REFERRAL OF A PROJECT FOR A DECISION ON THE NEED FOR ASSESSMENT UNDER THE *ENVIRONMENT EFFECTS ACT 1978*

REFERRAL FORM

The Living Murray

Hattah Lakes Environmental Flows Project

Lake Little Hattah Photo: B Merlin

PART 1 PROPONENT DETAILS, PROJECT DESCRIPTION & LOCATION

1. Information on proponent and person making Referral

Name of Proponent:	Goulburn-Murray Water (G-MW)	
Authorised person for proponent:	Greg Watkins	
Position:	Project Manager	
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Person who prepared Referral:	Sharada Ramamurthy	Faith Deans
Position:	Statewide Coordination of River Murray Icon Sites	Environmental Scientist
Organisation:	Department of Sustainability and Environment (DSE)	GHD Pty Ltd
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Available industry & environmental expertise: (areas of 'in-house' expertise & consultancy firms engaged for project)	DSE (Office of Water and Biodiversity & Ecosystem Services) G-MW Murray Darling Basin Authority (MDBA) Mallee Catchment Management Authority (CMA) Sinclair Knight Merz (SKM) Ecological Associates GHD Pty Ltd Environment Protection Authority (EPA) Arthur Rylah Institute (ARI) Murray Darling Freshwater Research Centre (MDFRC)	

2. Project – brief outline

Project title: *The Hattah Lakes Environmental Flows Project*

Project location: (describe location with AMG coordinates and attach A4/A3 map(s) showing project site or investigation area, as well as its regional and local context)

The Hattah Lakes are part of the Hattah-Kulkyne National Park (HKNP). The park is located in north-west Victoria, adjacent to the River Murray, in the triangle between the towns of Mildura, Robinvale and Ouyen, and to the east of the Calder Highway. The Hattah-Kulkyne National Park is 48,000 ha in area and is managed by Parks Victoria. The area of lakes and floodplains within the Park is approximately 13,000ha.

The Hattah Lakes have been identified as one of six icon sites under the MDBA's The Living Murray initiative. Twelve of the lakes are also listed as a Ramsar site.

A locality map of the Hattah Lakes National Park is attached in Appendices

Appendix 1.

Short project description (few sentences)**:**

The project involves construction of a pumping station, three regulators and three stop banks, refurbishment of an existing regulator and lowering of sills in Chalka Creek. These works will allow the replication, to some degree, of the extensive flooding that occurred in the Hattah Lakes before river regulation and large scale water extractions. The project also involves installation of a high voltage power line to supply electricity to the pump station.

3. Project description

Aim/objectives of the project (what is its purpose / intended to achieve?):

The project aims to restore a more natural water regime to the Hattah Lakes. The proposed works will enable flooding of 5583 ha of wetlands and floodplain, including:

- *1127 ha of wetlands, including 11 Ramsar-listed lakes;*
- *2959 ha of River Red Gum (Eucalyptus camaldulensis); and*
- *1272 ha of Black Box (Eucalyptus largiflorens).*

These works will provide a mechanism to water stressed floodplain vegetation and improve the extent and quality of habitat available for native waterbirds, fish, frogs, turtles and other wetland-dependent biota. As the pump station will allow water to be delivered to the lakes in the absence of floods, the lakes and surrounding floodplain can be protected during drought and through climate change.

Background/rationale of project (describe the context / basis for the proposal, e.g. for siting):

Hattah Lakes is one of six Icon Sites identified under the Murray Darling Basin Ministerial Council's The Living Murray Initiative, established in mid-2002 in response to widespread concerns about the environmental and economic health of the River Murray system. The Ministerial Council's First Step decision aimed to recover 500 GL to address the declining health of the River Murray system with an initial focus on maximising environmental benefits for six icon sites, including Barmah-Millewa Forests; Gunbower-Koondrook-Perricoota Forests; Hattah Lakes; Chowilla-Lindsay-Wallpolla; the Murray Mouth, Coorong and Lower Lakes; and the River Murray Channel.

These icon sites are flood dependent ecosystems which have been severely degraded by regulation of the River Murray and the extraction of water for agriculture, industry and urban use. This has changed the frequency, magnitude and duration of flows within the river, subsequently affecting the flow regimes of associated wetlands, waterways and floodplain. The Living Murray Initiative aims to address these threats through water recovery and the use of structural works and operational measures to maximise environmental benefits.

Funding for implementation of The Living Murray First Step is provided for through an Intergovernmental Agreement (IGA) signed by the NSW, Victorian, SA, ACT and Australian

Governments on 25 June 2004, and a Supplementary IGA released by the Council of Australian Governments (COAG) in 2006.

The MDBA is responsible for the implementation of the entire program. DSE is responsible for delivery of the program within Victoria. At the icon site level, CMA CEOs act as regional Icon Site Coordinators - the Mallee CMA's CEO oversees implementation of the Living Murray program at the Hattah Lakes icon site. State water corporations are MDBA's delegated constructing authorities for the icon sites. As such, G-MW is responsible for detailed design and construction of the works proposed for the Hattah Lakes. All infrastructure built under the Living Murray's Environmental Works and Measures Program (EWMP) will become assets of the River Murray Operations Assets Joint Venture.

This project is funded through the Living Murray's EWMP and is the culmination of six years of detailed investigations at the Hattah Lakes. Ecological objectives have been set for this icon site and numerous investigations have been undertaken to develop a suite of works to achieve them. These studies have used a range of tools to develop a package of works that will achieve the ecological objectives for the icon site, including digital elevation and hydraulic models. Further information about the development of the project is provided in the Investment Proposal (Appendix 2) including the ecological objectives for the icon site.

Main components of the project (nature, siting & approx. dimensions; attach A4/A3 plan(s) of site layout if available):

The project involves the following works:

- *Lowering sills in Chalka Creek to 41.75 m AHD;*
- *Construction of three regulators (Oatey's, Cantala and Messenger's);*
- *Works to provide fish passage at Oatey's and Messenger's Regulators;*
- *Construction of three stop banks (Bitterang, Breakout and Cantala);*
- *Refurbishment of the Little Hattah regulator; and*
- *Construction of a permanent pumping station.*
- *Construction of a 22kv powerline (both upgrades and new lines)*

*Concept designs have been prepared for the package of works and an investment proposal has been approved by MDBA. Approval of the investment proposal provides funding for the development of detailed designs. Information about the proposed works is provided below, with further details in the investment proposal (Appendix 2) and the Concept Design Report (*Appendix 4*).*

Appendix 3*shows the location of the proposed works and* Appendix 5 *the extent of inundation that can be achieved.*

Sill lowering in Chalka Creek south

Chalka Creek south is the main inflow point for the Hattah Lakes (see Appendix 3*). Water from the River Murray starts to flow into the creek when river flows exceed 37,600 ML/day. Lowering sills in the creek to 41.75m AHD will reduce the inflow threshold from 37,600 ML/day to 20,000 ML/day, increasing the frequency of natural inflows. This will allow inflows to occur 24% of the time, compared with 13% of the time at the current sill level (under historic flows).*

The proposed works will involve excavation of 28,000 m^3 of soil from four locations along Chalka Creek over a total distance of 1305 m (see

Appendix 3*). Site inspections have indicated this volume may be reduced during the detail design process. As part of the detailed design phase, engineers specialising in river and stream rehabilitation works will develop specific recommendations for the bed and banks of each sub-reach. This will refine the works required and minimise impacts on in-stream habitat.*

Construction of regulators and stop banks

The proposed regulators and stop banks will retain water within the project area to 45.0 m AHD (see

Appendix 3*). At this level, all wetlands within the area of influence are inundated, as well as large*

areas of fringing Red Gum and Black Box. This is the maximum inundation extent that can be obtained, minimising the number of structures required, and the negative impacts on flora, fauna and cultural heritage. As the entire project area has significant ecological and Indigenous cultural heritage values, a number of potential locations for each structure were identified, with the final location for each chosen based on the results of geotechnical investigations, cultural heritage, flora and fauna assessments and accessibility at proposed sites.

Regulators are proposed where maintaining the capacity for inflow and outflow is important, i.e. primary natural flow paths. These include Messengers Regulator on Chalka Creek south, just upstream from the offtake point on the River Murray (main inflow point for the lakes); Oatey's Regulator on Chalka Creek north, via which water returns to the River Murray as natural floods recede; and Cantala Regulator, on Cantala Creek, a minor effluent of the River Murray which empties into Lake Cantala (see

Appendix 3*). Using regulators at these points will enable the retention of water within the targeted inundation area (hereafter referred to as the Central Lakes region) following flood events and pumping of environmental water, and allow controlled return of water to the River Murray once ecological objectives have been met.*

Stop banks are proposed where the primary objective is to prevent water returning to the River Murray or flowing to areas outside the Central Lakes region, rather than allowing inflows and outflows. Proposed stop banks include the Breakout Stop Bank, Bitterang North Stop Bank and Cantala Stop Bank (see

Appendix 3*). The flow paths at these points are very wide and building regulators to allow two-directional flow would be prohibitively expensive; stop banks have been designed to be overtopped in large natural floods.*

Regulators:

***Messengers Regulator** will be constructed on Chalka Creek south, 150m upstream of the confluence with the River Murray. The regulator will prevent water returning to the river during managed flood events, as the pump station (see below) will deliver water from the River Murray to Chalka Creek upstream of the new Messengers Regulator. The regulator will have a maximum controlled water level of 45.5 m AHD, providing sufficient head for pumped water to spread throughout the Central Lakes region to the target level of 45 m AHD. This structure will replace the existing regulator which has a retention level of only 43.4 m AHD. The new regulator will be 7 m high; the combined regulator and earthen embankment will be 80 m long. The proposed regulator will remain open to allow inflows during natural flood events. It will also contribute to the drawdown of the floodplain in large, managed flood events and will have a release capacity of 750 ML/d.*

***Oatey's Regulator** will control outflows from the Central Lakes region via Chalka Creek north. The regulator will retain water to the target level of 45 m AHD. The regulator will be closed to enable filling of the lakes, either for a planned flooding event or to enhance a natural flooding event. The regulator will be 5.5 m high; the combined regulator and earthen embankment will be 55 m long. This regulator will be the principal release point from the flooding area to the River Murray and will be opened to drain the flood area or to allow natural flows to pass. The structure will have a regulated release capacity of 1250 ML/d.*

*The **Cantala Regulator** will be constructed on Cantala Creek, between Lake Cantala and the River Murray. The regulator will be operated to promote filling of the lakes by preventing water from the flooded area to the west draining to the River Murray. The regulator will be 5.3 m high; the combined regulator and earthen embankment will be 70 m long. Regulator gates will usually be open to allow inflows from the River Murray, and will only be closed during planned flooding events to attain the desired inundation level of 45 m AHD. No releases to the River Murray are planned at this location due to the steep return path to the river and the likelihood of erosion.*

Regulator specifications:

The three regulators shall have a common design consisting of:

- *A concrete regulator on the bed of the channel, 5-7 m high, with an opening width of 4 m;*
- *A sheet pile cut-off wall to minimise seepage;*

- *An earthen embankment of suitable impermeable material faced with road pavement gravel;*
- *Dual leaf over and undershot gates, to enable overshot flow for the majority of the time, facilitating fish and turtle passage;*
- *A plunge pool downstream of the regulator gates to prevent impact damage to fish and turtles passing through the regulators during the draining phase.*
- *Localised beaching at the structures and entry points into the river will prevent erosion at these sites.*

Regulators have also been designed to present minimal impedance to incoming floodwaters. Oatey's and Cantala regulators will be supported on concrete piles to minimise settling; Messenger's Regulator will have a single lane vehicle bridge, maintaining access along the River Track and to the pump station. The other regulators will have a walkway for operation and maintenance access.

Refurbishment of an existing regulator within the lake system is also proposed. The Little Hattah Regulator is located between Lakes Little Hattah and Lake Hattah (see Appendix 3*). The regulator is 2 m high and 6 m wide. The refurbishment will involve:*

- *Replacement of timber stop-logs with aluminium stop-logs;*
- *Minor concrete repairs and erosion protection works; and*
- *Installation of a new pedestrian deck with facility for lifting stop logs.*

Stop Banks

All stop banks will be earthen structures.

*The **Breakout Stop Bank** will be constructed along the alignment of the River Track near the Chalka Creek Reference Area, north of Messenger's Regulator. The stop bank will be 560 m long and up to 0.8 m high. It will prevent uncontrolled escape of water from Chalka Creek to the River Murray across low lying floodplain prior to reaching the target inundation level of 45 m AHD*.

*The **Bitterang Stop Bank** will be located adjacent to the existing Eagles Nest Track to retain water within the Central Lakes region by preventing flow to Lake Boolca and the Dry Lakes to the north of Lake Bitterang during maximum inundation pumped events. It will be 1090 m long and a maximum of 1.1 m high. The material used to construct this stop bank will be sourced within the Park adjacent to the site. This has minimised the amount of truck movements, upgrading of tracks and removal of vegetation required if alternative sites were used.*

*The **Cantala Stop Bank** will be built across a branch of Cantala Creek in the vicinity of the Cantala Regulator. The bank will prevent uncontrolled draining of water to the River Murray via Cantala Creek. The stop bank located within the creek will be approximately 40 m long and 2.3 m high.*

Construction of a Pumping Station at Messengers Crossing

A permanent electric pumping station will be constructed on the bank of the River Murray, near the confluence with Chalka Creek. It will be located approximately 100m from the new Messengers Regulator. The pumping station will be used to deliver water to the floodplain in the absence of sufficient natural inflows. Pumping is required at the Hattah Lakes site, due to the difference in height of the entrance to Chalka Creek and current water levels in the river. This allows the extent and frequency of watering to be managed so that the icon site ecological objectives can be achieved. The pumps will have sufficient capacity to replicate natural flooding events to a peak of 45 m AHD at a rate of rise and fall that matches natural flood peaks. The pumps will also be used to top up natural inflows, maximising environmental benefits and optimising the use of environmental water.

