to 7 m in height.
Surface Water	Small pools of stagnant water were observed. Pool 1: 0.3 m depth and 3 m wide. Pool 2: 0.05 m depth and 1 m wide.
Channel Alteration (channelisation, scouring & deposition)	Channelisation and deposition observed in pools.
Habitat Features	A high density of coarse woody debris occurs throughout the stream reach and at the pools in particular. Exposed tree roots occur sporadically at the stream edges.
Width of Riparian Zone	North Bank: 20 m South Bank: 20 m
Canopy Cover	North Bank: 10 % South Bank: 30 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) with associated River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM2 – Facing Downstream

Stream Morphology Site 3 (SM3)

Location	Located on Phillips Creek in the central region of the Project site.
Co-ordinates	22.39373° S 148.40965° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 8 m
Channel Width	8 m
Flow Direction	North-east
Bank Slope	North Bank: 55° South Bank: 50°
Bank Stability	Good – erosion and bank slumping occurs in small patches which are mostly healed.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Occurs on the both embankments; lower terrace typically occurs to a height of 1 m and width of 1.5 m. High bank height ranges from 6.5 to 8 m.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Scouring or channelisation has resulted in a small depression in this section of the stream.
Habitat Features	Exposed tree roots and fallen woody debris occur sporadically throughout the stream reach.
Width of Riparian Zone	North Bank: 15 m South Bank: 40 m
Canopy Cover	North Bank: 60 % South Bank: 40 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM3 – Facing Downstream

Stream Morphology Site 4 (SM4)

Location	Located on Phillips Creek in the central region of the Project site.
Co-ordinates	22.39505° S 148.40485° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 8 m
Channel Width	8 m
Flow Direction	North-east
Bank Slope	North Bank: 80° South Bank: 45°
Bank Stability	Moderate – moderately sized patches of erosion and bank slumping occur infrequently.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Occurs to a height of 3 m on the southern embankment; high bank height is to 6 m (S bank) and 8 m (N bank).
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	A few small areas of scouring were noted including a 30 cm wide channel and a couple of small depressions.
Habitat Features	The moderate density of fallen logs and bank overhang vegetation observed in this section of the creek offers aquatic habitat during flow events.
Width of Riparian Zone	North Bank: 50 m South Bank: 30 m
Canopy Cover	North Bank: 60 % South Bank: 40 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*) with associated Moreton Bay Ash (*Corymbia tessellaris*).

Stream Morphology Site SM4 – Facing Upstream

Stream Morphology Site 5 (SM5)

Location	Located on Phillips Creek in the north-central region of the Project site.
Co-ordinates	22.39397° S 148.40001° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 11 m
Channel Width	8 m
Flow Direction	East
Bank Slope	North Bank: 60° South Bank: 60°
Bank Stability	Moderate – a few small to moderately sized areas of erosion that are mostly healed.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Terracing is subtle and occurs sporadically throughout the stream reach. Lower terraces are typically to a height of 1 m while upper banks extend to 8 m.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Slight scouring/channelisation was observed – channels present are from <5 cm deep to 30 cm deep.
Habitat Features	Small areas of undercut bank occur at the stream edges. Some leaf litter was present in the stream bed but coarse woody debris is lacking throughout the stream reach.
Width of Riparian Zone	North Bank: 40 m South Bank: 40 m
Canopy Cover	North Bank: 60 % South Bank: 40 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM5 – Facing Upstream

Stream Morphology Site 6 (SM6)

Location	Located on Phillips Creek in the central north of the Project site.
Co-ordinates	22.39684° S 148.39635° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 9 m
Channel Width	8 m
Flow Direction	North-east
Bank Slope	North Bank: 45° South Bank: 65°
Bank Stability	Moderate – several small to moderately sized areas of erosion and bank slumping were noted; mostly healed over.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	A 10 m long stretch of terracing occurs on the northern embankment; lower terrace occurs to a height of <1 m, while upper bank extends to 8 m.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Slight channelisation occurs to a depth of 15 cm.
Habitat Features	Moderate density of debris and fallen logs occur throughout the stream reach. No exposed tree roots or areas of undercut bank were observed.
Width of Riparian Zone	North Bank: 30 m South Bank: 40 m
Canopy Cover	North Bank: 30 % South Bank: 50 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM6 – Facing Upstream

<u>Stream Morphology Site 7 (SM7)</u>

Location	Located on Phillips Creek in the west of the Project site.
Co-ordinates	22.39878° S 148.39548° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 7 m
Channel Width	11 m
Flow Direction	North-east
Bank Slope	<u>North Bank</u>: 60° <u>South Bank:</u> 50°
Bank Stability	Moderate – several small areas of erosion and bank slumping were noted. However, the well vegetated state of the banks provides stability.
Substrate Composition	<u>Bed:</u> yellow/red sand <u>Bank:</u> red/yellow sandy loam
Terracing	Occurs sporadically throughout the stream reach, to a height of <1.5 m.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Slight channelisation occurs to a depth of <10 cm.
Habitat Features	Moderate density of fallen woody debris occurs throughout the stream reach. Stream edges consist of small areas of overhang vegetation and undercut banks.
Width of Riparian Zone	<u>North Bank:</u> 20 m <u>South Bank:</u> 50 m
Canopy Cover	<u>North Bank:</u> 30 % <u>South Bank:</u> 50%
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM7 – Facing Upstream

Stream Morphology Site 8 (SM8)

Location	Located on Phillips Creek in the west of the Project site.			
Co-ordinates	22.40061° S 148.39098° E (GDA 94, Zone 55)			
Channel Depth	A well defined channel to a depth of 8 m			
Channel Width	11 m			
Flow Direction	North-east			
Bank Slope	North Bank:	45°	South Bank:	65°
Bank Stability	Moderate **–** Some small to moderately sized areas of eroded bank were noted. In most cases, the areas of erosion have not been healed over by cover of vegetation.			
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam			
Terracing	Occurs frequently in patches along both embankments. Lower terraces occur to a height of 1.5 m and width of 1 m, while upper bank extends to 8 m.			
Surface Water	Dry at the time of assessment.			
Channel Alteration (channelisation, scouring & deposition)	Channelisation occurs particularly on the edges of the channel, where channels are as deep as 30 cm in some areas.			
Habitat Features	Fallen woody debris occurs sparsely throughout the stream reach. Exposed tree roots were observed in low abundance along the lower embankments.			
Width of Riparian Zone	North Bank:	20 m	South Bank:	40 m
Canopy Cover	North Bank:	40 %	South Bank:	70 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*).			

