Attachment 5

Aquatic Ecology Responses

WINCHESTER SOUTH PROJECT

Environmental Impact Statement

Response to Submissions

WHITEHAVEN COAL

Resource Strategies

Brendan Dillon
Whitehaven Coal Limited
Level 22, 12 Creek Street
BRISBANE QLD 2000

Our Reference: 2111.003V3

24 March 2023

RE: Winchester South Project – Aquatic Ecology Responses

Dear Brendan,

This memo has been compiled in response to the Department of Agriculture and Fisheries' (DAF's) request for additional information for the Winchester South Project (the Project), following public notification of the *Revised Draft Environmental Impact Statement* (Revised Draft EIS) for the Project.

The sections below provide a response to each item relevant to aquatic ecology as it relates to Ecological Service Professionals (ESP) contributions to the Revised Draft EIS, including the *Aquatic Ecology and Stygofauna Additional Information* report (ESP 2022a) and *Aquatic Ecology and Stygofauna Supplementary Assessment* (ESP 2022b). The responses were prepared in conjunction with the findings of a site inspection with DAF, completed on Tuesday 14 February 2023 and associated report prepared by DAF (2023) *Winchester South Site Inspection - 14 February 2023*.

Section – General

Issue 610.1: The Matter of State Environmental Significance (MSES) of waterway providing for fish passage is not defined by the Water Act 2000*. The definition of waterway is within the* Fisheries Act 1994*, this directly links to the* Environmental Offsets Act 2014 *and the State Planning Policy. The* Fisheries Act 1994 *has the following definition -* ***waterway*** *includes a river, creek, stream, watercourse, drainage feature or inlet of the sea.*

As per DAF's factsheet for determining *What is a waterway?* (DAF 2022), a waterway must have at least one of the following attributes:

1. *Defined bed and banks*

   The bed and banks need to be continuous upstream and downstream of the site rather than isolated and broken sections of a depression.

2. *An extended, if non-permanent, period of flow*

   Flow must continue beyond the duration of a rain event and have some reliability attached to rainfall. There is a need to distinguish between channels that funnel immediate localised rainfall; and waterways where flow has arisen from an upstream catchment.

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3. *Flow adequacy*

   The flow needs to be sufficient to sustain basic ecological processes and habitats, and to maintain biodiversity within or across the feature. The adequacy of the flow depends on the ecological function of the channel e.g. waterways that connect to fish habitat like a wetland or waterhole may only need infrequent and short-duration flows to provide connectivity for fish.

4. *Fish habitat at, or upstream of, the site*

   Most instream features provide habitat for fish under adequate flow conditions or, in the case of pools, during dry periods. Therefore, it is important to have some knowledge of the fish species for the site and their habitat use, particularly in headwater streams. Periodic connectivity to upstream and off stream fish habitat are also considered fish habitat.

It is acknowledged that the definition of a waterway providing for fish passage is from the *Fisheries Act 1994* (Fisheries Act). This is the definition that was used to ground-truth the extent of waterways providing for fish passage within the Project area.

However, it is noted that the definition of a waterway under the *Environmental Offsets Regulation 2014* (EO Regulation) was used for the purposes of defining MSES waterways providing for fish passage that may require an offset for significant residual impacts (SRI), and does not include 'drainage features'. Drainage features, as defined under the *Water Act 2000* (Water Act) were therefore described in the supplementary assessment (ESP, 2022b); but did not form the basis of the waterway determinations.

Section – Aquatic Ecology and Stygofauna Additional Information: Aquatic Ecology, Stygofauna Supplementary Assessment; and Attachment 10: Aquatic and Stygofauna Supplementary Impact Assessment

Issue 610.2: Artificial features that may interrupt fish passage (dams, roads, etc.) do not preclude the feature from being a waterway providing fish passage. This is because the removal of these barriers would result in the ability of the waterway to provide fish passage.

Artificial features can interrupt fish passage, and also change the characteristics of a waterway feature in such a way that the feature does not meet the definition of a waterway as defined under the Fisheries Act. For example, an artificial feature such as a dam, quarry, or road, may interfere with the feature in such a way that the feature no longer has defined bed and banks, prevents the feature from having an extended, or adequate period of flow, and due to the composition of the artificial feature, does not provide fish habitat opportunity upstream of an assessment site.

While the waterway determination completed by ESP (2022a) stated that barriers along the northern unnamed tributary (including quarry walls, dam walls, and road crossings) act as significant barriers to fish passage, it is acknowledged that these artificial features do not preclude the feature from being a waterway providing fish passage. The waterway determination completed by ESP was based on the definition outlined in the Fisheries Act. The waterway determination for the site has been finalised by DAF following the site inspection (as described below).

Section – Aquatic Ecology and Stygofauna Additional Information (3.1.2.2, 3.1.3.1, 3.1.3.2, 3.1.2.3, 3.1.3.3, 3.1.2.4); Aquatic Ecology, Stygofauna Supplementary Assessment; and Appendix F: Winchester South Project Technical Study Report – Geomorphology

Issue 610.3: In the absence of detailed LiDAR imagery of the development site the imagery and descriptions provided in the Aquatic Ecology and Stygofauna, Additional Information, Aquatic Ecology; Stygofauna Supplementary Assessment and Appendix F Winchester South Project Technical Study Report – Geomorphology IN Appendix B – Surface Water and Flooding Assessment. This information along with the provided fish survey information describes the presence of waterways within the mining lease area.