The pump station will be comprised of a bank of 7 axial pumps, each with a capacity of 144 ML/day, providing a total pumping capacity of 1008 ML/day. The pumps will have variable speed drives to ensure that the pumps are able to operate within their design parameters over a wide range of river levels and to facilitate soft starting of flow events. Telemetry is proposed to allow operation of the site from the G-MW Mildura office.

The pump station will be located in Victoria and the pipes and suction sections in NSW, covering a total of 1250 m^2. Seven pumps situated 2 m apart will be located on top of a concrete pad

(approximately 75 m^2) at the top of the river bank, above the high water mark. The high water mark is also the state boundary, so the pump station is located in Victoria. The pipes and suctions will extend approximately 17 m down the river bank and around 1.2 m into the river, so will be located in NSW and subject to NSW planning requirements and permits (see Section 10). Installation of the pipes and suctions will require excavation of the river bed. Fish barrier nets will be fitted to suction points and velocities will be kept to less than 0.8 m/s to minimise entrainment of water plants, debris, fish and other aquatic biota. Members of the MDBA's Fish Passage Taskforce reviewed the design of the pumps and regulator to build in appropriate design of the structures (full detail in Appendix 6*).*

Installation of a 22 kv power line

Various power supply options were investigated during the concept design phase, including natural gas, diesel and mains-delivered electricity. A cost-benefit analysis determined that mains-supplied electricity represents the most cost effective solution and avoids the risk of using diesel close to the River Murray and within the National Park. Parks Victoria, the land manager, also expressed a clear preference that diesel not be used long-term in the park in line with other irrigators in the region.

An existing power line to a nearby private property will be upgraded to supply 2 MVA to the pump station site. This involves an over build of the existing line within an existing power line easement. This easement may need to be modified following detailed design of the power line. An underground power line (around 200m in length) will be installed between the existing above ground supply and the pump station.

Ancillary components of the project (e.g. upgraded access roads, new high-pressure gas pipeline; off-site resource processing):

Existing access tracks may need to be upgraded to support transport of materials and heavy machinery during construction. The trees along existing tracks may need to be lopped or removed to accommodate the low loader trucks that will be used to import materials. These trees will be marked and accounted for in the net gain assessment, and appropriate off-sets provided.

The existing access tracks to the Cantala and Oatey's regulator sites are in close proximity to indigenous cultural heritage sites. Large trucks and machinery will not be able to access to the works sites using these tracks without significant impacts on cultural heritage, unless significant realignment takes place, which will require removal of native vegetation. New access routes have therefore been chosen in consultation with Indigenous stakeholders, and DSE and Parks Victoria staff, that have less impact on cultural heritage and native vegetation.

Key construction activities:

- *Establishment of construction sites, set down areas, access routes and removal of existing structures, where required.*
- *Importation of construction materials for tracks, regulators and stop banks. Any importation of borrow material will comply with conditions of consent under Section 27 of the National Parks Act 1975.*
- *Construction in compliance with the proposed Environmental Management Plan (EMP) for construction.*
- *Once construction of regulators, stop banks and all associated works are complete, all waste and spoil will be removed from the sites and disposed of as required by the proposed EMP.*

Key operational activities:

The package of works will:

- *Increase natural inflows to the Hattah Lakes;*
- *Retain water in the lakes system to increase the duration of inundation;*
- *Pump water into the system during periods of low river flows, in the absence of natural inflows; and*
- *Pump water into the system to augment natural floods, increasing the extent and duration of inundation.*

Infrastructure will be operated to maximise the frequency, extent, and duration of inundation over 5583 ha, meeting the water requirements of wetland and floodplain communities and enabling ecological objectives to be met. The area of inundation has been determined using the Hattah Lakes hydraulic model and vegetation mapping.

A preliminary operating strategy was developed for the project's investment proposal (see Section 8 in Appendix 2). This strategy outlines the likely operation of the structures under various scenarios. A more detailed operating strategy will be developed during the detailed design phase of the project and an operating manual will also be developed for each of the structures on completion.

The operating strategy aims to mimic the natural seasonality of flooding and inundate the lakes between August and November. Water will be delivered to the system via natural inflows or pumping.

The Hattah Lakes package of works has been designed to flood lakes, waterways and fringing vegetation (inundation to 43.5 m AHD), and to inundate the floodplain to an elevation of up to 45m AHD. The proposed works can be operated in a number of ways to manage the water regime to achieve flow objectives for particular water regime classes. In general, the works will be operated to provide low level flooding approximately three years in 10, targeting wetlands and fringing River Red Gums, and large floods one year in eight, targeting River Red Gums with drought tolerant understorey and Black Box. Potential operating scenarios are described below:

- *Increase frequency of natural inflows: Sill lowering in Chalka Creek will reduce the commence-to-flow threshold from 37,600 ML/day to 20,000 ML/day.*
- *Extension of a natural flood: Closing regulators on the flood recession to retain water on the floodplain.*
- *Enhancement of a natural flood: Using pumps to top up a natural flow peak and closing regulator to retain water on the floodplain.*
- *Managed inundation event with all flows delivered by pumping: Close regulators and pump to desired elevation.*
- *Unmanaged inundation event with all structures open to allow a large natural flooding event to enter the site and recede without retention: All regulators open for the duration of the flood.*

In the absence of natural high flows in the River Murray, environmental water for the lakes will be sourced from environmental entitlements via an annual allocation process. This may include water from the Living Murray, Commonwealth or Victorian environmental entitlements. This water has been specifically set aside for the environment, so use of water from these sources within the Hattah Lakes will not have an impact on the volumes available to other users. Water allocated to the Hattah Lakes will be released from upstream storages (e.g. Hume Dam or upstream weir pools) as it is requested by environmental water managers. This water will then be extracted using the proposed pump station and debited from the appropriate environmental water account.

As water will be specifically released for the lakes, the impact on downstream flows will be minimal, particularly as water will be primarily extracted during the irrigation season, when flows are, on average, 26,000 to 34,000 ML/day (under historic flows or "Base Case" scenario; outputs from DSE's Resource Allocation Model for the River Murray and tributaries). Reducing flows by up to 1000 ML/day (maximum pumping rate) will only marginally reduce in-stream water levels.

Once the desired duration of flooding has been achieved, regulators will be opened to return water to the River Murray at a rate of up to 1500 ML/day (through Oatey's and Messengers regulators). This will also return nutrients and plant propagules to the river, as well as adults and larvae of fish and other aquatic biota. Once regulators are opened, water will drain to natural retention levels throughout the system. Water retained within wetlands will be gradually lost through seepage and evaporation.

The actual volume of environmental water used in each managed flood event will depend on the volume of natural inflows, the volume consumed within the lakes (through seepage and evaporation) and the volume returned to the river once regulators are opened.

Key decommissioning activities (if applicable):
n/a
Is the project an element or stage in a larger project?
☐ No ☒ Yes If yes, please describe: the overall project strategy for delivery of all stages and components; the concept design for the overall project; and the intended scheduling of the design and development of project stages).
This referral describes all works planned for Hattah Lakes as part of the Living Murray program. There are additional works planned at other icon sites in Victoria as part of this program, including Gunbower Forest, Mulcra Island and Lindsay Island. Separate referrals will be submitted for each site, as required.
Is the project related to any other past, current or mooted proposals in the region?
☒ No ☐ Yes If yes, please identify related proposals.

4. Project alternatives

Brief description of key alternatives considered to date (e.g. locational, scale or design alternatives. If relevant, attach A4/A3 plans):

A range of options were investigated to achieve ecological objectives for the Hattah Lakes, which requires an increase in the frequency of inflows and the extent (to water the lakes and surrounding floodplain) and duration of flooding. The table below describes options that were investigated but not progressed further on the basis of cost-efficiency, operational flexibility and the extent of benefits.

A map of previous options is provided in Appendix 7.

Option	***Reason not pursued***
Lower Chalka Creek below 41.75 m to 41.55 m AHD (invert of current regulator at Messengers)	*Modelling (Lee et al.2009) indicated that this would only provide a small additional increase in benefit, reducing the commence-to flow of Chalka Creek from about 20,000 (at 41.75 m AHD) to 17,000 ML/day at Euston), whereas the additional impact (due to removal of spoil) and cost would be significant (GHD 2009). The Steering Committee agreed that lowering below 41.75 m AHD could not be justified in terms of cost/benefit.*
Lower Cantala Creek between Lake Cantala and River Murray from 42.3 m AHD to 42 m AHD or 41 m AHD	*Both lowering options were modelled by MDBA, in conjunction with a regulator on Cantala Creek to retain water in the lake.* *Lowering the creek significantly increases the frequency of inflows at lower elevations, but has minimal effect at higher elevations. As the lake can also receive inflows via Chalka Creek to the west (see below) this option was not considered further.*
Lower Cantala Creek between Lake Cantala and the Chalka Creek	*Lowering of Cantala Creek on the west side of Lake Cantala, between the lake and Chalka Creek was modelled by GHD to determine if these works are required. The sill level is currently approximately 43.3 m AHD. Provided the remainder of the system is watered every three years to 43.5 m, and provided there is sufficient conveyance in the creek channel, Lake Cantala may receive sufficient water from the west to allow the ecological objectives to be achieved without creek lowering works. The ability of water to reach Lake Cantala should however be monitored in case some excavation at high points would be beneficial.*
Removable weir on River Murray downstream of Chalka Creek to direct water into the creek independently	*This option was considered unfeasible due to the high anticipated cost (up to $50 million) and significant negative environmental impact, particularly as this is one of the remaining free-flowing reaches of the River Murray (GHD 2007).*

of river flows	
Raise existing rock bar on River Murray downstream of Chalka Creek off-take to direct flows into the creek, similar to a weir. The rock bar extends two thirds of the way across the river.	*Hydraulic modelling found that raising the bar to 44 m AHD (by up to 6 m) would have a negligible effect on Chalka Creek inflows (SKM 2007).*
Omit Bitterang Stop Bank to increase inundation area	*If a stop bank was not installed at Bitterang, water would flow unimpeded to Lake Boolca and the Dry Lakes. Achievement of inundation to 45 m AHD within the high priority Central Lakes area would then require massive amounts of additional water and enormous pumping capacity to achieve ecological objectives.*
Increase inundation area by flooding to greater than 45 m AHD for the flood area	*Examination of the Digital Elevation Model (DEM) and EVC mapping shows that 45 m AHD is the highest practicable elevation for inundation during managed flood events - that which maximises the extent of inundation in the central lakes area while minimising the number and size of regulators and stop banks required. At higher elevations (e.g. 45.5 m AHD) much larger structures and at least four additional stop banks would be required (GHD 2008c).*
Releases from Euston Weir to increase the peak of a flood	*SKM's (2004) investigations indicated that it would not be possible to operate the weir in such a way as to increase the peak of a flood to an extent that it would have any real impact on flooding at the Hattah Lakes icon site.*
Releases from upstream storages to extend a flood event	*SKM (2004) explained that this option was not feasible because all the major storages are so far upstream that huge volumes of water would need to be released to have any effect on flooding at the Hattah Lakes icon site.*

Brief description of key alternatives to be further investigated (if known)**:**

No further investigations are planned.

5. Proposed exclusions

Statement of reasons for the proposed exclusion of any ancillary activities or further project stages from the scope of the project for assessment:

n/a

6. Project implementation

Implementing organisation (ultimately responsible for project, i.e. not contractor)**:**

G-MW will be the implementing organisation. As the MDBA's delegated constructing authority for that reach of the River Murray, G-MW will be managing the detailed design and construction phases of the project.

All infrastructure will be owned by River Murray Operations Joint Venture and listed on the MDBA asset register as assets connected to Lock 11 (Mildura). It is expected that operation and maintenance will be the responsibility of G-MW and carried out by staff from Lock 11 (Mildura), on behalf of MDBA. It is likely that Parks Victoria staff will assist with operation as required.

Implementation timeframe:

Detailed designs are currently being developed for the proposed package of works (aside from the pump station) and are expected to be completed in August 2010. G-MW intends to let a design and construct contract for the pump station. Applications for the associated planning approvals will be submitted in the coming months.

Concurrently to detailed designs, a construction proposal will be developed by G-MW for approval by the MDBA. It is anticipated that the construction proposal will be submitted in September 2010. Approval of the construction proposal will provide funding for construction and a call for construction tenders will be released. The design and construct contract for the pump station will also be let at this time.

Construction is anticipated to commence in February 2011 and will take approximately nine months (complete in November 2011). It is anticipated that there will be three construction crews working simultaneously on the pump station, regulators and stop banks/creek lowering.

Proposed staging (if applicable): *n/a*

7. Description of proposed site or area of investigation

Has a preferred site for the project been selected?

☐ No ☒ Yes If no, please describe area for investigation.
If yes, please describe the preferred site in the next items (if practicable).

General description of preferred site, (including aspects such as topography/landform, soil types/degradation, drainage/ waterways, native/exotic vegetation cover, physical features, built structures, road frontages; attach ground-level photographs of site, as well as A4/A3 aerial/satellite image(s) and/or map(s) of site & surrounds, showing project footprint):

Works will occur within the Hattah-Kulkyne National Park and borrow material is planned to be sourced from nearby private property. The area includes access tracks of varying standards (all-weather gravel to dirt tracks). There are fewer than ten houses within a five km radius of the proposed works. The closest urban centres are Ouyen and Mildura, which are 40 km and 70 km away, respectively.

The national park covers 48,000 ha, most of which is typical mallee country with extensive low scrub and open native pine woodland. The freshwater lakes and permanent flow in the nearby River Murray create a unique aspect, providing food and shelter for waterbirds and fish within a semi-arid landscape. Stands of River Red Gum line the banks of the River Murray and the ephemeral streams that run through the park. Numerous large old trees are present providing important habitat for hollow-dependent species, such as Regent Parrot (Polytelis anthopeplus monarchoides), Carpet Python (Morelia spilota metcalfei) and Brushtail Possum (Trichosurus vulpecula). Extensive areas of Black Box woodlands and small areas of Lignum tend to dominate the landscape at higher elevations and greater distances from the lakes, where flooding is less frequent. Cypress-pine (Callitris spp.) and Buloke (Casuarina luehmannii) occupy the rolling sand plains. On higher and less fertile sand ridges, Mallee eucalypts flourish. Most of the area was heavily logged and grazed after European settlement but the condition has improved since the park was proclaimed in 1960.