Stream Morphology Site SM8 – Facing Upstream

Stream Morphology Site 9 (SM9)

Location	Located on Phillips Creek in the western portion of the Project site.
Co-ordinates	22.40499° S 148.39261° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 6.5 m
Channel Width	8.5 m
Flow Direction	North-west
Bank Slope	North Bank: 60° South Bank: 45°
Bank Stability	Good – A few small areas of bank erosion and slumping were noted. However, these areas were generally healed over by the dense ground layer of exotic grasses.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Terracing was noted on both embankments however various levels of terracing were observed on the northern embankment. Lower terraces occur to a height of <1 m and width of 1 m.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Some channelisation occurs on the northern edge of the stream bed.
Habitat Features	Fallen woody debris occurs in low abundance, sporadically throughout the stream reach. No exposed tree roots or areas of undercut bank were observed.
Width of Riparian Zone	North Bank: 30 m South Bank: 30 m
Canopy Cover	North Bank: 40 % South Bank: 50 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM9 – Facing Upstream

Stream Morphology Site 10 (SM10)

Location	Located on Phillips Creek in the western portion of the Project site.
Co-ordinates	22.41338° S 148.38911° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 8 m
Channel Width	11 m
Flow Direction	North-east
Bank Slope	North Bank: 60° South Bank: 70°
Bank Stability	Moderate – a moderate extent of erosion and bank slumping was observed.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	A lower terrace occurs along a small length of the northern embankment to a height of 2 m and a width of 1 m.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Slight channelisation was evident; channels are up to 50 cm wide and 10 cm deep.
Habitat Features	Several fallen logs and small clumps of woody debris occur throughout the stream reach. Bank overhang vegetation also occurs commonly along the stream edges.
Width of Riparian Zone	North Bank: 30 m South Bank: 40 m
Canopy Cover	North Bank: 40 % South Bank: 40 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM10 – Facing Upstream

Stream Morphology Site 11 (SM11)

Location	Located on Phillips Creek in the western portion of the Project site.
Co-ordinates	22.41795° S 148.38864° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 7.5 m
Channel Width	11 m
Flow Direction	North
Bank Slope	North Bank: 55° South Bank: 50°
Bank Stability	Moderate – several small areas of eroded bank were noted although most areas of erosion were healed over.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Lower terraces are present in small areas along the stream bank and range from <0.5 m to approximately 1.5 m in height.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Slight channelisation was evident; a small channel was observed in the centre of the stream bed. The channel was generally up to 50 cm wide and 5 cm deep but tending to a depth of 40 cm on the northern edge of the channel.
Habitat Features	Several small to moderately sized logs were observed in the stream bed. These logs were partially or deeply surrounded by stream sediment. Bank overhang vegetation occurs in small sporadic patches along the stream edges.
Width of Riparian Zone	North Bank: 30 m South Bank: 20 m
Canopy Cover	North Bank: 40 % South Bank: 30 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*) with associated Moreton Bay Ash (*Corymbia tessellaris*).

Stream Morphology Site SM11 – Facing Upstream

Stream Morphology Site 12 (SM12)

Location	Located on Phillips Creek in the western portion of the Project site.
Co-ordinates	22.42225° S 148.38689° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 6 m
Channel Width	10 m
Flow Direction	North
Bank Slope	North Bank: 45° South Bank: 50°
Bank Stability	Poor – two areas of significant bank slumping were noted on the southern bank. These areas are mostly healed over due to the growth of exotic grasses but may be subject to further disturbance during future high flow events.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	A lower terrace to 0.5 m in height and 1 m in width occurs on both embankments in small sections.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	The presence of 3 channels, each up to 1 m wide and 10 cm deep, indicates channelisation is occurring in this section of the stream.
Habitat Features	Woody debris occurs sparsely throughout the stream reach. Small clumps of bank overhang vegetation may provide aquatic habitat during wet periods.
Width of Riparian Zone	North Bank: 30 m South Bank: 20 m
Canopy Cover	North Bank: 30 % South Bank: 20 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM12 – Facing Upstream

Stream Morphology Site 13 (SM13)

Location	Located on Phillips Creek, adjacent to the south-west boundary of the Project site.
Co-ordinates	22.42684° S 148.38770° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 6 m
Channel Width	10 m
Flow Direction	North
Bank Slope	North Bank: 75° South Bank: 70°
Bank Stability	Moderate **–** some areas of exposed earth occur on the lower bank and a number of areas of erosion and bank slumping were observed.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	A lower terrace to 1 m in height and 1 m in width occurs in small sections on both embankments. A 3 m high terrace also spans a 10 m length of the northern bank.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Some channelisation was observed; channels ranged from 1 m to 2 m in width but each was less than 15 cm deep.
Habitat Features	Several fallen logs were observed sporadically in the stream bed and were partially surrounded by stream sediment. Small clumps of bank overhang vegetation and exposed tree roots may provide aquatic habitat along the stream edges.
Width of Riparian Zone	North Bank: 20 m South Bank: 30 m
Canopy Cover	North Bank: 30 % South Bank: 50 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*).

Stream Morphology Site SM13 – Facing Upstream

Stream Morphology Site 14 (SM14)

Location	Located on Phillips Creek, at the south-west boundary of the Project site.
Co-ordinates	22.43179° S 148.38063° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 7 m
Channel Width	12 m
Flow Direction	North-east
Bank Slope	North Bank: 80° South Bank: 80°
Bank Stability	Moderate – a few large areas (5 – 10 m in length) of erosion and bank slumping were observed along the embankments. For the most part these areas have not healed over and contain considerable areas of exposed bank.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Terracing occurs up to a height of 2 metres along both embankments.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Some channelisation was observed; shallow channels ranged from 10 cm in depth in the centre of the stream bed to 40 cm deep at the stream edge.
Habitat Features	A moderate density of fallen woody debris occurs throughout the stream reach. Small clumps of bank overhang vegetation may also provide aquatic habitat during wet periods.
Width of Riparian Zone	North Bank: 20 m South Bank: 30 m
Canopy Cover	North Bank: 50 % South Bank: 30 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*) with associated Moreton Bay Ash (*Corymbia tessellaris*).