Extensive ground-truthing by ESP during the baseline and supplementary assessments for the Draft EIS (ESP 2021) and Revised Draft EIS (ESP 2022a) found large sections of the three unnamed waterway features mapped on DAF's *Waterways for Waterway Barrier Works* (WWBW) spatial layer lacked the features required to be considered a waterway, as defined by the Fisheries Act (ESP 2022a) and described by DAF (2022). Waterway assessments consistently indicated that the mapped features:

- lacked continuously defined bed and banks along their length;
- had no aquatic vegetation other than in discrete patches within water-holding dams;
- lacked fish habitat, other than within the water-holding dams; and
- appeared to have insufficient flow or water availability to sustain basic aquatic ecological processes and habitats (lacked flow adequacy and extended periods of flow after rainfall).

The features also contained significant barriers for fish passage in the form of raised dam walls (for dams that have been in place for many years) with steep slopes, quarry walls and rock barriers, and road crossings. The dams contribute to the lack of sufficient flows to sustain basic ecological processes and fish habitats downstream.

However, as per Issue 610.3, the determination of a waterway under the Fisheries Act is undertaken by DAF with the information provided by applicants and other data. Following the site inspection on 14 February 2023, the *Winchester South Site Inspection 14 February 2023* report (DAF 2023) concluded that:

- the extent of fish passage in the northern waterway (referred to as Waterway 2) is from approximately 1 km upstream of the quarry down to the Isaac River;
- the extent of fish passage in the central waterway (referred to as Waterway 1) is as per the Queensland Waterways for Waterway Barrier Works spatial layer;
- the southern feature is not considered a waterway within the mining lease application area; and
- an unmapped waterway (referred to as Waterway 3) providing for fish passage is present in the vicinity of the quarry, that is an extension of a waterway mapped north of the proposed disturbance area.

These waterways are discussed in each of the subsections below.

Northern Waterway (Waterway 2)

The northern waterway (referred to as Waterway 2 in DAF 2023) extends from approximately 1 km upstream of the quarry (i.e. just beyond Stop 6[1]) downstream to the Isaac River (Figure 1). Based on the outcomes of the February 2023 site inspection, ESP's assessment is consistent with the waterway determination for the northern waterway, as mapped by DAF (2023).

This section of the northern waterway contained several attributes of a waterway providing for fish passage (DAF 2022), including defined bed and banks, the presence of distinct bed sediments in the channel that differed from the surrounding landscape, riparian vegetation, and fish habitat (such as isolated pools, woody debris, and aquatic plants; Plate 1). Fish were observed in the pool at Stop 6 during the February 2023 site inspection, and were caught at sites further downstream during baseline and supplementary surveys undertaken by ESP (2021 and 2022a).

Beyond (upstream of) the agreed upstream extent of the waterway, no discernible waterway channel could be identified within the disturbance area. Rather, this area was described during the site visit as being gilgai country within an area of brigalow regrowth (e.g. refer to description of Stops 4 and 5 in DAF (2023), see Figure 1 for Stop locations). Further descriptions and photographs of the area upstream of the agreed waterway extent are provided in ESP (2022a).

Plate 1 Stop 6 near the upstream extent of the northern waterway, showing waterway features

[1] noting that the DAF (2023) report text contradicts the mapping, and states that the waterway does not extend upstream of the quarry; ESP accepts the DAF mapping as correct because DAF's Site 6 has been incorrectly spatially-located (refer to discussion of Waterway 3 below). GPS locations for each of the stops on the site visit are provided in Figure 1, and a comparison to the DAF mapping is provided in Attachment A.