The Hattah Lakes floodplain is a complex of lakes and watercourses set within a wider floodplain vegetated by River Red Gum, Black Box and small areas of Lignum (Muehlenbeckia cunninghamii). The system has adapted to utilise regular inundation events created by peaks in River Murray flow of varying magnitude and duration. Chalka Creek is the main waterway within the park. It is a well-defined natural watercourse which diverges from the River Murray 69 km downstream of the Euston Weir. When river flow exceeds 36,700 ML/d, water flows through Chalka Creek and spills into Lake Lockie, 19 km from the River Murray. Once Lake Lockie fills, water spills into the wetland complexes to the north and south.

At higher river flows, water also enters the Hattah floodplain from the northern continuation of Chalka Creek which joins the River Murray further downstream, spreading to additional lakes and the fringing Red Gum woodland community. Lake Cantala is an isolated lake filled by an independent flow path, Cantala Creek, which fills when river levels exceed 45,000 ML/d at Euston.

The lakes are well defined basins that retain water for long periods after River Murray flow peaks recede. They provide persistent aquatic habitat that supports communities of native fish and waterbirds.

Site area (if known):

The combined area of all worksites during construction will be less than 15 ha. This does not include tree lopping and track upgrades during construction (see below).

Route length (for linear infrastructure) *30* (km) **and width** *~5m; 10 m wide for passing areas* (m)

This is the length of all existing access tracks which may require lopping of overhanging limbs or tree removal. Specific numbers are yet to be confirmed. Approximately 18 passing bays have been nominated along access tracks.

Current land use and development: *National Park*

Description of local setting (e.g. adjoining land uses, road access, infrastructure, proximity to residences & urban centres):

The Hattah-Kulkyne National Park is bounded by the River Murray to the east, the Calder Highway to the west and the Hattah-Robinvale Road to the south. The park is surrounded by private land which has been largely cleared for agriculture, including dryland farming and irrigated horticulture. There are also areas of private property within the park, including Kulkyne Station which is intermittently grazed, a house block near Messengers (currently for sale) and approximately 5 acres of privately owned un-occupied land adjacent to Oatey's regulator.

There are fewer than ten houses within a five km radius of proposed works. The nearest townships are Hattah and Nowingi, which abut the park. The closest urban centres are Ouyen and Mildura, which are 40 km and 70 km away, respectively.

Planning context (e.g. strategic planning, zoning & overlays, management plans):

The following zones and planning scheme overlays apply to this area. Maps and schedules are detailed in Appendix 16*.*

Zoning

- *Zoned Public Conservation and Resource Zone,*
- *Overlays include Environmental Significance Overlay 1 – River Murray Corridor and Land Subject to Inundation Overlay.*

Plans and Strategies

- *Hattah Lakes Icon Site Environmental Management Plan 2006-2007 (MDBC 2006)*
- *Mallee Regional Catchment Strategy (Mallee CMA 2003)*
- *Mallee Parks Management Plan (Department of Natural Resources & Environment 1996)*
- *Murray River Frontage Action Plan – Robinvale to Merbein (Mallee CMA 2003)*
- *Hattah-Kulkyne Lakes Ramsar Site Strategic Management Plan (DSE 2003)*

Note: Parts of the pumping station will be in NSW and will require approvals from that state.

Local government area(s):

Mildura Rural City Council

8. Existing environment

Overview of key environmental assets/sensitivities in project area and vicinity
(cf. general description of project site/study area under section 7)**:**

Hattah Lakes is recognised for its many environmental, social and economic values – in particular for its role as a refuge and breeding habitat for migratory waterbirds and its sites of indigenous cultural significance. The system is comprised of over 20 seasonal and intermittent freshwater lakes, ranging in size from less than 10 ha to around 200 ha. Surrounding vegetation communities

range from those that require frequent flooding, such as Red Gum woodland, to those that require only periodic inundation, such as Black Box woodland and Lignum shrubland.

*Twelve of the lakes are listed as a wetland of international importance under the Ramsar Convention (*Appendix 19*), these are:*

- *Arawak (40 ha)*
- *Bitterang (73ha)*
- *Brockie (28 ha)*
- *Bulla (40ha)*
- *Cantala (101ha)*
- *Konardin (121ha)*
- *Hattah (61ha)*
- *Kramen (161ha)*
- *Lockie (141ha)*
- *Mournpall (243ha)*
- *Yelwell (81ha)*
- *Yerang (65ha)*

These wetlands are listed due to their value to waterbirds. In regard to carrying capacity, up to 288 Hoary-headed Grebes (Poliocephalus poliocephalus), 101 Freckled Duck (Stictonetta naevosa) [listed as threatened in Victoria under the Flora and Fauna Guarantee (FFG) Act 1988], 1960 Pacific Black Duck (Anas superciliosa), 2550 Grey Teal (Anas gracilis), 1280 Pink-eared Duck (Malacorhynchus membranaceus), 128 Black-fronted Dotterel (Elseyornis melanops) and 1000 Australian Pelicans (Pelecanus conspicillatus) have been recorded at any one time. Sixteen waterbird species have also been recorded breeding at the site (DSE 2003).

The Ramsar site includes two different types of wetland − Deep Freshwater Meadow and Permanent Open Freshwater. Deep Freshwater Meadow is one of Victoria's most depleted wetland habitats and is the least represented in Victoria's protected area network (DSE 2003).

While no construction activities are proposed within the Ramsar site, some works will occur within close proximity of the listed lakes as described in the table below:

Ramsar-listed wetland	***Structure***	***Distance from works site***
Lake Hattah	*Lake Little Hattah Regulator refurbishment.*	*130 m*
Lake Cantala	*Cantala Creek Regulator*	*1.5 km*
Lake Bitterang	*Bitterang Stop Bank*	*1 km*

All other works will occur at least ten kilometres from the Ramsar-listed lakes. The proposed structures will enable more natural water regimes to be achieved at all Ramsar-listed wetlands within the Hattah Lakes with the exception of Lake Kramen. Works have been developed to water Lake Kramen but EWMP budget limitations mean that there is no funding available for construction.

The park supports a high diversity of vertebrate fauna, with 281 species recorded (Atlas of Victorian Wildlife 2007, Parks Victoria 2000). More than 230 of these are birds (Parks Victoria 2000) and a large proportion of these rely directly on flood-dependent habitats. Species include various migratory waders, dabbling and diving ducks and large fish-feeding species such as cormorants and darters, which feed, breed and shelter in wetland habitats; as well as birds which depend on the tree hollows, seeds, nectar and insect prey provided by healthy floodplain vegetation.

Of the birds recorded, four species are listed under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999. Of those, two are dependant on flooding and floodplain vegetation: the Regent Parrot, which nests in tree hollows within River Red Gum and Australian Painted Snipe (Rostratula australis), a wader that forages around the fringes of the flooded lakes.

Eleven waterbird species are considered threatened in Victoria (listed under the Flora and Fauna Guarantee (FFG) Act 1988), including Freckled Duck (Stictonetta naevosa), Blue-billed Duck (Oxyura australis), Australian Painted Snipe, Eastern Great Egret (Ardea modesta), Intermediate Egret (Ardea intermedia), Little Egret (Agretta garzetta), Caspian Tern (Sterna caspia), Australasian Bittern (Botaurus poiciloptilus), Little Bittern (Ixobrychus minutus), Gull-billed Tern (Sterna nilotica) and White-bellied Sea Eagle (Haliaeetus leucogaster). Twelve of the recorded waterbird species are migratory and protected under JAMBA and CAMBA.

Historically, the lakes have held water for decades without drying, supporting mature fish populations, including the EPBC-listed Murray Cod (Maccullochella peelii peelii) and historically (previously in 1963) Murray Hardyhead (Craterocephalus fluviatilis). The record of Murray Hardyhead is considered likely to be a misidentification (most likely Flyspecked Hardyhead (southern form), Craterocephalus stercusmuscarum fulvus), as the lakes do not provide the type of habitat in which this species is normally found (I. Ellis – MDFRC, pers. comm.). FFG-listed fish species recorded include Silver Perch (Bidyanus bidyanus), Eel-tailed Catfish (Tandanus tandanus) and Flyspecked Hardhead.

The FFG-listed Inland Carpet Python which feeds on small reptiles, small to medium mammals and birds, is associated with the lakes and shelters in the hollows of River Red Gum and Black Box tree branches and fallen logs. Ten bat species have been recorded within the Hattah-Kulkyne National Park, including the EPBC-listed Greater Long-eared Bat (Nyctophilus timoriensis).

The wetlands and floodplain support nine Ecological Vegetation Classes (EVCs), illustrated below including:

- *EVC 106 - Riverine Grassy Forest - Depleted within the Robinvale Plain Bioregion;*
- *EVC 811 - Grassy Riverine Forest - Depleted within the Robinvale Plain Bioregion;*
- *EVC 813 - Intermittent Swampy Woodland - Depleted within the Robinvale Plain Bioregion;*
- *EVC 818 - Shrubby Riverine Woodland- Least Concern within the Robinvale Plain Bioregion;*
- *EVC 295 - Riverine Grassy Woodland - Depleted within the Robinvale Plain Bioregion;*
- *EVC 823 - Lignum Swampy Woodland - Depleted within the Robinvale Plain Bioregion;*
- *EVC 103 - Riverine Chenopod Woodland - Depleted within the Robinvale Plain Bioregion;*
- *EVC 808 - Lignum Shrubland - Least Concern within the Robinvale Plain Bioregion;*
- *EVC 104 - Lignum Wetland - Vulnerable within the Robinvale Plain Bioregion; and*
- *EVC 107 - Lake Bed Herbfield - Depleted within the Robinvale Plain Bioregion.*

Additionally, the proposed borrow pits support modified treeless Semi-arid Woodland (EVC 97 – Vulnerable within the Robinvale Plain Bioregion) in poor-fair condition, whilst one of the borrow pits on the Orchard Partners property supports modified treeless Woorinen Sands Mallee (EVC 86 - Depleted in the Robinvale Plain Bioregion) in fair condition .

Eight plant species found on the Hattah Lakes floodplain are listed, or nominated for listing, under the FFG Act 1988. One of these species, Winged Peppercress (Lepidium monoplocoides), is listed as nationally endangered under the EPBC Act 1999.

Vegetation surveys of potential works sites identified one of these species within the activity areas, the FFG-listed Pop Saltbush (Atriplex holocarpa).

The icon site also has significant cultural and social value. The lakes have been a focus for traditional Aboriginal society for thousands of years. There are over 1000 registered Aboriginal archaeological sites within the Hattah-Kulkyne National Park and the local Indigenous community maintains a strong connection to the area.

The area lies on the border of two documented language groups, the Latji Latji and the Jari Jari (SKM, 2007). Historically, the lakes would have provided an abundant and reliable source of food and water for Aboriginal populations. Early observations suggest the area was densely populated in the 1830s and continually occupied until at least 1914. The local Indigenous community still maintains strong connections to the land and its traditional resources. The Robinvale Aboriginal

Corporation has filed a native title claim that includes the Hattah Lakes.

9. Land availability and control

Is the proposal on, or partly on, Crown land?

☐ No ☒ Yes If yes, please provide details.

The proposal entails works within the Hattah-Kulkyne National Park, managed by Parks Victoria. All works are within the national park with the exception of borrow pits whose sites are yet to be confirmed but are most likely going to be on nearby private land.

Current land tenure (provide plan, if practicable):

National Park

Intended land tenure (tenure over or access to project land):

National Park

Other interests in affected land (e.g. easements, native title claims)

The land is subject to a native title claim by the Robinvale Aboriginal Community (V6002/2000 and V6003/98). The claim was filed on 27 March 1996 and is yet to be determined.

10. Required approvals

State and Commonwealth approvals required for project components (if known):

Works Requiring Approval	*Approval required*	*Act*	*Determining Authority*
Removal of hollow-bearing trees that may impact on Regent Parrot and Greater Long-eared Bat habitat. *Construction activities in riparian habitats that may impact on potential Winged Peppercress habitat.*	*Determination under the EPBC Act 1999*	*Commonwealth Environmental Protection and Biodiversity Conservation Act 1999*	*Commonwealth Department of Environment, Water, Heritage and the Arts*
Borrow pits	*Planning Permit*	*Victorian Planning and Environment Act 1987 and the Mildura Planning Scheme*	*Mildura Rural City Council*
All works	*Consent under Section 27 of the National Parks Act 1975*	*Victorian National Parks Act 1975*	*Victorian Minister for Environment*
All works	*Public Land Managers Consent*	*Victorian Planning and Environment Act 1987 and the Mildura Planning Scheme*	*Victorian Department of Sustainability and Environment*
All regulators, erosion control works, pump station, Cantala stop bank and Kulkyne Station borrow pit	*Licence to construct and operate works on a waterway*	*Victorian Water Act 1989*	*Lower Murray Water*
All works sites	*Cultural Heritage Management Plan*	*Victorian Aboriginal Cultural Heritage Act 2006*	*Aboriginal Affairs Victoria*
All works	*Notification to Native Title Claimants*	*Commonwealth Native Title Act 1995*	*Relevant Native Title Claimants*
All works within the National Park	*Consent under Section 27 of the National Parks Act 1975*	*Victorian National Parks Act 1975*	*Parks Victoria*
Borrow pits	*Extraction permit*	*Victorian Extractive Industries Development Act 1995*	*Victorian Department of Primary Industries*

Any listed threatened flora recorded on site	*Permit to remove threatened or protected flora*	*Victorian Flora and Fauna Guarantee Act 1988*	*Victorian Department of Sustainability and Environment*

A number of NSW planning permits will also be required, as construction will occur within NSW also (banks and bed of the River Murray)The Victorian border is defined as the southern high water mark if the River Murray:

Pipes and suctions extending down river bank into the River Murray	*Development Consent*	*NSW Environmental Planning and Assessment Act 1979*	*Balranald Shire Council*
Pipes and suctions extending down river bank into the River Murray	*Licence over Crown Land*	*NSW Crown Lands Act 1989*	*NSW Land and Property Management Authority*
Pipes and suctions extending down river bank into the River Murray	*Controlled Activity permit*	*NSW Water Management Act 2000*	*NSW Office of Water*

Have any applications for approval been lodged?