Stream Morphology Site SM14 – Facing Downstream

Stream Morphology Site 15 (SM15)

Location	Located on Phillips Creek, where the creek crosses the eastern boundary of the Project site.
Co-ordinates	22.38172° S 148.44792° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 5 m
Channel Width	9.5 m
Flow Direction	North-east
Bank Slope	North Bank: 80° South Bank: 75°
Bank Stability	Poor – Erosion and bank slumping occurs frequently. For the most part, these moderately sized areas have not healed over and remain as exposed bank.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Terracing occurs along both embankments, at heights of <1 m and 3 m.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Slight channelisation was evidenced by the presence of narrow (0.3 – 1 m wide), shallow channels (<0.1 – 0.2m deep).
Habitat Features	A moderate density of fallen woody debris occurs throughout the stream reach. Bank overhang vegetation and exposed tree roots are sparse along this section of the Phillips Creek.
Width of Riparian Zone	North Bank: 40 m South Bank: 30 m
Canopy Cover	North Bank: 60 % South Bank: 40 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*) with occasional Moreton Bay Ash (*Corymbia tessellaris*).

Stream Morphology Site SM15 – Facing Downstream

Stream Morphology Site 16 (SM16)

Location	Located on Phillips Creek; shortly upstream of the eastern boundary of the Project site.
Co-ordinates	22.38412° S 148.44267° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 6 m
Channel Width	8 m
Flow Direction	North-east
Bank Slope	North Bank: 75° South Bank: 50°
Bank Stability	Poor – moderately sized areas of erosion and bank slumping occur frequently throughout the stream reach. For the most part, these areas have healed over due to the presence of groundcover vegetation.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Terracing occurs to a height of 1 m on the southern embankment.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	Some channelisation and deposition was observed in association with the stream edges and large fallen logs occurring in the stream bed. Channelisation throughout the streambed was otherwise minor.
Habitat Features	Fallen woody debris consisted of a few large fallen logs that would provide good aquatic habitat value during wet periods. Bank overhang vegetation and undercut banks occur commonly along the stream edge, while exposed tree roots are sparse.
Width of Riparian Zone	North Bank: 40 m South Bank: 30 m
Canopy Cover	North Bank: 60 % South Bank: 30 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*) with associated Moreton Bay Ash (*Corymbia tessellaris*).

Stream Morphology Site SM16 – Facing Upstream

<u>Stream Morphology Site 17 (SM17)</u>

Location	Located in the east of the Project site, on Phillips Creek.			
Co-ordinates	22.38654° S 148.43744° E (GDA 94, Zone 55)			
Channel Depth	A well defined channel to a depth of 6 m			
Channel Width	8 m			
Flow Direction	North-east			
Bank Slope	North Bank:	50°	South Bank:	60°
Bank Stability	Poor – small areas of erosion and bank slumping occur frequently throughout the stream reach. These areas are largely healed over due to the persistence of exotic groundcover vegetation.			
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam			
Terracing	Terracing occurs to a height of 1.2 m on both embankments.			
Surface Water	Dry at the time of assessment.			
Channel Alteration (channelisation, scouring & deposition)	Some channelisation was evident with narrow channels to 0.2 m deep occurring at the edges of the stream bed. Channelisation throughout the streambed was otherwise minor.			
Habitat Features	A moderate density of fallen woody debris occurs on the stream bed and banks. Bank overhang vegetation and undercut banks occur commonly along this section of the creek.			
Width of Riparian Zone	North Bank:	30 m	South Bank:	40 m
Canopy Cover	North Bank:	10 %	South Bank:	20 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*) with occasional Moreton Bay Ash (*Corymbia tessellaris*).			

Stream Morphology Site SM17 – Facing Upstream

Stream Morphology Site 18 (SM18)

Location	Located on Phillips Creek in the central region of the Project site.
Co-ordinates	22.39235° S 148.42596° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 9 m
Channel Width	9 m
Flow Direction	North-east
Bank Slope	North Bank: 60° South Bank: 80°
Bank Stability	Very Poor – large areas of erosion and bank slumping occur commonly throughout this section of the creek. The southern embankment occurs on a bend and exhibits significant areas of erosion and exposed bank. Canopy vegetation is sparse along this section of the bank.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Terracing on the southern bank typically occurs at up to three levels (1.2 m, 5 m, and 8 m). Terracing also occurs on the northern bank to a height of 0.5 m and 3 m.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	No channelisation was evident in this section of Phillips Creek.
Habitat Features	A moderate density of fallen woody debris occurs in the stream channel. Bank overhang vegetation and undercut banks occur sporadically throughout this section of the creek.
Width of Riparian Zone	North Bank: 50 m South Bank: 30 m
Canopy Cover	North Bank: 10 % South Bank: 40 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*) with occasional Moreton Bay Ash (*Corymbia tessellaris*).

Stream Morphology Site SM18 – Facing Upstream

Stream Morphology Site MP4

Location	Located on Phillips Creek in the central-east of the Project site, between SM17 and SM18.
Co-ordinates	22.38960° S 148.43237° E (GDA 94, Zone 55)
Channel Depth	A well defined channel to a depth of 7 m
Channel Width	9 m
Flow Direction	North-east
Bank Slope	North Bank: 55° South Bank: 65°
Bank Stability	Poor **–** small to moderately sized areas of erosion and bank slumping occur frequently throughout this section of the creek.
Substrate Composition	Bed: yellow/red sand Bank: red/yellow sandy loam
Terracing	Terracing occurs to a height of 0.6 m on the northern bank.
Surface Water	Dry at the time of assessment.
Channel Alteration (channelisation, scouring & deposition)	No evidence of channelisation was observed in this section of Phillips Creek.
Habitat Features	A very low density of exposed tree roots, woody debris and fallen logs were observed in this section of the stream.
Width of Riparian Zone	North Bank: 30 m South Bank: 40 m
Canopy Cover	North Bank: 40 % South Bank: 50 %
Riparian Vegetation	Dominated by River Red Gum (*Eucalyptus camaldulensis*) and River She-oak (*Casuarina cunninghamiana*) with associated Moreton Bay Ash (*Corymbia tessellaris*).