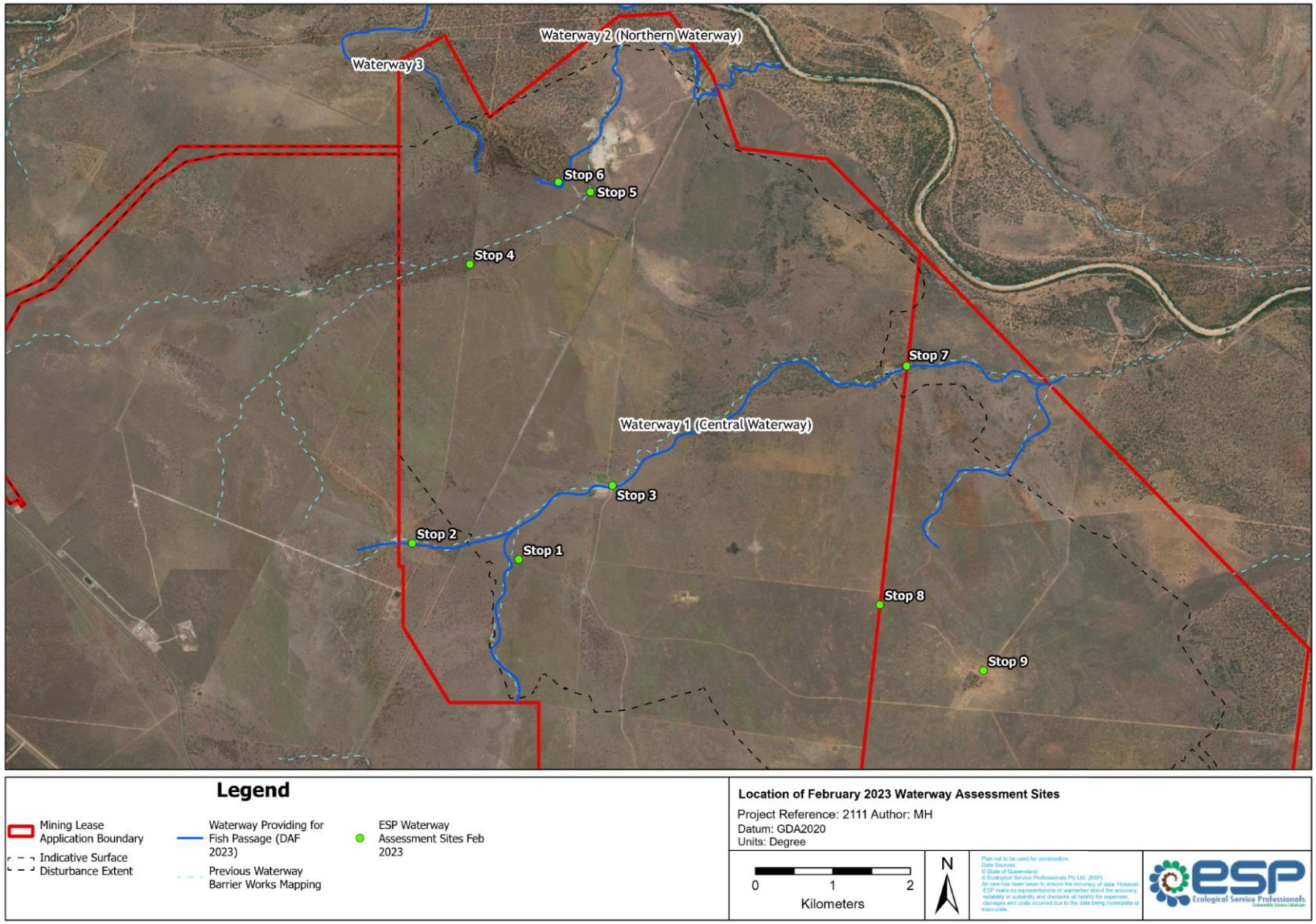


Figure 1 Extent of waterways on the site as determined by DAF (2023), showing location of the stops visited during the 14 February 2023 site inspection

Central Waterway (Waterway 1)

DAF's review of the central waterway (referred to as Waterway 1 in DAF 2023) and its tributaries during the site inspection on 14 February 2023 concluded that its extent is generally as per current Queensland *Waterways for Waterway Barrier Works* mapping.

The waterway determination for the central waterway (Waterway 1) by DAF (2023) regarding the extent of the central waterway is inconsistent with:

- the outcomes of the supplementary assessment by ESP in February 2022, which included detailed ground-truthing of 34 sites within the central waterway and its tributaries (ESP 2022a; Figure 2); and
- recent determinations made by DAF on sites with similar features, such as mapped features at the top of catchments, with ill-defined, non-continuous, bed and banks, the presence of dams (including water-holding dams), potential fish habitat at isolated locations that lack sufficient flow or connectivity, and / or historical works that have severed connectivity for fish passage[2].

While ESP accept that bed and bank features were present at the locations visited during the February 2023 site inspection, ESP maintains its conclusion from the supplementary assessment (ESP 2022a) that most of these reaches do not provide for fish habitat or fish passage. Rather, the observed 'bed and banks' are drainage lines formed within erosive soils that convey overland flows, and would not flow beyond an immediate rainfall event. As such, there is not adequate flow to maintain aquatic ecological processes and there is no riparian vegetation or fish habitat. It remains ESP's view that these drainage lines do not meet the definition of a waterway, on the basis that a waterway must have 'at least one' of the criteria listed by DAF (2022) in its waterway definition, but that does not mean that if a feature meets one criterion, that it must be defined as a waterway. However, DAF's advice on the site inspection was that a waterway only needs to have one of the criteria of a waterway (as defined by DAF (2022)) in order to be classified a waterway (e.g. the presence of bed and banks is enough to determine a waterway, even if flow is insufficient to maintain basic ecological processes) (Clague, C. pers. comm. 14 February 2023).

During the site inspection on 14 February 2023, five stops were made along the central waterway and its tributaries during the site visit: DAF Stops 1, 2, 3, 7 and 8 (Figure 1[3]), all of which were reported by DAF to display the features of waterways providing for fish passage (DAF 2023). Results of ESP's assessment during the site inspection are provided below.

Stops 1, 2 and 8

These sites were located towards the upstream extents of the three mapped first order features that flow into the central waterway (Figure 1).

DAF (2023) concluded that bed and banks were clearly visible as flow paths at Stops 1 and 2. Regarding Stop 8, DAF concluded that although the feature is not a waterway providing for fish passage where the farm road and fence cross the feature, it is apparent that overland flow and multiple smaller features join the feature. As such, it was considered likely (based

[2] e.g. SARA Refs: 2110-25591 SPL; 2107-23901 SPL; 2012-20287 SPL, and 2112-26344 SPL
[3] Noting that DAF (2023) incorrectly indicates the location of Stop 1, see Attachment A

on the LiDAR mapping and other waterways inspected on the site) that this is a waterway for fish passage along its mapped extent. That is, this tributary was not ground-truthed by DAF.

ESP's assessment found that these upstream reaches as mapped by DAF (2023) do not provide for fish passage due to a lack of sufficient flow to sustain basic (aquatic) ecological processes and habitats, and that the upstream reaches of the feature are characteristic of 'channels that funnel immediate localised rainfall' (DAF 2022) (Plate 2). A previous comprehensive waterway determination by ESP at sites along these tributaries in close proximity to Stop 1 (Figure 1) (i.e. Sites 139, 140 and 143 in ESP 2022a (Figure 2)); Stop 2 (Figure 1) (i.e. Sites 135, 137, 154 and 155 in ESP 2022a (Figure 2)); and Stop 8 (Figure 1) (i.e. Sites 56, 119 and 120 in ESP 2022a (Figure 2)) further supports this conclusion (see ESP 2022a).

a) b)

Plate 2 View of the waterway at
a) Stop 1 with view upstream of the track; and
b) Stop 1 with view downstream of the track

Stop 3

Stop 3 was located downstream of a farm dam (Figure 1). DAF (2023) concluded that this site had clearly defined bed and banks (although the low flow channel was braided in places). It also concluded that because a significant volume of gravel had been washed off the road and transported downstream, this demonstrates that the waterway experiences strong and consistent flows. Greener terrestrial vegetation was noted within the channel.