☐ No ☒ Yes If yes, please provide details.

The Cultural Heritage Management Plan (Plan ID 10455) was approved by the Secretary, Department of Planning and Community Development on 25 March 2010.

All other approvals will be lodged once the determination on this referral is received.

Approval agency consultation (agencies with whom the proposal has been discussed):

- *Parks Victoria – Land manager*
- *Mallee CMA - Water Act licence*
- *DSE, Biodiversity & Ecosystem Services Division - Consultation regarding native vegetation removal, potential impacts on Regent Parrot, FFG Act and Wildlife Act requirements and permits*
- *Heritage Victoria*
- *Mildura Rural City Council*
- *Aboriginal Affairs Victoria – regarding development of the Cultural Heritage Management Plan (CHMP)*
- *Commonwealth Department of Water, Heritage and the Arts – regarding EPBC Act referral. Submission of this referral is expected at the end of May 2010.*

Other agencies consulted:

Goulburn-Murray Water

PART 2 POTENTIAL ENVIRONMENTAL EFFECTS

11. Potentially significant environmental effects

Overview of potentially significant environmental effects (identify key potential effects and comment on their significance and likelihood, as well as key uncertainties):

While reinstating a wetting and drying regime to the Hattah Lakes of appropriate frequency, duration and extent is likely to impart significant ecological benefits for the Hattah Lakes, large infrastructure projects such as this have inherent environmental risks. There will be some short-term impacts during the construction phase, however an EMP is being developed that identifies potential environmental risks and highlights mitigation strategies to avoid or minimise these risks. Any impacts will be localised and site rehabilitation will occur following completion. The EMP will set out specific measures that will be employed to minimise impacts during construction. This plan will be submitted with the planning permit application and will be implemented by all construction contractors.

A CHMP has also been completed in accordance with Victorian legislation to manage risks to cultural heritage during construction. The Hattah Lakes Floodplain Management CHMP (see Appendix 13) provides management recommendations and contingency plans for the protection and preservation of Aboriginal archaeological sites.

A detailed semi-quantitative analysis of the potential salinity impacts of the proposed operational scenarios has also been completed. This assessment concluded that a major salinity impact on the River Murray, Hattah Lakes or surrounding floodplain is unlikely to occur and outlines a monitoring program to verify this (see Appendix 8*).*

Eutrophic conditions may develop in the lakes after flooding, particularly in larger events when the adjacent floodplain is also inundated. This is not considered a key risk as blue-green algal blooms are common at Hattah Lakes following natural floods. While blue-green algal blooms have

resulted in the occasional closure of some lakes to recreational activities, these blooms are a natural phenomenon in floodplain ecosystems and Parks Victoria does not consider that active management is necessary. Parks Victoria have developed plans to manage the public health risk associated with blue-green algal blooms and will undertake frequent monitoring of algal concentrations during blooms. In the event of a bloom, cautionary signage is posted around affected lakes to alert the public.

Black-water events may also occur following floodplain inundation due to breakdown of leaf litter and terrestrial vegetation by bacteria, which releases nutrients into the water. This is not considered a significant risk associated with the works, as black-water events are a natural process. Operation of the proposed works may actually reduce the incidence of black-water events by restoring more frequent floods to the system and reducing the accumulation of leaf litter and nutrient loads between inundation events.

Overall, the project is likely to significantly benefit the environment, reinstating appropriate wetting and drying regimes to over 5500 ha of wetlands and floodplain. This will maintain and enhance the health of more than 1000 ha of wetlands, almost 3000 ha of River Red Gum and more than 1200 ha of Black Box communities. This will increase the extent and condition of habitat for aquatic and floodplain fauna, including waterbirds, fish, frogs, turtles and terrestrial species reliant on floodplain habitats, such as woodland birds, bats, small/medium mammals and reptiles. The project will enable environmental water to be delivered to 11 of the 12 Ramsar-listed lakes (excluding Lake Kramen), assisting in maintaining the ecological character of the Ramsar site. This will be of particular benefit during long dry periods and under current climate change scenarios.

Impacts on vegetation

Vegetation clearing has been avoided wherever possible, but all construction activities will involve physical disturbance to the floodplain, requiring the removal of up to 12 ha of native vegetation, including approximately 20 large old trees, as defined in Victoria's Native Vegetation Framework. The area and number of trees will be further refined during detail design to minimise this footprint. Project engineers and ecologists are currently refining the construction footprint and final figures be available in June 2010.

Structures have been positioned to minimise vegetation loss, including shifting of the Breakout Stopbank from its original location beside the River Track to within the footprint of the track. Track establishment has been designed to minimise removal of large trees at both the Oatey's and Cantala sites. Some vegetation will need to be cleared around works sites and along access tracks for safety reasons and to allow the movement of large trucks and machinery required for construction. Passing bays have been sited in areas which require no tree removal and minimal vegetation disturbance.

Preliminary vegetation and habitat assessments have been completed and a Net Gain Assessment will be undertaken in June 2010 at all construction sites. The principal of avoid, minimise, off-set, in accordance with Victoria's Native Vegetation Framework, has been applied to minimise the impacts of construction. Any native vegetation clearing that does occur will be offset in accordance with the Native Vegetation Framework.

Impacts on fauna

A range of impacts are likely to occur in regard to fauna species and their habitats resulting from the construction of the floodplain management structures for this project. Impacts may include but are not limited to the following (further detail can be found within GHD 2009, Appendix 15*):*

- *Direct mortality or injury to ground-dwelling species during construction;*
- *Removal of, or disturbance to, the roots of hollow-bearing trees, resulting in tree mortality and consequent loss of a key habitat feature for hollow-dependent fauna;*
- *Removal of leaf litter, woody debris and low shrubs, and an associated decline in low-lying structural habitat;*
- *Disturbance/damage to ground-layer vegetation and other terrestrial habitats through*

trampling and vehicle traffic;

- *Disturbance caused by human activity such as increased levels of noise, dust and light – these changes could result in animals abandoning breeding attempts and/or moving away from habitats in close proximity to the construction zones;*
- *Erosion, runoff and sedimentation of waterways, wetlands and other drainage lines*
- *Accidental spills of oils and other chemicals; and*
- *Introduction of weeds to construction areas or dispersal of weeds from the construction areas to other locations.*

These impacts will be managed and mitigated according to guidelines in the proposed EMP during and after construction.

12. Native vegetation, flora and fauna

Native vegetation

Is any native vegetation likely to be cleared or otherwise affected by the project?
☒ NYD ☒ No ☒ Yes If yes, answer the following questions and attach details.

What investigation of native vegetation in the project area has been done? (briefly describe)

Preliminary flora surveys and assessment of likely impacts, including habitat hectare and Net Gain assessments.

What is the maximum area of native vegetation that may need to be cleared?

Total area to be cleared is approximate at this stage, but is anticipated to be less than 12 ha.

Access tracks

- *Lopping of trees along existing access tracks (note: approximately 350 trees will have less than 30% of their canopy lopped; any trees that requires more than 30% of its canopy to be lopped has been counted as removed);*
- *Removal of trees and understorey vegetation to accommodate passing bays along existing access tracks (up to 0.8 ha cleared); and*
- *Removal of trees and understory vegetation to construct new access tracks and to widen or straighten existing access tracks (up to 2.1 ha cleared).*

Pump Station, regulators and stop banks

- *Removal of mature trees (approximately 30 large old trees); and*
- *Clearing of 5.76 ha.*

Chalka Creek excavation

- *Removal of approximately 4 mature trees; and*
- *Clearing of 1.15 ha.*

Temporary concrete batch plant on Kulkyne Station

- *No removal of trees; and*
- *Clearing of up to 1 ha.*

Installation of high voltage power line

The design of the power line over build and underground construction footprint is yet to be finalised. This will be designed by Powercor and assessed in the following months.

- *removal of trees (TBA following designs); and*
- *Clearing of native vegetation (TBA following designs).*

How much of this clearing would be authorised under a Forest Management Plan or Fire Protection Plan?
☒ N/A ……approx. percent (if applicable)

Which Ecological Vegetation Classes may be affected? (if not authorised as above)
☒ NYD ☒ Preliminary/detailed assessment completed. If assessed, please list.

The following EVCs will be impacted on by the construction of water management structures and associated infrastructure. These areas will be further refined following detailed pegging of sites and are expected to be less than those calculated below.

Site	***EVC***	***Bioregional Conservation Status***	***Approximate area affected***	
Bitterang stop bank	*Riverine Chenopod Woodland*	*Depleted*	*1.7 ha*	
Breakout stop bank	*Riverine Chenopod Woodland*	*Depleted*	*0.8 ha*	
Pump station and Messengers regulator	*Riverine Grassy Woodland*	*Depleted*	*1 ha*	
Oatey's regulator *New access tracks*	*Riverine Grassy Woodland*	*Depleted*	*0.8 ha* *1.4 ha*	
Cantala regulator *New access tracks*	*Riverine Grassy Woodland*	*Depleted*	*0.36 ha* *0.7 ha*	
Little Hattah regulator	*Riverine Grassy Woodland*	*Depleted*	*0.02 ha*	
Rock beaching at Chalka Creek north outlet	*Riverine Grassy Woodland*	*Depleted*	*0.05 ha*	
Cantala stop bank	*Intermittent Swampy Woodland*	*Depleted*	*0.08 ha*	
Kulkyne Station borrow pit	*Intermittent Swampy Woodland*	*Depleted*	*1 ha*	
Temporary concrete batch plant (Kulkyne Station)	*Riverine Chenopod Woodland*	*Depleted*	*1 ha*	
Chalka creek lowering	*Intermittent Swampy Woodland*	*Depleted*	*0.4 ha*	
Chalka Creek south lowering	*Intermittent Swampy Woodland*	*Depleted*	*0.75 ha*	
Orchard Partners borrow pit	*Predominantly Introduced Vegetation*	*N/A*	*N/A*	
Power line installation	*TBC*	*TBC*	*TBC*	
TOTAL			***10.06 ha***	

Flora and fauna

What investigations of flora and fauna in the project area have been done?

Detailed site assessments have been undertaken at each works site to determine existing vegetation types and potential habitat and how best to manage or minimise impacts associated with construction. Relevant flora and fauna assessment /Investigations include:

- *Report for Hattah Lakes Living Murray Floodplain Management Project – Ecological Assessment (GHD 2009);*
- *Annual Condition Monitoring-waterbirds, fish and floodplain vegetation (MDFRC 2009);*
- *Hattah Lakes Living Murray Floodplain Management – Aquatic Investigation (GHD 2007);*
- *A Survey of Regent Parrot Breeding Colonies along the Murray River In Victoria (Webster & Belcher 2005);*
- *Net-gain Assessment (GHD in prep May 2010);*
- *Eastern Hooded Scaly-foot Survey (GHD 2009);*
- *Tree Health Assessments (GHD in prep 2010).*

If known, what threatening processes affecting these species or communities may be exacerbated by the project? (e.g. Loss or fragmentation of habitats) Please describe briefly.

The project will involve the removal of native vegetation of up to 12 ha, including up to approximately 20 large old trees, some of which contain hollows. The impact of this activity is described below in regard to species likely to utilise these habitats.

Are any threatened or migratory species, other species of conservation significance or listed communities potentially affected by the project?

☒ NYD ☒ No ☒ Yes If yes, please describe:

EPBC-listed Migratory Species

A diverse suite of EPBC-listed migratory species that have been recorded within 10 km of the study area. The majority of these species are likely to use the Hattah Lakes and surrounding habitats at certain times of the year (e.g. summer migrant Rainbow Bee-eater) or at various periods during the filling and drying of the lakes (e.g. Australian Painted Snipe may use the lakes following a period of inundation and the Eastern Great Egret is likely to forage along the Chalka Creek once full). The proposed project will provide over 1000 ha of wetland habitat (at various stages during the inundation period and subject to environmental water availability) and maintain and enhance the condition of floodplain and wetland vegetation. Other species such as the Black-eared Miner (generally a mallee specialist) and Fork-tailed Swift (generally an aerial forager that rarely lands away from coastal breeding areas) are unlikely to be greatly affected by the proposal. It is likely that the proposal as a whole will be beneficial to a range of resident and migratory species, through increased wetland productivity, improved condition of wetland and floodplain vegetation and hence fauna habitats.

Despite the overall positive impacts of the project, construction will entail some vegetation removal which is likely to adversely impact some threatened species, as described below.