Stream Morphology Site MP4 – Facing Upstream

Appendix 3 – Sensitivity Analysis

Contents

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1 Water Surface Levels

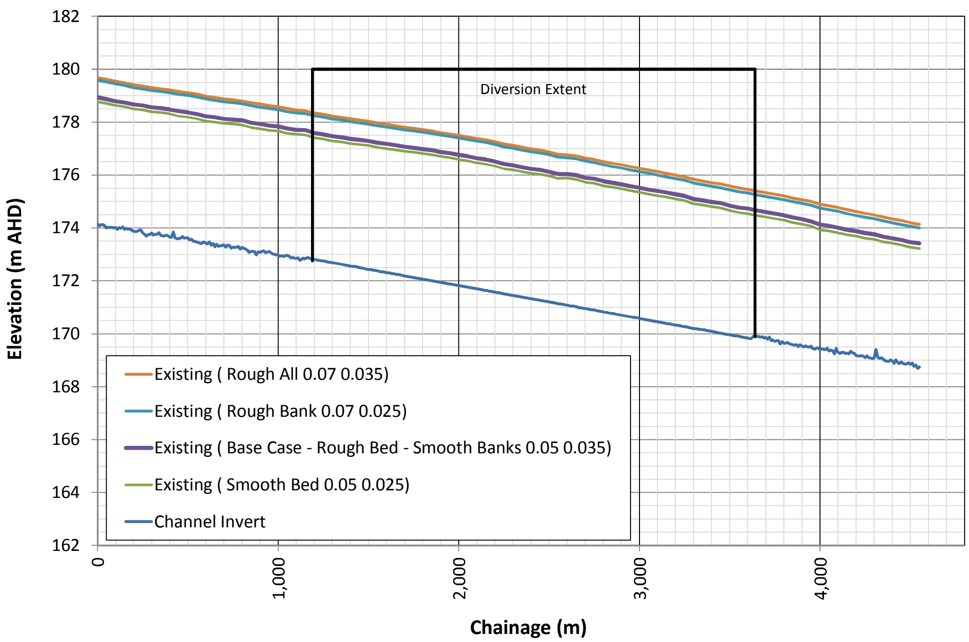

Figure 1.1 - Water surface level sensitivity to bed roughness (existing conditions)

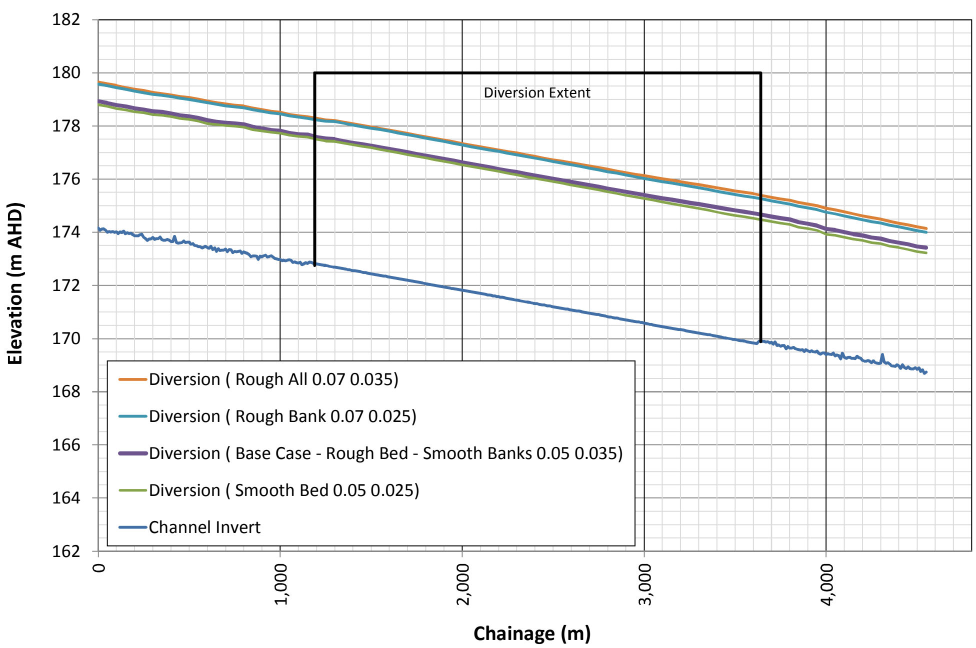

Figure 1.2 - Water surface level sensitivity to bed roughness (developed conditions)