ESP's conclusion is that this site consisted of an eroded drainage channel. Water-deposited gravel and green terrestrial vegetation are not necessarily indicative of an extended period of flow that continues beyond a rain event, or adequate flow to sustain basic ecological processes and habitats. Furthermore, no fish habitat was identified at this site. A previous comprehensive waterway determination by ESP at sites in close proximity to Stop 3 (Figure 1) (i.e. Sites 70 and 71 in ESP 2022a (Figure 2)) further supports this conclusion (see ESP 2022a).

Stop 7

Stop 7 was located downstream of a farm dam (Figure 1). Standing water containing fish was present at this site, and DAF stated that there was a visible flow path through a paddock with defined bed and banks further downstream. Fish have also been recorded previously at the farm dam upstream of this site (ESP 2021). As previously acknowledged by DAF, the farm dams within the disturbance area are not waterways providing for fish passage[4].

ESP accepts that waterway features were present upstream of the track and fence, such as riparian vegetation, defined bed and banks, ponded water and the presence of small-bodied fish. However, ESP did not observe a defined channel downstream, i.e. there was a lack of continuous defined bed and banks, and the connectivity with the pool is impaired (Plate 3). A previous comprehensive waterway determination by ESP at sites in close proximity to Stop 7 (Figure 1) (i.e. Sites 62 to 66 in ESP 2022a (Figure 2) and Plate 4) further supports this conclusion (see ESP 2022a).

a)

b)

Plate 3 View of the waterway at Stop 7, with views:
a) upstream of the track and fenceline; and
b) downstream of the track and fenceline.

[4] Winchester South Waterways technical agency assessment response: Technical Agency (TA)—Department of Agriculture and Fisheries

a)

b)

c)

d)

Plate 4 Site 62 showing a lack of waterway features, with views:
a) upstream;
b) towards the north;
c) downstream; and
d) towards the south

Summary of Central Waterway

The waterway determination completed by DAF (2023) based on a site inspection on 14 February is inconsistent with findings from ESP. Regardless of this, ESP accepts the determination of a waterway under the Fisheries Act undertaken by DAF. However, it is clear that much of the waterway as defined by DAF has a very low value in terms of fish habitat or fish passage opportunities (i.e. the lack of riparian habitat and fish habitat features, extended period of flow, and adequate flow to maintain ecological processes)and impacts to fish passage associated with the removal of this feature within the disturbance footprint will be insignificant.

Notwithstanding, Whitehaven WS will offset the impact to the central waterway as mapped by DAF (2023) in accordance with the Financial Settlement Offset Calculation Methodology outlined in the *Queensland Environmental Offsets Policy (Version 1.11)* and would re-establish surface drainage that is sympathetic with the natural existing drainage features.

Southern Waterway

The southern unnamed waterway upstream of the disturbance area lacks the features of a waterway providing for fish passage as defined by the Fisheries Act (ESP 2022a). Therefore, the southern unnamed feature is not considered a waterway providing for fish passage within the disturbance area. This conclusion was accepted by DAF following the February 2023 site inspection (DAF 2023). As such, no further action regarding this feature is required (i.e. there will be no SRI, and subsequently no offset is required).

Unmapped Waterway (Waterway 3)

DAF identified an unmapped waterway in the vicinity of the quarry that was described by DAF as 'an extension of a waterway mapped north of the proposed mining area' (DAF 2023). This waterway has not been assessed previously by ESP, nor was it assessed during the site visit with DAF on 14 February 2023. ESP note that this waterway as mapped by DAF (2023) is a significant distance from the quarry and from the northern waterway (Waterway 2) which flows through the quarry.

The *Winchester South Site Inspection 14 February 2023* report (DAF 2023) incorrectly states that Waterway 3 was visited during the site inspection on 14 February 2023 (i.e. Stop 6; shown on Figures 12, 13 and 14 in DAF 2023, and in Attachment A). However, Stop 6 was the pool at the headwaters of the northern waterway (Waterway 2); the coordinates for Stop 6 based on ESP's assessment are 22.136044°, 148.252871° (Figure 1).

This unnamed waterway, as mapped by DAF (2023), appears to flow through gilgai country, and to ESP's knowledge has not been subject to any onsite waterway determination. Based on desktop review of available aerial and LiDAR imagery (Figure 3), ESP does not consider this unmapped feature to be a waterway providing for fish passage within the disturbance area as it does not have any identifiable channel. Rather, the upstream extent of the waterway channel appears to be north of the mining lease application boundary (Figure 3). Within the disturbance area, the feature (as mapped by DAF) appears to consist of numerous gilgais that are fed through localised overland flow. During the terrestrial ecology assessment for the Draft EIS (E2M 2021), this region was characterised by pastureland with gilgai, bordered by Eucalypt woodland and Brigalow with Eucalypt (including areas of mature and immature regrowth; E2M 2021).

There is no evidence that Waterway 3, as mapped by DAF (2023), is a waterway providing for fish passage. Notwithstanding, Whitehaven WS will offset the impact to the waterway as mapped by DAF (2023) in accordance with the Financial Settlement Offset Calculation Methodology outlined in the *Queensland Environmental Offsets Policy (Version 1.11)*.