EPBC-listed Migratory Species [Protected Matters Search Tool (PMST)

Common Name	*Scientific Name*	*Predicted (PMST)*	*Recorded (AVW, GHD 2009)*
Black-eared Miner	*Manorina melanotis*	✓	✓
Cattle Egret	*Ardea ibis*	✓	
Eastern Great Egret	*Ardea modesta*	✓	✓
Latham's Snipe	*Gallinago hardwickii*	✓	✓
Fork-tailed Swift	*Apus pacificus*	✓	✓
Australian Painted Snipe	*Rostratula australis*	✓	✓
Malleefowl	*Leipoa ocellata*	✓	
Rainbow Bee-eater	*Merops ornatus*	✓	✓
White-throated Needletail	*Hirundapus caudacutus*	✓	
White-bellied Sea-eagle	*Haliaeetus leucogaster*	✓	✓

Hollow Dependent Fauna:

Regent Parrot:

The Regent Parrot is listed as threatened in Victoria under the FFG Act 1988 and nationally under the EPBC Act 1999. The Regent Parrot typically nests within suitable hollows of RRG, with the male initially travelling up to 20 km to forage within Mallee habitats, returning to feed the female

(when incubating eggs) and later the nestlings. There are records of this species at all of the proposed construction sites within the study area and breeding activity has been observed within the broader Hattah Lakes area (Lake Mournpall, Lake Hattah, Lake Bulla), Chalka Creek (north and south arms), Sextons Bend, 'The Boiler', Retail Bend, and at the sites of the proposed Messengers and Oateys regulators (Webster and Belcher 2005, GHD 2009) (also see map in

Appendix 11 *and Ecological Assessment,* Appendix 15*, pp. 61, 89). Construction activities will require the removal of approximately eight large old RRGs at Messengers Regulator (approx 5 trees) and Oateys Regulator (approx 2 trees) that could potentially contain Regent Parrot nests (at this stage, no Regent Parrot nests have been confirmed within the trees proposed for removal) and could also disturb the roots of other RRGs that may contain Regent Parrot nests.*

Increased levels of noise and general activity may also create sufficient disturbance to cause parrots to abandon nesting activities. It is difficult to predict the likelihood of this occurring as Messenger's has always been the subject of much activity due to the current environmental watering program where diesel pumps and other vehicles have been present for weeks to months. These activities do not appear to have precluded Regent Parrot breeding attempts in the past. It is possible that the parrots will continue to breed provided that construction activities occur outside the breeding season, however, a residual risk still remains that breeding attempts could still be disrupted although this is unlikely to be significant.

Throughout the Park, previous surveys have recorded 75 individual Regent Parrot nests and 35 suspected nests (these are individual nests, with multiple nests possible within the same tree) (Webster and Belcher 2005, GHD 2009, refer to Appendix 5). Whilst not quantified in GHD (2009), it is suspected that many additional nest sites exist within the Park (P Murdoch and S Southon pers. comm.). GHD (2009) confirmed four nests GHD 2009 at Messenger's Regulator and four nests at 'Oateys'.

Ecologists from GHD and staff from the Mallee CMA have worked with construction engineers to situate proposed regulators so that removal of known nesting trees is avoided wherever possible. The rich cultural landscape and geotechnical issues were also key (and sometimes conflicting) considerations when identifying suitable locations for regulators, so removal of some trees was unavoidable.

This has resulted in the proposal to remove only one tree with confirmed nests, six trees with suspected nests and the retention of 12 trees with suspected nests at Messengers and one tree with confirmed nests at Oateys. More than 60 confirmed nest trees exist within the Park (Webster and Belcher 2005).

This project is expected to maintain and enhance the breeding habitat (River Red Gums) of Regent Parrots through improved tree health and increased recruitment of new trees. Research indicates that the widespread decline of Red Gums along the River Murray floodplain is caused by the reduction in flooding due to the combined effects of river regulation, water extraction and, in more recent time, severe drought (Cunningham et al. 2007 and 2009). River Red Gum communities at Hattah are currently in a state of decline, with many trees exhibiting poor health (MDFRC 2009, see Appendix 15*) and less than 30% considered to be in "good" condition (Cunningham et al. 2009).*

The proposed management of water regimes through this project is likely to be critical to maintaining breeding habitat for Regent Parrots within the Hattah-Kulkyne National Park in both the short and long term.

Greater Long-eared Bat, Major Mitchell's Cockatoo (Lophochroa leadbeateri), Inland Carpet Python and Lace Monitor (Varanus varius):

Other species likely to be impacted by the removal of habitat in localised areas where the structures are built are the following FFG-listed hollow-dependent species: Greater Long-eared Bat, Major Mitchell's Cockatoo, Inland Carpet Python and Lace Monitor. Each of these species relies on hollow-bearing trees either as refuge or for breeding purposes.

The Inland Carpet Python and Lace Monitor use hollow-bearing trees for refuge, as foraging habitat (source of prey such as small reptiles, mammals and nestlings), to thermoregulate (e.g. move in and out of to control body temperature), to hibernate within and, in the case of the Inland Carpet Python, to lay and incubate eggs within. The Inland Carpet Python is likely to be relatively scarce

within the study area (and also very difficult to observe), with the Lace Monitor much more visible and recorded during the field investigation (GHD 2009a, Appendix 8). Both of these species could potentially use habitats within the proposed construction areas, although both are less specialised that the Regent Parrot and present throughout the National Park (i.e. utilise hollow-bearing trees of River Red Gum and Black Box, with less specialisation in regard to the size of hollows).

The Greater Long-eared Bat (also EPBC-listed) relies on hollow-bearing trees as roosting/breeding sites. This species is generally associated with Mallee habitats and has been frequently recorded within the Hattah-Kulkyne National Park and from riparian habitats in the eastern parts of Australia. The loss of roosting/breeding sites through tree removal during construction may impact upon this species (e.g. loss of possible occasional roosting and breeding sites, unlikely to significantly impact on this species), although the River Red Gum/Black Box habitats present at the proposed construction sites are likely to be a secondary preference to hollow-bearing Mallee habitats (which support hollow-bearing Mallee trees, preferred roosting and breeding habitat for this species).

Major Mitchell's Cockatoo was recorded during the field assessment (GHD 2009a, Appendix 15*) in association with the Chalka Creek and Lake Hattah. This species is known to nest in a range of hollow-bearing tree species, including Slender Cypress Pine (Callitris sp.), Mallee (Eucalyptus spp.) and is also known to nest within Red Gum (A. Holmes – GHD, pers. obs.). This species could potentially nest within large hollow-bearing trees within or near to construction sites, although this is likely to be a relatively rare event. It is possible that potential nests for this species could be removed or damaged through the construction process.*

Each of these hollow-dependent fauna species are expected to potentially experience localised impacts from the construction phase of the project to varying degrees, i.e. the Regent Parrot, with its specialised nesting preferences may suffer a greater impact than the Lace Monitor that uses a broad size range of hollows within various trees for different purposes.

For all species, this project is likely to provide a net benefit through the maintenance and enhancement in condition of existing hollow-bearing trees. In addition, the works will provide the appropriate conditions for recruitment of Red Gum and Black Box trees within the Central Lakes area, and for maturation and development of hollows, maintaining habitat in the long-term for these species.

Under the current flow scenario, floods occur at insufficient frequency, duration and extent to maintain large areas of habitat for these species. Without intervention, the quality and extent of suitable habitat will continue to decline, threatening the viability of their populations within the Hattah-Kulkyne National Park.

Other Species:

Eastern Hooded Scaly-foot (Pygopus schraderi):

Initial surveys (GHD 2009, Appendix 15*) suggested that a number of the set-down areas may have provided potential habitat for the FFG-listed Eastern Hooded Scaly Foot. This species generally occurs in low chenopod shrublands, native grasslands, and Black Box and Buloke communities located on a clay/clay-loam substrate.*

While this species is only known from a few locations in north-western Victoria (Terrick Terrick National Park, Kerang, Lake Ranfurly and Ned's Corner Station), the area does provide potential habitat for this species. As individuals are known to shelter in soil cracks, spider burrows, fallen debris, rocks and dead vegetation, proposed activities within set-down areas could disturb habitat and result in injury or mortality of any individuals present.

This is considered unlikely however, as there are no records of the Hooded Scaly-foot within the Hattah-Kulkyne National Park and the species was not observed during recent nocturnal surveys of proposed activity areas (GHD 2009, see **Appendix 9***).*

Growling Grass Frog (Litoria raniformis):

This species (also EPBC-listed) has been recorded within various wetlands in the Mallee CMA region (e.g. Kings Billabong, Mulcra Island, and Lake Cullulleraine Channel). This species is predicted to occur within the study area. The proposed construction activities are unlikely to impact on this species as Chalka Creek and the lakes (in the vicinity of the works) will largely be dry and so

will not provide suitable habitat (i.e. the species is unlikely to be present).

Overall, the Growling Grass Frog is likely to benefit from the proposed project, as it will improve the extent and habitat quality of wetland habitat, increasing opportunities for breeding, feeding and dispersal.

Bush Stone-curlew (Burhinus grallarius):

Bush Stone-curlew is reliant on open woodland with scattered woody debris and low shrubs. This habitat type occurs at many of the proposed construction sites, in particular at the proposed Breakout Stop Bank. Construction is expected to have little impact on habitat for this species as, although this stop bank structure will be about 600 m long, it will be located on the River Track, thus avoiding the need to clear large areas of suitable habitat.

Other threatened species:

A range of other threatened species has been recorded from within a 10 km radius of the study area (see GHD 2009, Appendix 15*). These species are unlikely to be adversely impacted upon by the proposal and in fact, many of these species are wetland dependent and likely to derive significant benefit from the wetting and drying regimes (including appropriate frequency, duration and extent of inundation and drying periods) to be implemented through the project.*

Flora

Flora surveys have been carried out at each potential construction site (GHD 2009a) Ecological Assessment, see Appendix 15*). No nationally threatened flora species were recorded however one species listed under the FFG Act (Pop Saltbush, Atriplex holocarpa) was recorded.*

A total of 16 flora taxa of state conservation significance (i.e. listed under the DSE Advisory List of Rare or Threatened Plants in Victoria, 2005) were identified during the survey of the potential construction sites. These taxa and the site(s) at which they occur are listed below:

Common Name	***Scientific Name***	***Status***	***Site***
Pop Saltbush	*Atriplex holocarpa*	*v, f*	*Cantala Creek Lowering 1,4 and 2*
Riverine Flax-lily	*Dianella porracea*	*v*	*Cantala Creek Lowering 5*
Spear-fruit Copperburr	*Sclerolaena patenticuspis*	*v*	*Clay Borrow Pit 4*
Twin-leaf Bedstraw	*Asperula gemalla*	*r*	*Cantala Creek Lowering 5*
Garland Lily	*Calostemma purpureum*	*r*	*Breakout Regulator*
Blue Burr-daisy	*Calotis cuneifolia*	*r*	*Breakout Stop Bank*
Three-wing Bluebush	*Maireana triptera*	*r*	*Set Down Area No. 1*
Goat Head	*Malacocera tricornis*	*r*	*Set Down Area No. 2*
Spiny Lignum	*Muehlenbeckia horrida subsp. horrida*	*r*	*Set Down Area No. 1*
Sandhill Spurge	*Phyllanthus lacunellus*	*r*	*Chalka Creek Lowering 4 Breakout Stop Bank*
Small-leaf Swainson-pea	*Swainsona microphylla*	*r*	*Clay Borrow Pit 3*
Plains Joyweed	*Alternanthera sp. 1 (Plains)*	*k*	*Chalka Creek Lowering 4, Breakout Regulator, Cantala Creek Lowering, all sites*
Warty Peppercress	*Lepidium papillosum*	*k*	*Cantala Creek Lowering 1,2,4*
Native Peppercress	*Lepidium pseudohyssopifolium*	*k*	*Breakout Stop Bank*
Black Roly-poly	*Sclerolaena muricata var.*	*k*	*Cantala Creek Lowering*

	muricata		*3,5, Kulkyne Station*
Desert Spinach	*Tetragonia eremaea s.s.*	*k*	*Set Down Area No. 2*

Key:
f listed under the FFG Act
v vulnerable in Victoria
r rare in Victoria
k poorly known in Victoria

This project will require clearing of small areas of a number of EVCs and may include the removal of some threatened or protected flora species within activity areas. This will not result in a major or extensive impact on any of these EVCs or individual species as the impacts will be of a localised nature, with the loss of only a very minimal area of native vegetation. The EVCs to be impacted by the project are all 'depleted' and as such are relatively well represented within the mallee catchment (i.e. status is not 'vulnerable' or 'endangered'). The possible threatened plants that could be impacted by the project are generally 'poorly known', 'rare' or 'vulnerable' and are likely to only be impacted upon at a highly localised scale. Occurrences of these species have been mapped and will be avoided where possible during construction.. As such, the loss of a genetically important population, or extensive loss of important species of flora is considered extremely unlikely to occur due to the localised nature of construction and the mitigation measures to be implemented during construction (e.g. avoiding occurrences of threatened flora species).

Overall, impacts of the project on vegetation are expected to be positive due to the higher frequency and duration of flooding that will occur. This will contribute to meeting the water requirements of these vegetation communities.

Is mitigation of potential effects on indigenous flora and fauna proposed?

☒ NYD ☒ No ☒ Yes If yes, please briefly describe.

All sites have been chosen to minimise impacts on indigenous flora and fauna, balancing this with potential impacts on significant cultural heritage sites and geotechnical considerations. Flora and fauna assessments were undertaken at sites to quantify the impact of the works on flora and fauna and recommend design-based measures to mitigate potential impacts.

Clearing native vegetation will be minimised wherever possible and, where clearing cannot be avoided, will be offset according to the Native Vegetation Framework. An off-set management plan will be submitted to DSE for approval.