2 Smooth Bed - Rough Banks

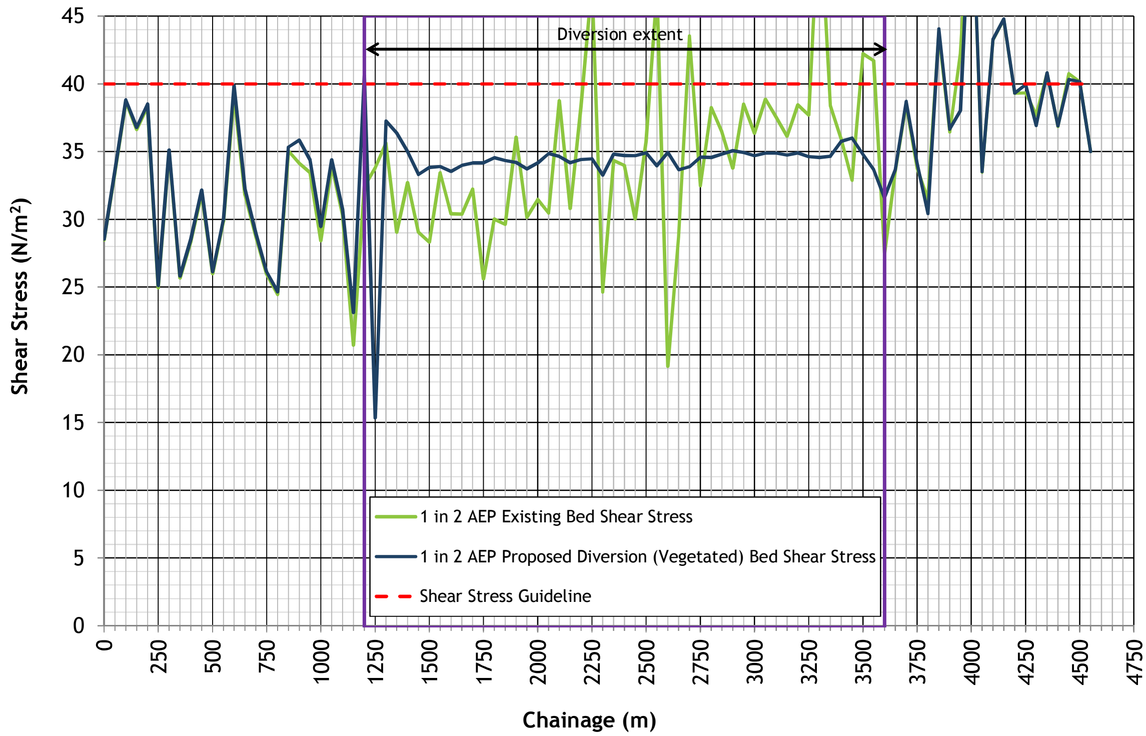

Figure 2.1 - Bed shear stress 1 in 2 AEP sensitivity analysis (n_{bed} =0.025, n_{banks}=0.07)

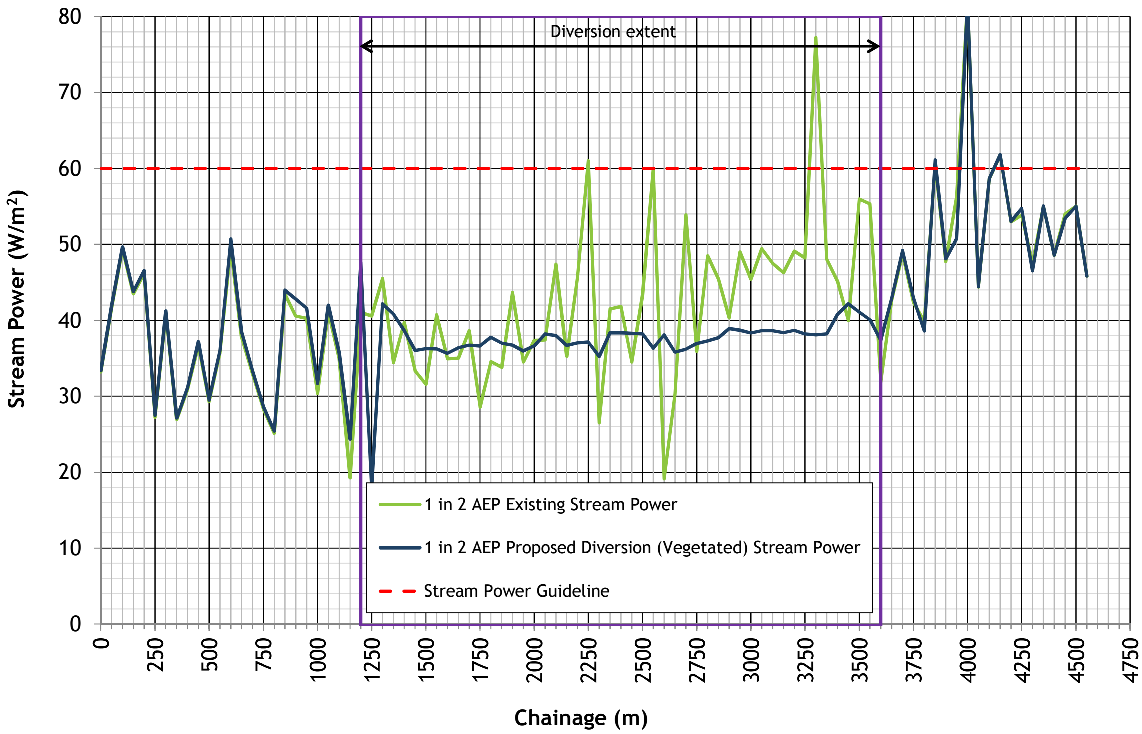

Figure 2.2 - Stream power 1 in 2 AEP sensitivity analysis (n_{bed}=0.025, n_{banks}=0.07)