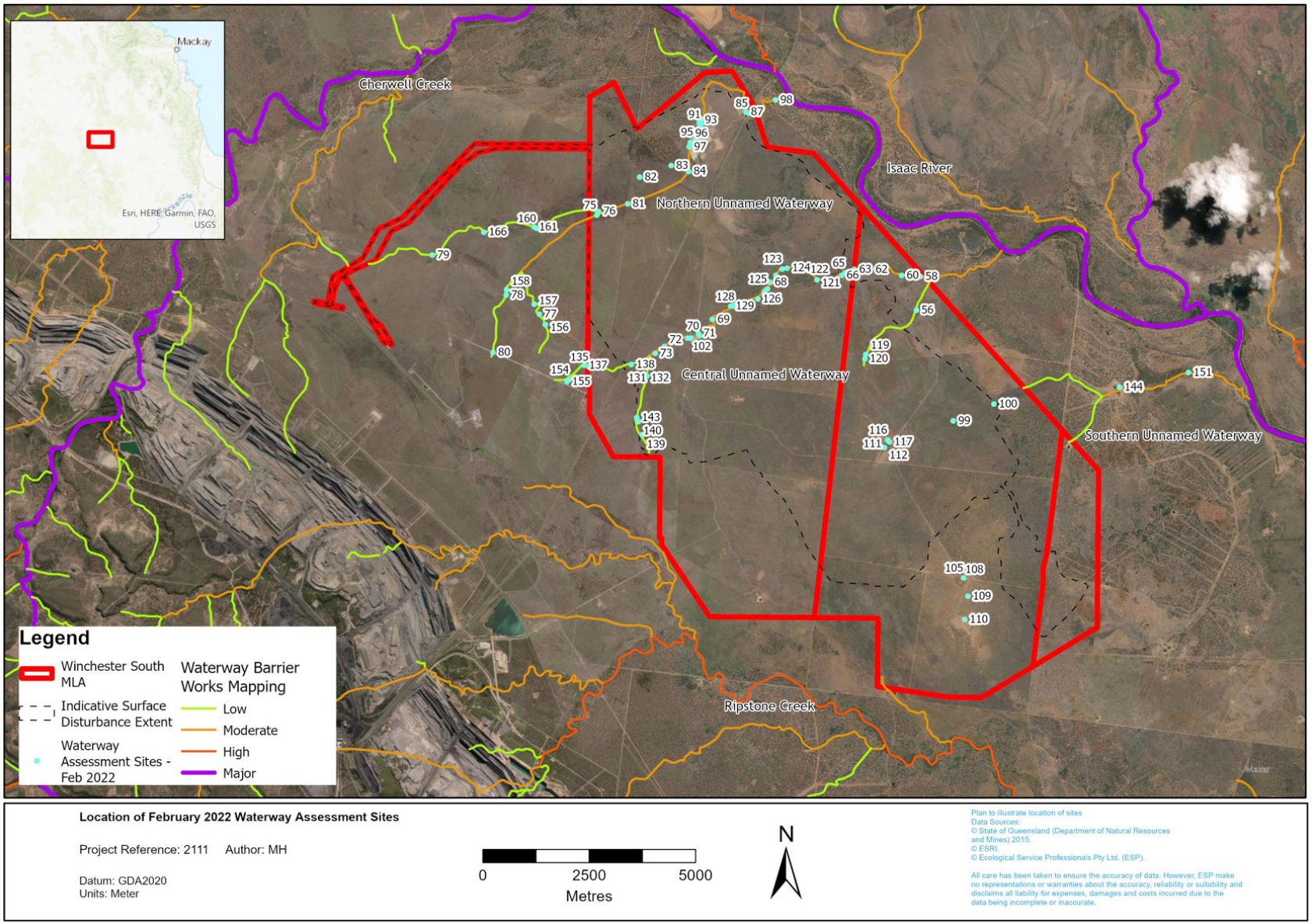


Figure 2 Waterway assessment sites surveyed by ESP in February 2022 (ESP 2022a)