In addition, the following general mitigation measures will be implemented to minimise and avoid impacts upon identified ecological values at all construction sites:

- *Structural works should avoid disturbing established hollow-bearing trees. Construction activities should be well away from surrounding large trees to avoid damage to the roots. A safe operating distance can be estimated by measuring the diameter of the tree (in centimetres) and multiplying by 12 (Tree Logic 2004). Several of the proposed structures may be in close proximity to mature hollow-bearing trees, therefore site-specific working distances will need to be established to minimise impacts on tree root zones;*
- *Where possible, undertake sill lowering works in channels between late autumn and mid winter, where potential stress to eucalypt root zones is likely to be minimised by cooler and moister conditions;*
- *Establish work zones for each site to avoid 'sensitive' habitats (including areas containing threatened flora). This could be implemented through an initial briefing of construction works crews by a qualified ecologist and subsequent planning of safe work distances and establishment of each site, with periodic 'compliance' inspections as part of any works supervision process (this could potentially be conducted by Parks Victoria or a qualified ecologist contracted for this purpose). Temporary fencing should be erected around 'sensitive' areas to indicate areas to avoid during construction;*
- *Temporary fauna-proof barriers could be erected to prevent fauna from moving into the construction zone, particularly during the spring/summer, which is a period of high activity for many species. Trenches and deep holes should be covered or fenced off when*

unattended (i.e. after the completion of work, weekends, public holidays etc);

- *Develop and implement an EMP for the construction phase. This EMP should provide appropriate measures to avoid or minimise indirect impacts such as erosion, sedimentation and the accidental spill of oils or other chemicals. It would also provide a protocol for minimising impacts in ecologically sensitive areas such as the Hattah Lakes. Ideally, the EMP would be audited during and following the construction process to ensure works have been conducted appropriately;*
- *Develop and implement a plan to manage weeds during and after the construction phase within the study area (this could be part of the overarching EMP);*
- *Avoid periods of high activity for fauna such as spring and early summer when many species are active either breeding or foraging and may be disturbed or harmed by construction activities. This applies particularly to the Regent Parrot, in which case, construction should avoid the breeding season for this species (September to December inclusive);*
- *Rehabilitate construction areas, including setting aside topsoil to be reinstated when works are complete and compacting to original levels. If native vegetation must be removed, re-spreading of stored topsoil should occur within these areas, followed by monitoring to assess germination in the following year. Appropriate weed control measures at the site following the works should be incorporated into the rehabilitation program, as soon as possible. If the site is not naturally re-colonised by locally indigenous species, planting of locally indigenous species appropriate to that particular position in the landscape should be undertaken in the following year. Ground debris that is temporarily removed to allow construction activities, should be reinstated following the completion of works;*
- *Avoid driving machinery into waterway and floodway areas following heavy rain, to avoid damage to tracks and creation of new tracks; and*
- *Minimise the need to create new tracks and use existing tracks as much as possible.*

Hollow Dependent Fauna:

Regent Parrot:

*Specific mitigation measures have been developed by GHD 2009 to avoid and minimise impacts to Regent Parrot (*Appendix 15*). These recommendations are listed below and will be implemented during construction.*

- *Removal and damage to hollow-bearing trees will be avoided wherever practicable, taking into consideration the root zone of these trees. Trees confirmed as nesting sites during the field surveys (GHD 2009a) have been marked using a handheld GPS (Global Positioning System device) and mapped (see Appendix 11). Discussions have then taken place between the project ecologists and engineers to modify the location and design of proposed structures to avoid impacts, wherever possible, to all confirmed Regent Parrot nesting trees. These discussions have been successful in avoiding all confirmed nest trees (see*
- Appendix **4** *which show concept designs of proposed structures at Messenger's Regulator and 'Oateys' and retained [confirmed] Regent Parrot nest trees)*
- *Clear work zones will be established using highly visible temporary fencing to restrict traffic within and around 'confirmed Regent Parrot nests;*
- *Construction activities will not be undertaken within the breeding season for Regent Parrots (September to December inclusive at locations where nesting has been confirmed;*
- *Nest boxes will be provided within the vicinity of affected breeding sites to minimise the impacts of short-term habitat loss (i.e. removal of existing or potential nesting sites). While nest boxes are not an ideal replacement for the loss of a hollow-bearing tree, they are known to be widely used by birds in captivity and in the wild for nesting purposes (Hurley*

2009,

- Appendix 11*). It is proposed that the loss of any large old trees through this project will be offset by the installation of nest boxes (at least two-three nest boxes would be erected to offset each tree removed). It is possible that hollow-bearing sections of trees that are removed could be converted into a new nest box as an existing hollow is likely to possess superior thermal properties, dimensions, depth and hollow entry size than a constructed nest box (existing hollows could also be artificially altered to the preferred dimensions for Regent Parrots)*
- *Monitoring of the Regent Parrot breeding colonies at Messenger's and Oateys should be conducted each breeding season (within the period of September to December, preferably late September through October), to monitor breeding activity post construction. The monitoring program should also incorporate nest box usage (by the target species and other non-target species) and nest box attrition. The monitoring program should be conducted for a period of 5-years post construction (i.e. monitoring conducted over 5 separate breeding seasons). This activity will provide data that indicates whether Regent Parrots are continuing to breed at the two locations and whether they are using the nest boxes.*

These mitigation measures are likely to be successful in preserving existing (known) nest trees and minimising short-term impacts on breeding colonies, however do not address the removal of other River Red Gums that provide potential nest sites (i.e. unknown or unconfirmed nest trees).

Excluding construction activities from the breeding season will minimise disturbance when Regent Parrots are nesting, but birds will also carries out inspection of potential nest sites prior to the breeding season. It is possible that construction activities may disturb these activities, although hollow inspection could occur at any time outside the breeding season, therefore it is difficult to mitigate this potential impact without excluding construction altogether.

Greater Long-eared Bat, Major Mitchell's Cockatoo, Inland Carpet Python and Lace Monitor:

Mitigation measures for these species will largely be addressed by those for Regent Parrots, including avoidance of hollow-bearing trees and damage to native vegetation. Any trees that must be removed will be redistributed within the general area as woody debris, which will be beneficial for species such as the Inland Carpet Python and Lace Monitor.

Other Species:

Eastern Hooded Scaly-foot:

Nocturnal spotlight surveys were undertaken for this species (see Appendix 9 *GHD 2009b) at the sites identified as supporting potential habitat (see* Appendix 15*, GHD 2009a, proposed set-down areas). Although the surveys did not detect the species, recommendations have been made to avoid components of the proposed set-down area in better condition which could still be capable of supporting the species (corner of River and Kulkyne Tracks). These areas will now be excluded from all construction activities. The EMP will also contain mitigation measures in the event that any individuals of this species are found during construction.*

Growling Grass Frog:

No mitigation measures are proposed as the impacts on this species are unlikely to be significant.

Bush Stone-curlew:

Mitigation measures such as avoiding disturbing native vegetation, establishing temporary 'works zones' and fencing 'sensitive' areas will minimise significant impacts on this species. Realigning the proposed 'Breakout Stop Bank' so that it is constructed on top of River Track will greatly reduce the potential impacts of the project.

General mitigation measures of all threatened species:

*The mitigation measures to avoid or minimise impacts to fauna values are detailed in the Ecological Assessment (*Appendix 15*). Mitigation measures will be included in the EMP, including the examples such as (not an exhaustive list), establishment of work zones to avoid habitats, timing of*

vegetation removal to avoid breeding periods, rehabilitation following construction and weed control protocols.

Other information/comments? (e.g. accuracy of information)

Please note that a referral under the EPBC Act 1999 is currently being prepared for this project and will be submitted to the Department of Environment Heritage and the Arts (DEWHA) in early June 2010.

An EMP is also under development which will set out conditions and mitigation measures to minimise impacts on native flora and fauna.

The planning permit application will include a habitat hectare assessment and provision for off-sets where specified by all referral authorities.

13. Water environments

Will the project require significant volumes of fresh water (e.g.? > 1 GL/yr)?

☒ NYD ☒ No ☒ Yes If yes, indicate approximate volume and likely source.

The project will allow water to be delivered to the lake system via natural inflows or pumping. Water use at the site will vary from year to year depending on natural inflows and previous flooding history. In order to meet ecological objectives, wetlands and fringing Red Gums will require inundation to 43.5 m AHD approximately once every three years. This will require approximately 41 GL of water. The amount of environmental water used will depend on whether any natural inflows occur.

Inundation to 45 m AHD to water the floodplain is required approximately every eight years. This will require inflows to the site of 106 GL, of which 54 GL will be returned to the River Murray, resulting in a net use of 52 GL.

Once works are carried out at the Hattah Lakes Icon Site, any additional water used, over and above that what would have been used at the site without works, needs to be accounted for and debited from environmental water accounts. There are currently three potential sources of environmental water that could be used at Hattah Lakes:

- *The Victorian Murray Flora and Fauna environmental entitlement (27.6 GL);*
- *The Living Murray – shared environmental water recovered through MDBA's Living Murray initiative;*
- *Water recovered through the Commonwealth Government's `Restoring the Balance' water purchase program; and*
- *River Murray Unregulated Flows (RMUF).*

In December 2009, 465 GL was listed on the Living Murray's Environmental Water Register, with 485 GL or 97% of the 500 GL target expected to be recovered by June 2010. Detailed modelling undertaken by the MDBA has demonstrated that there is more than enough water to meet the optimum water requirements of three of the floodplain icon sites (Gunbower-Koondrook-Perricoota, Hattah Lakes and Chowilla-Lindsay-Wallpolla) under historic flows, and to meet at least the minimum requirements under medium climate change.

As at 31 March 2010, 535 GL has been recovered across the Murray Darling Basin by the Commonwealth Government. This provides an additional source of water for the Hattah Lakes; over the past two years, more than 11 GL from the Commonwealth entitlements has been pumped into the lakes using temporary pumps.

Water can also be sourced from RMUF. A period of RMUF may be declared by the MDBA when it is forecast that flows in transit in the River Murray system cannot be captured in Lake Victoria, either because it is in excess of the inlet capacity to Lake Victoria (which varies depending on conditions, but can be up to 10 000 ML/day); and/or it will fill and spill Lake Victoria – AND wiill be in excess of the SA entitlement flow (as notified by SA for that month).

For all RMUF events, there are operational requirements to end the event with Lake Victoria full and comply with the Lake Victoria Operating Strategy which includes protection of cultural heritage and has guidelines for how long the lake should be kept full.

Use of RMUF does not impact on other water users as, If a period of RMUF is declared the upper states (NSW and Victoria) may divert water for consumptive and environmental use (according to each State's water entitlements). All RMUF sourced from Victorian tributaries is available only for the environment (i.e. irrigators and other users do not have access to this water).

Water measurement

Inflows and outflows to the Hattah Lakes will be measured during managed flood events when the proposed works are utilised. A project is currently underway to determine the most accurate, cost effective method to measure environmental water (Hydroenvironmental, in prep.; draft report due on 24 May 2010).

There are two potential inflow locations – Messengers Regulator (on Chalka Creek) and Cantala Regulator (on Cantala Creek). Water pumped into the system via Chalka Creek will be measured with flow meters on the pumps. Preliminary information from Hydroenvironmental (in prep.) suggests that flow sensors could be installed at these regulators to measure natural inflows and outflows. These measurements will be important to calculate the volume of environmental water that is used in each event and to ensure the accuracy of water accounting.

Will the project discharge waste water or runoff to water environments?

☒ NYD ☒ No ☒ Yes If yes, specify types of discharges and which environments.

During a natural flood event, water will return to the Murray River, via Chalka Creek, as the flood recedes and water will be retained only within the lakes themselves. Managed flood events will be similar to this – regulators will be opened to allow water to return to the Murray River, via Chalka Creek, once the floodplain has been inundated for the duration needed to meet the water requirements of vegetation and associated biota.

Compliance monitoring will be undertaken during watering events to monitor water quality such as black-water and algal blooms. Any outbreaks of these conditions will be managed should they occur and water may be retained if it poses a risk to the River Murray.

Are any waterways, wetlands, estuaries or marine environments likely to be affected?

☒ NYD ☒ No ☒ Yes If yes, specify which water environments, answer the following questions and attach any relevant details.

Chalka Creek and the Hattah Lakes will be affected by the project, but the effects will be positive. While the creek and many of the wetlands were permanent or semi-permanent in the past, the system has received no natural inflows since 2000. Inflows are likely to occur only occasionally under climate change and the system will experience long dry periods of up to 12 years. This project will restore a more natural water regime to the Hattah Lakes, maintaining and restoring the ecological values of this system.

Use of the proposed regulators and stop banks to hold water at higher elevations (i.e. up to 45 m AHD) will exclude flows from areas outside the Central Lakes region, at least temporarily. These structures are however necessary in order to meet the water requirements of floodplain vegetation within the Central Lakes.

Oatey's Regulator will control outflows from the inundation area via Chalka Creek North. The regulator will retain water to the target level of 45m AHD. The regulator will be closed to enable filling of the Central Lakes area, either for a planned flooding event or to enhance a natural flooding event. This regulator will be the principal release point from the flooding area to the River Murray and will be opened to drain the flood area or to allow natural flows to pass.

The Cantala Regulator will be constructed on Cantala Creek, between Lake Cantala and the River Murray. The regulator will be operated to promote filling of the lakes by preventing water from the flooded area to the west draining to the River Murray. These gates will usually be open to allow inflows from the River Murray, and will only be closed during planned flooding events.

No releases to the River Murray are planned at this location due to the steep return path to the river and the likelihood of erosion.

The breakout stop bank prevents uncontrolled escape of pumped water from Chalka Creek to the River Murray across low lying floodplain prior to reaching the target inundation level of 45 m AHD. The Bitterang Stop Bank retains water within the target inundation area by preventing flow to Lake Boolca and the Dry Lakes to the north of Lake Bitterang during maximum inundation pumped events. Cantala Stop Bank prevents uncontrolled draining of water to the River Murray via Cantala Creek.

The sill lowering works in Chalka Creek South will reduce the threshold for inflows to the site due to flow peaks in the River Murray, increasing the frequency of inundation at the site. Further creek lowering will occur at the Boolungal crossing to remove rock fill that has facilitated vehicle crossing in the past. This will restore natural flow paths within this part of the system.

Are any of these water environments likely to support threatened or migratory species?

☐ NYD ☐ No ☒ Yes If yes, specify which water environments.

When flooded, Chalka Creek and the Hattah Lakes are likely to support threatened fish, frogs and birds. Twelve migratory bird species listed under the international JAMBA and CAMBA bird agreements have been recorded at the Hattah Lakes. Four threatened species of birds listed as vulnerable under the EPBC Act have been recorded, two of which are dependant on floods (Regent Parrot and Painted Snipe).

Are any potentially affected wetlands listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'?

☐ NYD ☐ No ☒ Yes If yes, please specify.