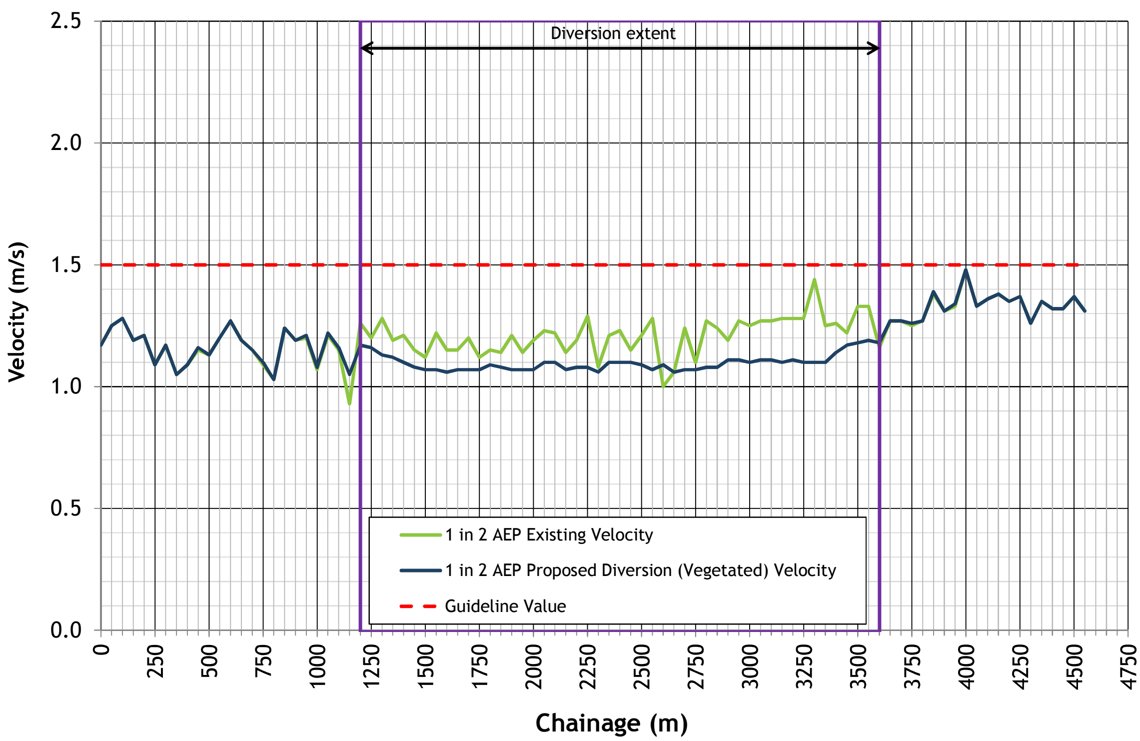

Figure 2.3 - Velocity 1 in 2 AEP sensitivity analysis (n_{bed}=0.025, n_{banks}=0.07)

3 Smooth Bed - Smooth Banks

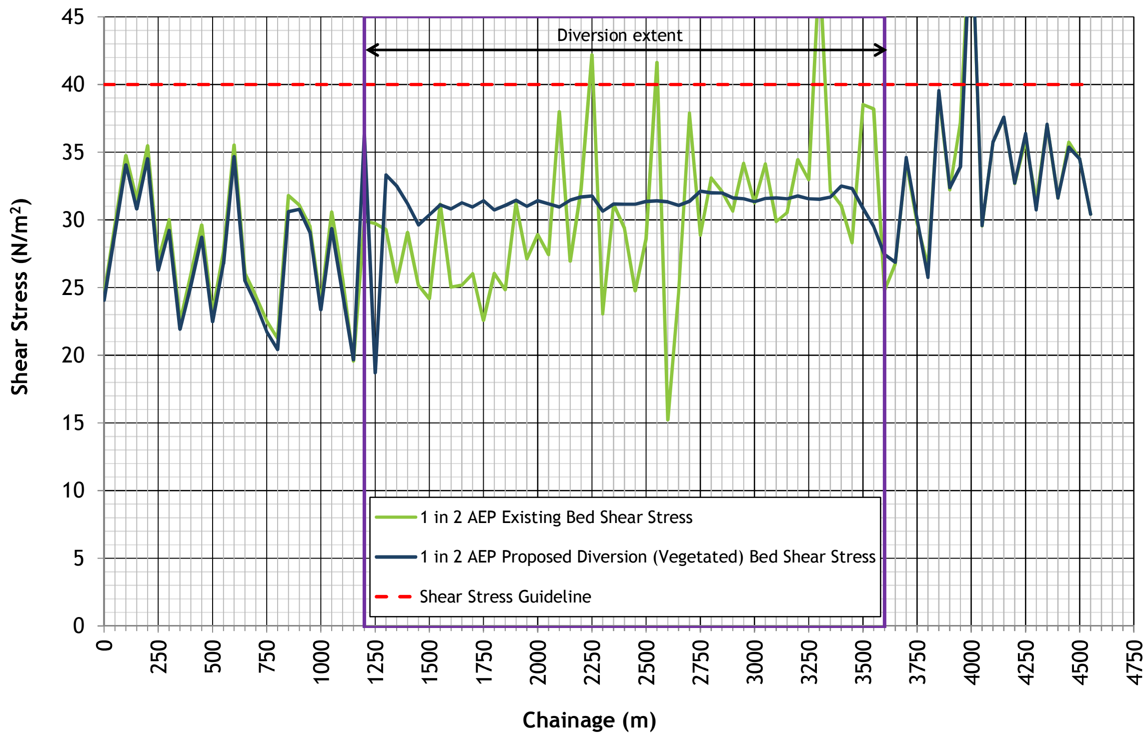

Figure 3.1 - Bed shear stress 1 in 2 AEP sensitivity analysis (n_{bed}=0.025, n_{banks}=0.05)

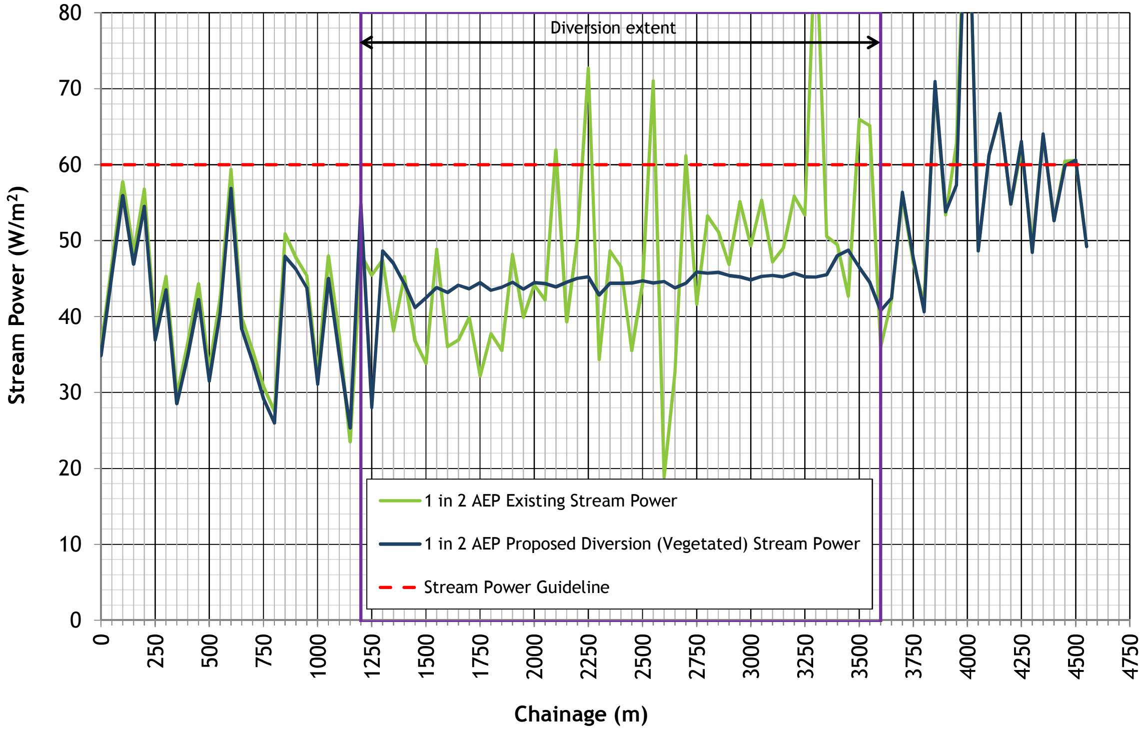

Figure 3.2 - Stream power 1 in 2 AEP sensitivity analysis (n_{bed}=0.025, n_{banks}=0.05)