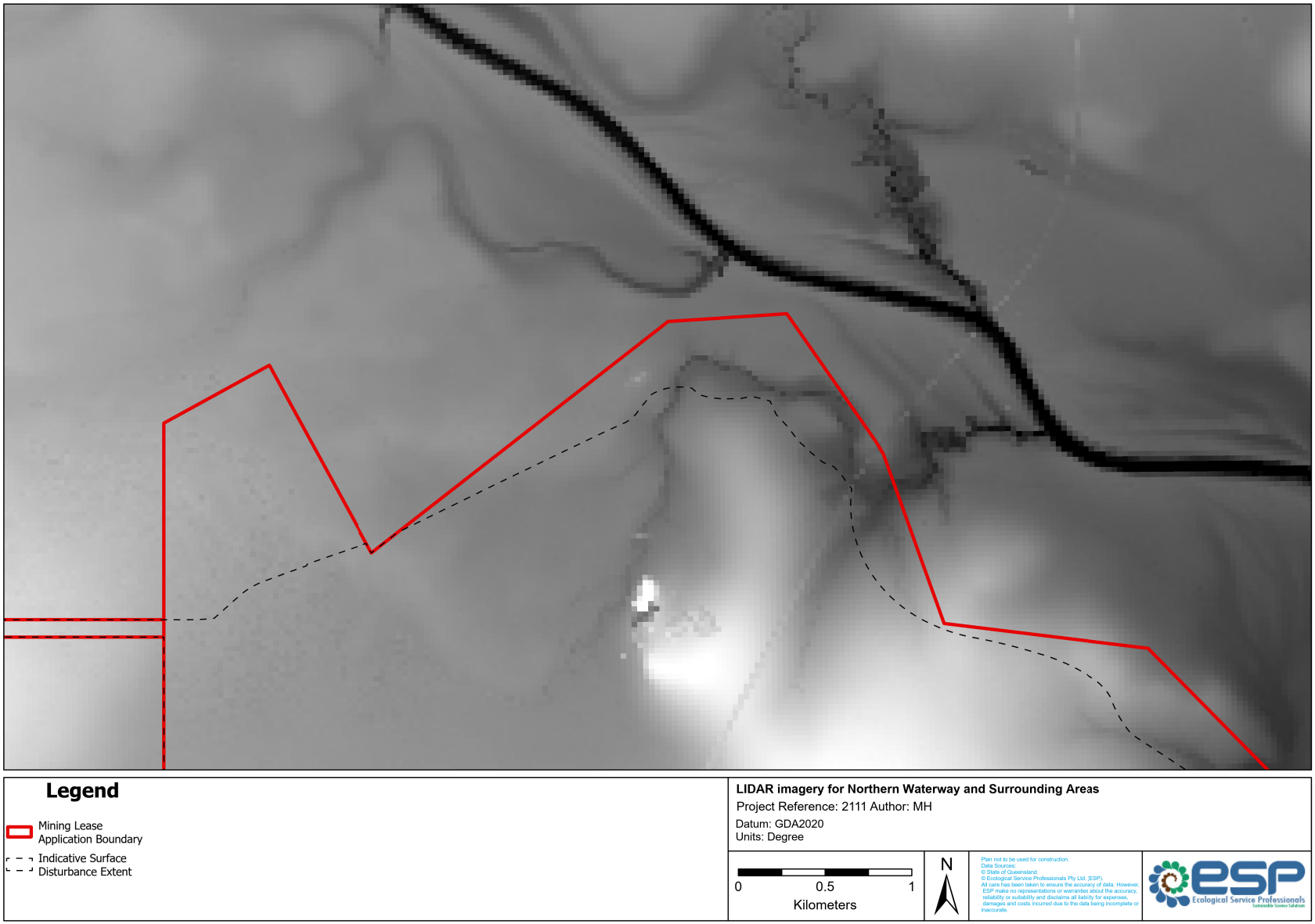


Figure 3 LiDAR imagery for the areas surrounding DAF's Waterway 2 and Waterway 3

Section – Aquatic Ecology and Stygofauna, Additional Information (3.2); Aquatic Ecology, Stygofauna Supplementary Assessment (Section 2.1); and Attachment 10: Aquatic and Stygofauna Supplementary Impact Assessment

Issue 610.4: Fish are defined under the Fisheries Act 1994*. The presence of live fish and dead fish such as crabs and mussels noted during surveys indicates that the waterway is providing fish passage. Given that the described invertebrates are considered fish under the* Fisheries Act 1994 *the extent of waterways providing fish passage remains as proposed by DAF.*

Noted. The presence of crabs and mussels within the disturbance area (as described in ESP 2021, 2022a) generally accords with DAF's determination of waterways providing for fish passage.

Section – Additional Information

Issue 610.14: (Figure 5.10c) Waterways providing fish passage are a value relevant to the project.

Issue 610.15: RE 5.6.1 Ecology: Revise the response to waterways providing for fish passage based on the information provided above.

Issue 610.16: (Fig. 5-6) There is likely to be an SRI for waterways providing fish passage.

Issue 610.23: RE 7.2.3.4 Impacts to waterways providing fish passage; Fig A7-6: The extent of waterways providing for fish passage requires revision as identified above. This must be included in the SRI on this matter.

Waterways providing for fish passage relevant to the Project (i.e. sections of the northern and central waterways and the unmapped waterway (Waterway 3) mapped by DAF (2023)) are described above. The SRI associated with potential impacts to these waterways is discussed below (Section – Attachment 7: Offset Management Strategy).

Issue 610.25: RE 7.2.3.6 Rehabilitation of waterways providing for fish passage: The proposal does not include impacts to all waterways providing fish passage at the site including the central waterway.

Issue 610.22: RE 7.2.2.3 Changes to flow durations: While the loss of 1 percent of flow from the Isaac River may result in little impact to this river, it will result in large impacts to the sub-catchments and waterways providing fish passage within the lease area.

Flows to waterways providing for fish passage downstream of the disturbance area are proposed to be maintained through construction of clean water diversions to direct surface flows around the disturbance area and to the lower reaches of the waterways. Regardless of this planned mitigation, a financial offset is proposed for disturbance of the northern and central waterways, as well as the unnamed Waterway 3 mapped by DAF (2023).

The section of the northern waterway providing for fish passage within the disturbance extent will be reinstated in the post-mining landform. The post-mining landform for the central waterway re-establishes surface drainage that is sympathetic with the natural existing drainage features, to provide flow to downstream waterways. Reinstatement of the central

waterway such that it is a waterway providing for fish passage is not feasible or considered necessary. Rather, a financial offset is proposed for impacts to the central waterway.

Issue 610.28: RE 7.2.3.9 Monitoring fish: To establish the effectiveness of a waterway for fish passage, diversions monitoring is necessary.

It is recommended that prior to the reinstatement of the northern waterway mapped by DAF (2023), a monitoring program for fish passage is developed and implemented to evaluate the effectiveness of timely and safe fish passage within the reinstated northern waterway in the post-mining final landform. Given that these details are a matter for detailed design, we suggest Whitehaven WS commits to developing and implementing the monitoring program for fish passage, with further details of the monitoring program provided at a later stage (e.g. prior to reinstatement of the northern waterway).

It is also recommended that the monitoring program includes the following during reinstatement of the northern waterway:

- site inspections to oversee the works and determine whether salvage is required; and
- fish salvage (only if required, following visual inspection when it is evident that fish are trapped following recession of waters).

Following reinstatement of the northern waterway in the post-mining landform, the following recommendations should be implemented due to the difficulties of accessing the site during and immediately following rainfall events (i.e. when there is potential for fish passage):

- the monitoring program will use flow rate monitoring (as proposed by DAF) to assess the adequacy of the diversion to suitably reduce the velocities for all or part of the flow events, such that fish passage is possible. This monitoring is expected to be executed through the installation of flow gauges at key stressor points (i.e. where the flow rates are predicted to be highest); and
- fish habitat assessments to ensure that there is adequate potential habitat (e.g. suitable flow types and shelter such as aquatic plants and woody debris) to allow for fish passage and fish habitat during periods of flow.