Twelve of the Hattah Lakes are listed under the Ramsar Convention and in 'A Directory of Important Wetlands in Australia'. The water regimes of eleven of these lakes will be affected by the project, except Lake Kramen (which is outside the area of influence). As the project will restore a more natural water regime to these lakes, this will contribute to maintaining the ecological character of the Ramsar site.

Could the project affect stream flows?

☐ NYD ☐ No ☒ Yes If yes, briefly describe implications for stream flows.

Flows in Chalka Creek will be affected by the project. The frequency of inflows will be increased, but not beyond that which would have occurred under natural conditions.

Could regional groundwater resources be affected by the project?

☐ NYD ☐ No ☒ Yes If yes, describe in what way.

The construction phase of the project will not affect groundwater resources, however operation may. Salinity impacts of Living Murray actions must be assessed and, if accountable under the MDBA's Basin Salinity Management Strategy (BSMS), be entered on Schedule B of the BSMS Salinity Register. Accountable impacts associated with Living Murray works will be accounted for under the existing system underpinning the BSMS, which includes a review of each salinity register entry every five years. Annually, each state/territory provides information to MDBA on activities with significant salinity effects for the year. MDBA calculates the salinity cost of these activities and updates the salinity registers for independent review by salinity auditors. All contracting governments, including Victoria, remain in net credit on the salinity registers.

The supporting studies (AWE 2007 and SKM 2009; see Appendix 8*) have concluded that operation of the proposed package of works is unlikely to have a significant salinity impact on the River Murray, creeks, wetlands or floodplain. However (SKM 2009) also noted a considerable degree of uncertainty in the assessment due to a lack of critical water level and quality data in the study area. This assessment also notes the possibility that successive watering events may cause priming of the floodplain and may generate salinity impacts larger than those created by a single watering in isolation.*

There are no groundwater observation bores within the Hattah Lakes floodplain or surrounding areas. This means that, while the consequences of proposed actions to river salt loads is has

been assessed as being low to moderate, the uncertainty associated with this assessment is moderate to high (SKM 2009).

Under a worst case scenario, the proposed actions could have a significant impact on salinity at Morgan 1*(up to 4.22 EC, assuming groundwater salinity = 36,400 mg/L). However if groundwater salinity is much lower (<5000 mg/L), as recent work by Cartwright et al. (submitted) suggests, salinity impacts are likely to be much lower.*

As a means of addressing the uncertainties above, (SKM 2009) has recommended the implementation of a groundwater monitoring program in the study area in conjunction with the construction and operation of the proposed works. This information will be critical to determine whether the proposed actions are accountable under the BSMS and to provide advice to MDBA regarding the salinity impact of the proposed works in a form consistent with the requirements of Schedule B of the BSMS Salinity Register and the protocols described in the Commonwealth Water Act 2007.

The Living Murray's Environmental Monitoring team (within the MDBA) have recently confirmed that funding will be provided for installation of monitoring bores, development of a monitoring program and for the first year of data collection. Subsequent proposals will need to be submitted to MDBA secure further funding for event-based monitoring.

Could environmental values (beneficial uses) of water environments be affected?

☒ NYD ☒ No ☒ Yes If yes, identify waterways/water bodies and beneficial uses (as recognised by State Environment Protection Policies)

Overall, the environmental values will be improved. The proposed structures and works will deliver environmental flows to the Hattah Lakes system.

It is understood that, once works are carried out at the Hattah Lakes Icon Site, any additional water used, over and above that what would have been used at the site without works, needs to be accounted for and debited from The Living Murray environmental water account (or other environmental accounts as appropriate). Victoria will propose to the Environmental Watering Group that procedures for water accounting for all The Living Murray Icon Sites be developed, including resolution of arrangements for crediting and re-using return flows.

There will be minimal impact on River Murray flows during the watering of the Hattah Lakes Icon Site. Any water pumped from the Murray will be debited against environmental watering accounts, as will any additional evaporation and seepage losses caused by impounding natural inflows on the floodplain beyond the peak of floodwaters passing. Water to be pumped into the lakes will come from upstream storages (e.g. Lakes Hume, Eildon and Dartmouth, or from weir pools), slightly increasing river flows upstream of Hattah, but having little impact on flows downstream. The installation of 1000 ML/d pump station will enable pumping to be completed prior to the commencement of the summer irrigation season, removing any risk of competing with irrigators for channel capacity during the peak usage period over summer.

Could aquatic, estuarine or marine ecosystems be affected by the project?

☒ NYD ☒ No ☒ Yes If yes, describe in what way.

Aquatic ecosystems will be improved by the project. The Hattah Lakes and surrounding floodplain are severely stressed due to lack of flooding and the project will provide a mechanism to deliver environmental flows to the floodplain and wetlands. In addition, the package of works will increase in-channel flow variability, which will also improve environmental values.

Is there a potential for extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems over the long-term?

☒ NYD ☒ No ☒ Yes If yes, please describe. Comment on likelihood of effects and associated uncertainties, if practicable.

The long-term effect on aquatic systems will be positive. More natural water regimes will be

[1] *The target for river salinity and salt loads in the Murray and major tributary valleys is less than 800 EC for 95% of the time at Morgan, South Australia; EC is a unit of electrical conductivity commonly used to indicate the salinity of water (1 EC = 1 micro Siemens per centimetre, measured at 25 °C).*

restored to the floodplain, improving the health of flood-dependent vegetation and significantly increasing the area and quality of available habitat for native fish, waterbirds, frogs and reptiles. Without implementation of the proposed works and structures, the condition of the wetlands, floodplain and associated biota will continue to decline.

Is mitigation of potential effects on water environments proposed?

☐ NYD ☒ No ☐ Yes If yes, please briefly describe.

See above. The impact of altered flow regimes will be beneficial so no mitigation is necessary.

Other information/comments? (e.g. accuracy of information)

14. Landscape and soils

Landscape

Has a preliminary landscape assessment been prepared?

☒ No ☐ Yes If yes, please attach.

Is the project to be located either within or near an area that is:

- **Subject to a Landscape Significance Overlay or Environmental Significance Overlay?**

NYD ☐ No ☒ Yes If yes, provide plan showing footprint relative to overlay.

Mildura City Council Environmental Significance Overlay 1 – River Murray Corridor. Overlay and Schedule provided in Appendix 16*. The River Murray is identified as an asset of national and state significance. The decision guidelines relative to this project that the schedule to this overlay describes is:*

Guidelines	***Project Impact and Mitigation***
Bank Disturbance *Whether disturbance to the shape of the bank and riparian vegetation is minimised.* *Whether it is appropriate for any approval to include permit conditions which ensure that any bank disturbance is minimised and where possible, restores the natural appearance of the river bank.*	*Regulators sited within the creeks will optimise the current creek profile. Vegetation removal has been planned along the principles of avoid, minimise and off-set.* *Creek lowering has been minimised to remove high points and avoid the removal of trees. Access to the creeks has been selected to prevent bank erosion and minimise vegetation removal.* *The Pump station will be designed in accordance with the "Siting and Design Guidelines for Water Diversion Works on or Across Crown Land"(see* Appendix 14*)*
Building Setbacks and Design *Whether buildings are designed so as to complement the natural environment generally in accordance with the River Murray Landscape Guidelines (Built Structures) and the Siting and Design Guidelines for Water Diversion Works on or across Crown Land.*	*The Pump station will be designed in accordance with the "Siting and Design Guidelines for Water Diversion Works on or Across Crown Land"(see* Appendix 14*)*
Earthworks *Whether earthworks obstruct natural flow paths or drainage lines.*	*Some earth works will intentionally obstruct natural flows, those being the regulators and stop banks. These have been designed to optimise the water available and costs associated with the project and to direct water into high value targeted sites. An application for a licence to construct and operate*

	works on waterways will be sought under the Water Act (1989)
Heritage • *Whether development is designed so as to protect and enhance historic and archaeological sites and the natural and cultural heritage of the river environs.* • *The views of the traditional owners of the land.*	*A Cultural Heritage Management Plan has been developed with indigenous stakeholders. This outlines the areas of cultural heritage sensitivity and measures to mitigate damage to any Aboriginal cultural heritage potentially present during construction (see* Appendix 13*).* *Notification will be made to Native Title claimants by the land manager (Parks Victoria) to the Latji Latji and Wergaia Peoples and Robinvale Aboriginal Community.*
Land degradation *Whether it is appropriate for any approval to include permit conditions which specifically address land degradation processes including erosion, native vegetation decline, pollution of ground or surface water, groundwater accession, salinisation and soil acidity, and adverse effects on the quality of land and water habitats.*	*Native vegetation removal will be undertaken using the Native Vegetation Guidelines three staged approach.* *Groundwater monitoring will be undertaken across the site to identify salinity impacts.* *A Framework Environmental Management Plan will be developed to manage and remediate construction impacts. This document will address all areas of potential land degradation and will be approved by referral agencies through the planning approvals process.*
Wetlands *Whether it is appropriate for any approval affecting wetlands within the overlay area to include permit conditions which:* • *provide for a hydrological regime appropriate for the maintenance or restoration of the productive capacity of the wetland; or* • *conserve native plants and animals.*	*The aim of the project is to resume more appropriate hydrological regimes for the maintenance and restoration of the productive capacity of the lakes.* *Restoration of this regime will improve the health of native floodplain vegetation and native fauna associated with these vegetation communities.*

• **Identified as of regional or State significance in a reputable study of landscape values?**

NYD ☐ No ☒ Yes If yes, please specify.

The Hattah Lakes are identified as an area of national geomorphological significance in the final report of the Victorian Environmental Assessment Council Investigation into River Red Gum Forests (2008). The report recommended for the Hattah-Kulkyne NP that:

(a) The area of 24,428 hectares shown on Map A be used in accordance with the general recommendations for national parks, and

(b) An appropriate environmental water regime be established for this national park as outlined in recommendation R13.

R13 states that environmental watering of the floodplains, conducted through the relevant existing or new national and state water programs, include:

(a) identifying appropriate allocations of water to maintain flood-dependent natural assets;

(b) distributing that water in a way that maximises the maintenance of the flood-dependent natural assets, through overbank flows if feasible, otherwise using targeted works;

(c) monitoring so that the sites, requirements and prioritisation of natural values and selection of watering regimes are regularly refined and updated; and

(d) Developing a greater public understanding of the natural values, and monitoring and publicly reporting on the delivery of water to sites.

- **Within or adjoining land reserved under the *National Parks Act 1975*?**

☒ NYD ☒ No ☒ Yes If yes, please specify.

Within the Hattah Kulkyne National Park

- **Within or adjoining other public land used for conservation or recreational purposes?**

☒ NYD ☒ No ☒ Yes If yes, please specify.

The Hattah-Kulkyne National Park is a popular destination for tourists, attracting more than 70,000 visitors annually (DSE 2003). Common activities include camping, bushwalking, bird watching and, when the lakes hold water, swimming, kayaking and canoeing. The direct economic value to the area of recreation and tourism at Hattah Lakes has been estimated at $1.5 million per year (Read and Sturgess cited in DSE 2003).

Is any clearing vegetation or alteration of landforms likely to affect landscape values?

☒ NYD ☒ No ☒ Yes If yes, please briefly describe.

Is there a potential for effects on landscape values of regional or State importance?

☒ NYD ☒ No ☒ Yes Please briefly explain response.

While the project will involve construction of regulators, stop banks and a pump station within a national park, the overall effect on landscape values will be positive. The health of floodplain vegetation across more than 5500 ha will be significantly improved and the project is strongly supported by Parks Victoria, the land manager the local Catchment Management Authority, the Department of Sustainability and Environment and the Murray Darling Basin Authority.

Once constructed all surrounding areas will be open to the public, with restrictions onto actual structure will be in place to prevent vandalism and for safety. The Messengers Pump Station site which has been used for camping in the past will be reduced in size and the surrounds may be off-putting to campers whilst in operation. This may occur once every three years for around 41 days and once every eight years for 106 days if the entire volume is delivered via pumping (i.e. no natural inflows). The pump station will comply with DSE's "Siting and Design Guidelines" (see

Appendix 14*). Management of the Park's visitors will be outlined in the Section 27 Consent and communication plan.*

Is mitigation of potential landscape effects proposed?

☒ NYD ☒ No ☒ Yes If yes, please briefly describe.

Measures will be taken during construction to minimise negative landscape impacts. Upon completion, each construction site will be reviewed to ensure all wastes and materials are removed from the site in compliance with the proposed EMP.

Other information/comments? (e.g. accuracy of information)

Soils

Is there a potential for effects on land stability, acid sulphate soils or highly erodible soils?

☒ NYD ☒ No ☒ Yes If yes, please briefly describe.

Geotechnical investigations were carried out during the concept design phase for the regulators, stop banks, pump station and borrow material sites. The bank of the River Murray at the site of Messengers Regulator has signs of moderate dispersive erosion. Control measures will be

developed during detail design to maintain the structural integrity of the bank.

Rock beaching will also be employed at sites where high velocity flows are expected (Messengers and Lake Little Hattah Regulators) to protect the bed and banks of the creeks from water erosion (GHD 2009, see

Appendix **4***).*

Are there geotechnical hazards that may either affect the project or be affected by it?

☒ NYD ☐ No ☐ Yes If yes, please briefly describe.

Other information/comments? (e.g. accuracy of information)

15. Social environments

Is the project likely to generate significant volumes of road traffic, during construction or operation?

☐ NYD ☐ No ☒ Yes If yes, provide estimate of traffic volume(s) if practicable.

It is anticipated that the construction will take up to nine months. There will be large volumes of traffic, most involving large trucks (semi-trailers) and heavy machinery. Parks Victoria has advised that affected areas may be closed to the public during construction to minimise risks. Passing bays have been identified to allow for larger vehicles as an alternative to wholesale track widening. A traffic management plan will be developed by the successful contractor and approved by Parks Victoria, the land manager.

Is there a potential for significant effects on the amenity of residents, due to emissions of dust or odours or changes in visual, noise or traffic conditions?