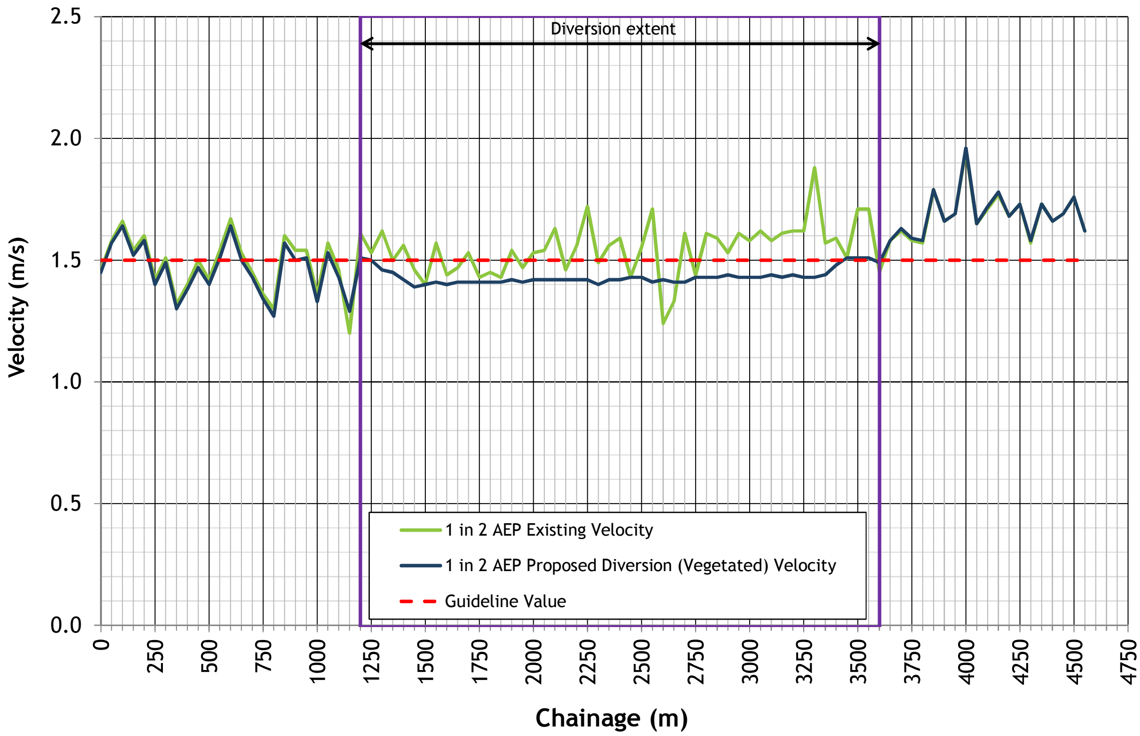

Figure 3.3 - Velocity 1 in 2 AEP sensitivity analysis (n_{bed}=0.025, n_{banks}=0.05)

4 Rough Bed - Rough Banks

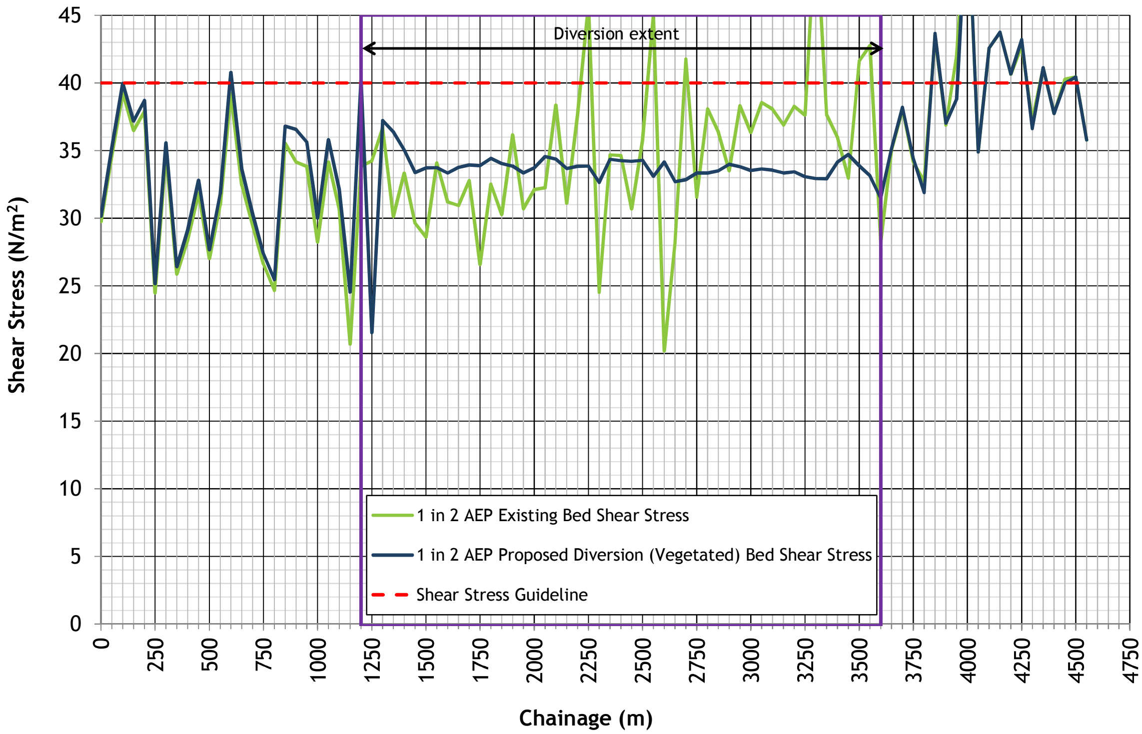

Figure 4.1 - Bed shear stress 1 in 2 AEP sensitivity analysis (n_{bed}=0.035, n_{banks}=0.07)