Issue 610.29: RE 7.2.3.10 Waterway Barrier Works: Self-assessment of What is a waterway? Should be supported by a waterway determination undertaken by DAF (the data custodians). As previously expressed, the determination of a waterway under the Fisheries Act is undertaken by DAF with the information provided by applicants and other data.

The mine access road crosses a mapped unnamed tributary of the Isaac River at ESP's assessment Site U3a (ESP 2021). Ground-truthing by ESP found that Site U3a is a drainage depression, with no defined bed or banks, or any other waterway features (ESP 2021 and ESP 2022a). This conclusion was supported by DAF following the site inspection on 14 February 2023, where it was agreed that this section of the feature was not a waterway providing for fish passage (DAF 2023). Therefore, an assessment of potential impacts of the access road on this feature (including associated mitigation and management measures) is not required.

Section – Attachment 7: Offset Management Strategy

Issue 610.3: Waterways providing for fish passage are not included in the Summary of impacts to Matters of State Environmental Significance for the project.

It is not possible to avoid disturbance of waterways providing for fish passage when developing the Winchester South Project.

Notwithstanding the commitments outlined above and that the impact to waterways providing for fish passage would not be significant for the central waterway and Waterway 3, Whitehaven WS has recalculated the SRI to each of the waterways as mapped by DAF (2023) (e.g. northern waterway, central waterway and Waterway 3) and will offset the disturbance in accordance with the Financial Settlement Offset Calculation Methodology outlined in the *Queensland Environmental Offsets Policy (Version 1.11)*. This has been included in Table H2 - Significant Residual Impacts to Prescribed Environmental Matters and shown on Figure H2 - Location of Significant Residual Impact to Matters of State Environmental Significance in Schedule H in Section 1.1 of Attachment 1 of the Response to Submissions.

Disturbance to the waterways as mapped by DAF (2023) will be fully offset at a cost of $185,800 for the total area of 6.8 hectares (ha) in accordance with the Financial Settlement Offset Calculation Methodology outlined in the *Queensland Environmental Offsets Policy (Version 1.11)*, as discussed below (Attachment B). Attachment 1 of the Response to Submissions includes the offset requirement for Waterways Providing for Fish Passage in Table H2.

Northern Waterway

The northern waterway (i.e. Waterway 2 in DAF 2023), as mapped by DAF following the site inspection on 14 February (2023) covers a length of approximately 2,750 m, with an average main channel width of 5.8 m (as determined through detailed site surveys, ESP 2022a) and a total area of approximately 1.59 ha. Whitehaven WS will offset the impact to the northern waterway as mapped by DAF (2023) in accordance with the Financial Settlement Offset Calculation Methodology outlined in the *Queensland Environmental Offsets Policy (Version 1.11)*.

While the full extent of disturbance to this waterway will be offset as described above, it should be noted that this waterway will be reinstated post-mining. Detailed design of the reinstated waterway will be completed at a future stage of the project. Recommendations regarding design considerations to ensure that the reinstated waterway has the potential to provide fish habitat and for fish passage are documented in Section 2.2.5.3 of ESP (2022b). The reinstated waterway would be subject to establishment of a monitoring program to confirm that it has the potential to provide for fish passage, as described above.

Central Waterway

The central waterway (i.e. Waterway 1 in DAF 2023), as mapped by DAF following the site inspection on 14 February (2023) covers a length of approximately 10,520 m, has an average main channel width of 4.6 m (as determined through detailed site surveys, ESP 2022a) and a total area of approximately 4.84 ha. As discussed above, most of this waterway and its tributaries consist of an eroded channel that does not contain fish habitat features, and there was no evidence of adequate or extended periods of flow. Therefore, impacts to fish passage associated with the removal of this feature within the disturbance footprint will

be insignificant. As such, mitigation measures (e.g. in the form of creation of a diverted or reinstated channel providing for fish passage) are not considered to be necessary. The post-mining landform for the central waterway re-establishes surface drainage that is sympathetic with the natural existing drainage features, to provide flow to downstream waterways. Whitehaven WS will offset the impact to the central waterway as mapped by DAF (2023) in accordance with the Financial Settlement Offset Calculation Methodology outlined in the *Queensland Environmental Offsets Policy (Version 1.11)*.

Unmapped Waterway (Waterway 3)

The unmapped waterway (i.e. Waterway 3 in DAF 2023), as mapped by DAF following the site inspection on 14 February (2023) covers a length of approximately 800 m, with an estimated average main channel width of 4.5 m and a total area of approximately 0.36 ha. Whitehaven WS will offset the impact to Waterway 3 as mapped by DAF (2023) in accordance with the Financial Settlement Offset Calculation Methodology outlined in the *Queensland Environmental Offsets Policy (Version 1.11)*.

Regards,

Lauren Thorburn

Ecological Service Professionals Pty Ltd

References

Department of Agriculture and Fisheries 2022, *What is a waterway?* Available at https://www.daf.qld.gov.au/business-priorities/fisheries/habitats/policies-guidelines/factsheets/what-is-a-waterway.

Department of Agriculture and Fisheries 2023, *Winchester South Site Inspection - 14 February 2023*.