☐ NYD ☐ No ☒ Yes If yes, briefly describe the nature of the changes in amenity conditions and the possible areas affected.

As the works will be largely undertaken within the National Park there will be minimal impact on residents. Any impacts of dust, noise and changed traffic conditions to the residence located near Messenger's will be managed through the Environmental Management Plan. Parks Victoria will also prepare a Visitor's Management Plan to identify potential impacts on Park visitors during construction, together with mitigating and management strategies. No further disturbance to neighbours or Park visitors is expected following construction.

Is there a potential for exposure of a human community to health or safety hazards, due to emissions to air or water or noise or chemical hazards or associated transport?

☐ NYD ☒ No ☐ Yes If yes, briefly describe the hazards and possible implications.

Is there a potential for displacement of residences or severance of residential access to community resources due to the proposed development?

☐ NYD ☒ No ☐ Yes If yes, briefly describe potential effects.

Are non-residential land use activities likely to be displaced as a result of the project?

☐ NYD ☒ No ☐ Yes If yes, briefly describe the likely effects.

Do any expected changes in non-residential land use activities have a potential to cause adverse effects on local residents/communities, social groups or industries?

☐ NYD ☒ No ☐ Yes If yes, briefly describe the potential effects.

Is mitigation of potential social effects proposed?

☐ NYD ☒ No ☐ Yes If yes, please briefly describe.

Other information/comments? (e.g. accuracy of information)

Cultural Heritage

Have relevant Indigenous organisations been consulted on the occurrence of Aboriginal cultural heritage within the project area?

☐ No If no, list any organisations that it is proposed to consult.

☒ Yes If yes, list the organisations so far consulted.

Indigenous engagement is a key part of the Hattah Lakes project. The Mallee CMA's Living Murray Indigenous Facilitator assists the project team in ensuring the local Indigenous community is fully engaged, involved and informed. This has been critical to ensuring the success of the project, particularly as there are a number of groups involved.

Consultation has occurred with Indigenous groups who are either Native Title claimants or Registered Aboriginal Party applicants (Latji Latji Peoples, Tati Tati Traditional Owner group, Robinvale Aboriginal Community Native Title Claimant Group, Nyeri Nyeri / Wergaia).

Numerous information days and briefings have been held with the Indigenous groups to build a solid working relationship and promote a common understanding of the project and its progress. This level of engagement and consultation is essential to ensure acceptance of the CHMP and its recommendations (see below). Active consultation and involvement of the Indigenous groups will be maintained throughout the project to ensure the community remains engaged and supportive of the project.

A summary of the Indigenous Engagement is included in Section 10.2 of Appendix 2

What investigations of cultural heritage in the project area have been done?

(attach details of method and results of any surveys for the project & describe their accuracy)

A CHMP in accordance with the Aboriginal Heritage Act 2006 was mandatory for this project given the high impact activities being undertaken and the activities being located within areas of cultural heritage sensitivity. The proposed works have been developed in conjunction with traditional owner groups. This has involved desktop assessments, numerous archaeological surveys of proposed activity areas, as well as sub-surface testing in sensitive areas.

The recommendations made in the CHMP are designed to respect Indigenous culture, and involve the Indigenous stakeholders in how the works and measures can be carried out to avoid, or minimise any damage to cultural heritage. Structures have been positioned to minimise impacts and works locations (including borrow pits, set-down areas and access tracks) have been planned to avoid disturbance to matters of cultural significance.

The CHMP (Plan ID 10455) was approved by the Secretary, Department of Planning and Community Development on 25 March 2010.

The CHMP is attached at Appendix 13.

Is any Aboriginal cultural heritage known from the project area?

☐ NYD ☐ No ☒ Yes If yes, briefly describe:

- Any sites listed on the AAV Site Register
- Sites or areas of sensitivity recorded in recent surveys from the project site or nearby
- Sites or areas of sensitivity identified by representatives of Indigenous organisations

A search of the of the AAV site register revealed over 1000 registered Aboriginal Places in the Park. There were 21 previously registered sites within the activity areas which were re-inspected during subsequent surveys.

Twenty-four new Aboriginal Places were recorded during the stage 1 survey (2007), 49 in stage 2 (2008) and 19 in the final stage (2009). In addition Aboriginal Places recorded included shell deposits, scarred trees, artefact scatters, earth features and a burial. These have all been registered on the Victorian Aboriginal Heritage Register (SKM 2010).

Aboriginal stakeholders were involved in the field surveys and provided recommendations for the avoidance, protection and mitigation measures to be employed. These included marking of the boundaries of works zones, site inspections after the works to ensure satisfactory measures were in place to preserve Aboriginal Places. Stakeholders also made specific recommendations such

as covering of Aboriginal Places with spoil from the creek lowering as a protection measure and salvaging of scarred trees.

A comprehensive list of Aboriginal Places recorded as well as mitigation measures are outlined in the approved CHMP in Appendix 13

Are there any cultural heritage places listed on the Heritage Register or the Archaeological Inventory under the *Heritage Act 1995* within the project area?

☒ NYD ☒ No ☒ Yes If yes, please list.

There are four Heritage Places listed on the Mildura Planning Scheme Heritage Overlay in the Hattah National Park (see **Appendix 16***). These are:*

- *HO117 Brighton's Block- Crown Land*
- *HO118 Brightons Bridge- Crown Land*
- *HO119 Florence Annie Wreck- Crown Land*
- *HO120 Mahon Homestead Site- Crown Land*

None of these places will be impacted on by the works.

Is mitigation of potential cultural heritage effects proposed?

☒ NYD ☒ No ☒ Yes If yes, please briefly describe.

The CHMP provides recommendations that are designed to respect Indigenous culture, and involve the Indigenous stakeholders in how the works and measures can be carried out to avoid, or minimise any damage to cultural heritage. Structures have been positioned to minimise impacts and works locations (including borrow pits, set-down areas and access tracks) have been planned to avoid disturbance to matters of cultural significance.

The CHMP will be kept on site for reference during construction and all persons must be made aware of the location of all Aboriginal Places and the procedures if any further cultural heritage material is uncovered.

Further details are provided in Appendix 13.

Other information/comments? (e.g. accuracy of information)

16. Energy, wastes & greenhouse gas emissions

What are the main sources of energy that the project facility would consume/generate?

☒ Electricity network. If possible, estimate power requirement/output ……

The pump station consumption will use variable amounts of power depending upon volume of water required to be pumped and river levels. Pumping to 43.5m (41GL from dry) will occur approximately 1:3 years and to 45m (106GL from dry) 1:8. Pumping will be planned to optimise natural flood events where possible. Details of the pumps' power consumption during these events will be confirmed during the detail design phase.

☒ Natural gas network. If possible, estimate gas requirement/output ……..

☒ Generated on-site. If possible, estimate power capacity/output ……

☒ Other. Please describe.

What are the main forms of waste that would be generated by the project facility?

☒ Wastewater. Describe briefly.

☒ Solid chemical wastes. Describe briefly.

☒ Excavated material. Describe briefly.

Soil will be excavated from strategic points within Chalka Creek. Geotechnical investigations have shown that this material may be suitable to construct the earthen banks associated with

Messengers regulator.

Soil will also be excavated from borrow pits established within the national park (for the Bitterang stop bank) and on private property at Kulkyne Station and Orchard Partners for construction of the Messengers, Oateys and Cantala Regulators and Breakout and Cantala stop banks.

No waste will be generated by the project after construction. Any remaining spoil will be deposited from within the Park at decommissioned borrow pit sites or as documented in the CHMP to cover any exposed cultural heritage sites. Specific guidelines on the management of spoil will be outlined in the proposed Environmental Management Plan, CHMP and Section 27 Consent (National Parks Act).

Results of the Geotechnical Assessment are in Appendix 17*.*

☒ Other. Describe briefly.

What level of greenhouse gas emissions is expected to result directly from operation of the project facility?

☒ Less than 50,000 tonnes of CO_2 equivalent per annum
☒ Between 50,000 and 100,000 tonnes of CO_2 equivalent per annum
☒ Between 100,000 and 200,000 tonnes of CO_2 equivalent per annum
☒ More than 200,000 tonnes of CO_2 equivalent per annum

Please add any relevant additional information, including any identified mitigation options.

The power consumption of the proposed pump station will vary significantly with river level, with more power required to pump water from a low river (maximum of 11.5 m lift required). For the maximum lift, power consumption will be approximately 40 kWh/ML (GHD 2009a, see Appendix 6*).*

Based on the proposed operating strategy and assuming that no natural inflows occur, i.e. pumps are the only method of water delivery to the lakes, the pumps will be used approximately 41 days every three years and 106 days every eight years. Assuming that pumps are always operated at maximum capacity (i.e. 1000 ML/day and lift of 11.5 m), this will generate approximately 59,552 tonnes of CO_2 over a 30 year period. This equates to an annual average of 1,985 tonnes of CO_2 generated.

17. Consultation program

Has a consultation program conducted to date for the project?

☒ No ☒ Yes If yes, outline the consultation activities and the stakeholder groups or organisations consulted.

Considerable community consultation has been undertaken regarding the proposed works at Hattah Lakes, with both the Indigenous and broader community. Ongoing communications and community engagement activities over recent years have been successful in building and maintaining community support for environmental watering at the Hattah Lakes.

*A communications and community engagement strategy (*Appendix 20*) for the project has been developed. The strategy takes a proactive approach to engaging with the community to ensure that they are effectively informed of the works, and to mitigate risk associated with potential perceived negative impacts amongst the local community. Preliminary activities implemented as part of the strategy suggest that the local community is generally supportive of the project. One of the key objectives of the plan is to ensure interested community groups and individuals are kept well informed about the project's development.*

The Hattah Lakes Community Reference Group (CRG) was established in October 2008 to provide advice regarding implementation of the communication strategy. The group has endorsed the strategy and meets regularly to provide advice regarding upcoming communication activities.

Engagement with the local community has primarily involved visits to the Hattah Lakes and meetings at surrounding townships to discuss the proposed works with the community. Broader community engagement has occurred through newspaper articles, fact sheets, radio broadcasts

and distribution of a documentary DVD that details the value of Hattah Lakes, its threats and potential for restoration through The Living Murray program. The publication of the Hattah Lakes Oral History booklet has raised the plight of the Hattah Lakes within the wider community and generated support for the project.

In addition, Environment Victoria's digital story telling project ('Hattah Lakes Storylines' – see http://www.environmentvictoria.org.au/content/hattah-lakes-storylines to watch the online episodes) has documented the recollections of people with strong personal associations with Hattah Lakes and has had widespread metropolitan and local exposure. This project was jointly funded by the Living Murray program and Environment Victoria, and included reference to the works proposed under the Living Murray program for the site.

Recently, the Australian Conservation Foundation's (ACF) "Just Add Water" campaign has highlighted the plight of the Hattah Lakes and increased community support for returning water to the lakes. The campaign aimed to raise money to the ACF for purchasing water, which was then donated to the Victorian government for use at Hattah. With the money raised, ACF was able to purchase 400 ML, which was pumped into the lakes in May 2010 (see website: https://support.acfonline.org.au/SSLPage.aspx?pid=259).

A DVD Google Earth tour of the project is being developed to document the significance of the lakes and the proposed works. This DVD will be available on the Mallee CMA website when finalised www.malleecma.vic.gov.au/

Has a program for future consultation been developed?

☒ NYD ☒ No ☒ Yes If yes, briefly describe.

- *Continuation of Community Reference Group involvement through implementation of works:*
- *Delivery of actions identified in the communications and community engagement strategy*
- *Ongoing consultation with Indigenous stakeholders*

Authorised person for proponent:

I, GREGORY WATKINS (full name),

PROJECT MANAGER, G-MW. (position), confirm that the information contained in this form is, to my knowledge, true and not misleading.

Signature _____

Date 21/5/10

Person who prepared this referral:

I, Faith Deans (full name),

Environmental Scientist, GHD (position), confirm that the information contained in this form is, to my knowledge, true and not misleading.

Signature _____

Date 21/5/10

ACRONYMS AND ABBREVIATIONS USED

AHD	Australian Height Datum
BB	Black Box
CAMBA	China Australian Migratory Birds Agreement
CMA	Catchment Management Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEM	Digital Elevation Model
EMP	Environmental Management Plan (prepared specifically for construction activity)
EWMP	Environmental Works and Measures Program
EPBC Act	Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999
FFG Act	Victorian *Fauna and Flora Guarantee Act* 1988
FSL	Full Supply Level
GL	Gigalitre
Ha	Hectare
JAMBA	Japanese Australian Migratory Birds Agreement
km	Kilometre
MDBC	Murray Darling Basin Commission
MDFRC	Murray Darling Freshwater Research Centre
ML	Megalitre
NRM	Natural Resource Management
RRG	River Red Gum
TLM	The Living Murray

Appendices

Appendix 1 Map of Hattah Lakes Location
Appendix 2 Hattah Lakes Environmental Flows Project Investment Proposal
Appendix 3 Map of Locations of Hattah Flood Management Works
Appendix 4 Concept Design Report
Appendix 5 Map of Inundation Extent
Appendix 6 Pump Station Concept Design Report
Appendix 7 Map of Previous Works Considered
Appendix 8 Salinity Impact Assessment
Appendix 9 Report for Hooded Scaly-foot Surveys for Hattah Lakes
Appendix 10 Aquatic Investigation
Appendix 11 Regent Parrot Reports
Appendix 12 Condition Monitoring Report
Appendix 13 Cultural Heritage Management Plan
Appendix 14 Siting and Design Guidelines for Water Diversion Works on or Across Crown Land
Appendix 15 Ecological Assessment
Appendix 16 Mildura Planning Scheme Overlays and Schedules
Appendix 17 Geotechnical Report
Appendix 18 Ecological Vegetation Classes of the Lakes And Surrounds
Appendix 19 RAMSAR Wetlands and Proximity to Works Sites
Appendix 20 Communications and Community Consultation Strategy

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