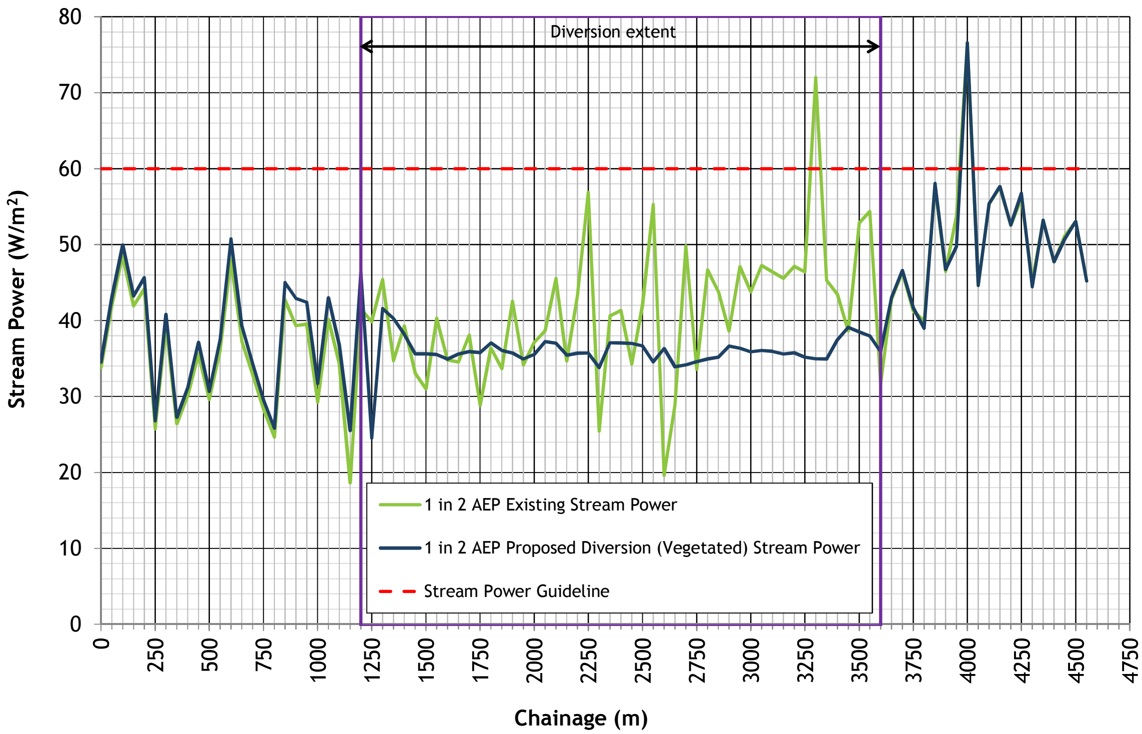

Figure 4.2 - Stream power 1 in 2 AEP sensitivity analysis (n_{bed} = 0.035, n_{banks} = 0.07)

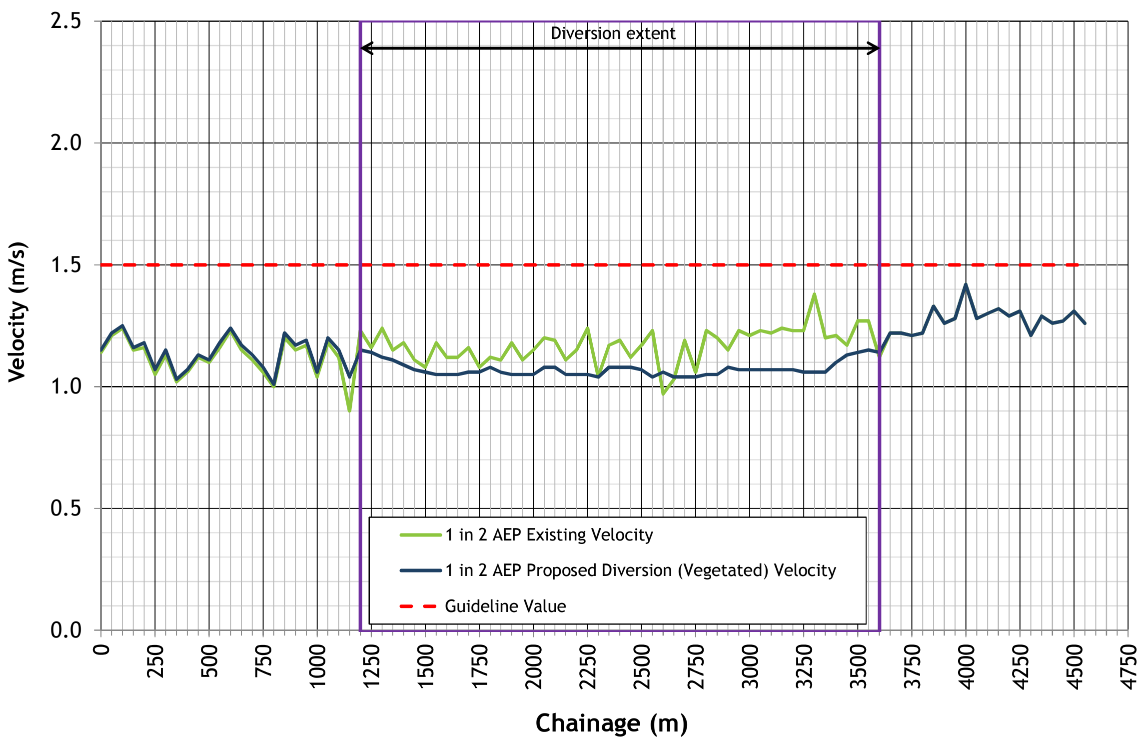

Figure 4.3 - Velocity 1 in 2 AEP sensitivity analysis (n_{bed} = 0.035, n_{banks} = 0.07)