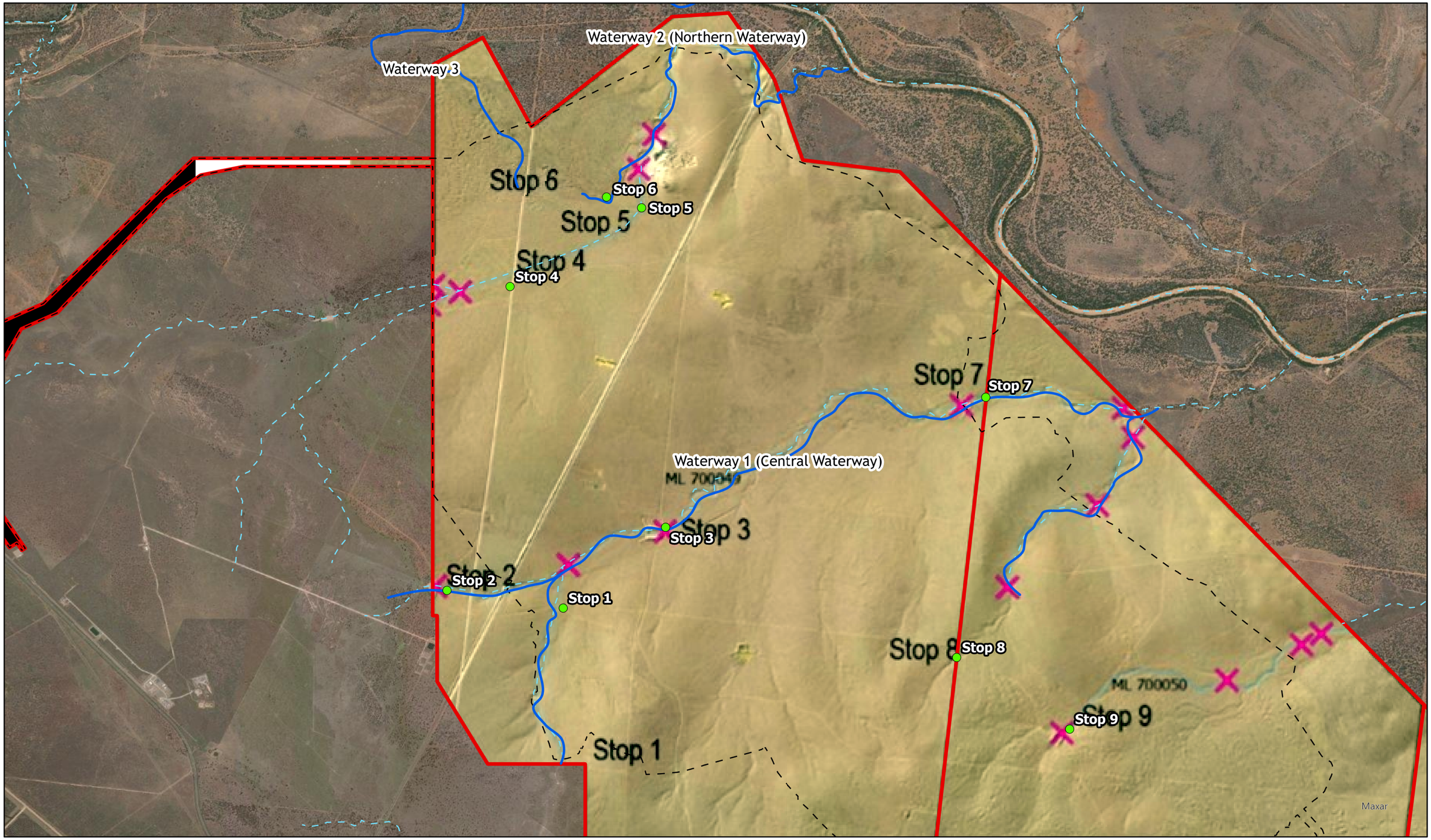
E2M 2021, *Winchester South Project Environment Impact Statement: Terrestrial Ecology Assessment,* report prepared for Whitehaven WS Pty Ltd.

ESP 2021, *Winchester South Project: Aquatic Ecology and Stygofauna Assessment,* report prepared by ESP for Whitehaven WS Pty Ltd.

ESP 2022a, *Winchester South Project EIS, Aquatic Ecology and Stygofauna, Additional Information*, report prepared for Whitehaven WS Pty Ltd.

ESP 2022b, *Winchester South Project, Aquatic Ecology and Stygofauna Supplementary Assessment,* report prepared for Whitehaven WS Pty Ltd.

Attachment A Figure Showing DAF's Indicated Stop Locations (per DAF 2023) for February 2023 Site Visit



Legend

- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Waterway Providing for Fish Passage (DAF 2023)
- Previous Waterway Barrier Works Mapping
- ESP Waterway Assessment Sites Feb 2023

DAF 2023 Waterway Determination Mapping with Previous Waterway Mapping

Project Reference: 2111 Author: MH
Datum: GDA2020
Units: Degree

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Kilometers

N

esp Ecological Service Professionals
Sustainable Science Solutions

Attachment B Financial Settlement Calculation

Subject: Environmental offsets calculator results - Financial settlement offset calculator
Date: Wednesday, 22 March 2023 at 3:32:07 pm Australian Eastern Standard Time
From: no-reply@des.qld.gov.au
To: Lauren Thorburn
Attachments: data.csv

Environmental offsets calculator results - Financial settlemer calculator

Payment details

Non-protected area cost

On ground cost	$135,800.00
Landholder incentive payment	$0.00
Administrative cost	$50,000.00
Total non-protected area cost	$185,800.00

Protected area cost

Total protected area cost	$0.00

Total cost

Grand total	$185,800.00

Total offset area: 6.79 ha

Section 1

Bioregion
Rivers and inland waterways
Subregion
Inland Waterways
Impact area
6.79 ha
Notional offset area
6.79 ha
Distinct matter area 1.1

Impact area: 6.79 ha
Notional offset area: 6.79 ha

Matter groups:

- 1.1.1: Fish passage

Sections, areas and matter groups used in calculations

Section	Bioregion / Marine (and waterways) zone	Subregion / Marine bioregion	Local government area (LGA)	Distinct matter area (DMA)	DMA impact area (ha)	DMA notion offset a (ha)
1	Rivers and inland waterways	Inland Waterways		1.1	6.79	6.79