Referral of proposed action

Proposed action title: Removal of Existing Pipe From the Main Conduit of GWSS

1 Summary of proposed action

1.1 **Short description**

The proposed action involves the main conduit of the Goldfields Water Supply Scheme (GWSS), a place included on the National Heritage List (place ID 106007). The GWSS is operated by the Water Corporation, the principal supplier of water in Western Australia.

This referral concerns the long term proposal to remove sections of pipe from the main conduit as they are replaced and existing pipes are decommissioned. The main conduit will remain intact with replacement contemporary below ground pipeline sections. The proposed action is planned to commence in 2017 and continue in phases over 50 years.

To mitigate impacts on the heritage values of the GWSS several interpretation sites are proposed over the length of the main conduit. These sites will maintain small sections of historic pipe and provide information on the history and function of the pipeline, and emphasize its importance as an engineering innovation and its role in opening up the region.

The design and construction of the contemporary replacement pipe will not be discussed in detail as part of this referral, as it does not impact the GWSS and is not subject to the approval through the EPBC act.

1.2 **Latitude and longitude**

	Latitude			Longitude		
location point	degrees	minutes	seconds	degrees	minutes	seconds
Mundaring Weir Pump Station	31°	57'	19.5"S	116°	09'	42.7"E
Chidlow Pump station	31°	51'	51.5"S	116°	15'	36.0"E
Wondowie Pump Station	31°	46'	42.1"S	116°	22'	58.1"E
Grass Valley Pump Station	31°	38'	31.0"S	116°	47'	40.3"E
Meckering Pump Station	31°	38'	06.4"S	116°	59'	32.4"E
Cunderdin Pump Station	31°	39'	09.8"S	117°	14'	33.6"E
Kellerberrin Pump Station	31°	38'	08.9"S	117°	42'	12.1"E
Merredin Pump Station	31°	29'	31.3"S	118°	14'	34.0"E
Walgaloon Pump Station	31°	23'	00.6"S	118°	32'	30.9"E
Carrabin Pump Station	31°	23'	28.0"S	118°	44'	16.7"E
Bodallin Pump Station	31°	19'	35.8"S	119°	01'	25.6"E
Southern Cross Pump Station	31°	14'	47.0"S	119°	17'	41.4"E
Ghooli Pump Station	31°	15'	27.0"S	119°	28'	13.8"E
Karalee Pump Station	31°	16'	32.6"S	119°	48'	58.6"E
Koorarawalyee Pump Station	31°	16'	05.3"S	120°	00'	33.3"E
Boondi Pump Station	31°	10'	58.6"S	120°	26'	43.0"E
Dedan Pump Station	31°	05'	30.9"S	120°	41'	33.3"E
Bullabulling Pump Station	31°	00'	56.3"S	120°	51'	02.4"E
Kalgoorlie Pump Station	30°	47'	10.3"S	121°	25'	03.4"E
Mount Charlotte Reservoir	30°	44'	18.2"S	121°	28'	42.7"E

The pipeline is linear and approximately 560 km long. Below are a list of pump station locations along the main conduit. The attached GIS data has an accurate map of the pipeline in total.

1.3 **Locality and property description**

The main conduit begins at Mundaring Weir, 30km east of Perth, and stretches approximately 560km east, terminating at Mount Charlotte Reservoir in Kalgoorlie. The pipeline and Great Eastern Highway follow the same path for much of the way between Perth and Kalgoorlie. Currently 90.6% of the main conduit is above ground, generally going below ground to make way for side roads and towns. The main conduit comprises of 43.4% locking bar pipe, 4.6% Kellerberrin pipe and 52% mild steel cement lined (MSCL) pipe.

The National Heritage List entry for the place also includes the six remaining original pump stations, the Mundaring and Mt Charlotte reservoirs, four regulating tanks, and four holding tanks. This referral does not propose any works that will affect these other components of the heritage listing.

The main conduit passes through the following towns: Chidlow, Bakers Hill, Northam, Meckering, Cunderdin, Tammin, Kellerberrin, Merredin, Burracoppin, Southern Cross, Coolgardie.

1.4 **Size of the development footprint or work area (hectares)**

The main conduit is approximately 560 km long, assuming an average width of 2m and excluding other assumptions the total footprint for the purpose of this referral is 112 hectares (1.12km^2)

1.5 **Street address of the site**

Begins: Mundaring Weir Road, Mundaring WA 6073
Ends: Collier Place, Williamstown WA 6430

Passes through the following suburbs:

Mundaring	Sawyers Valley	Chidlow
Wooroloo	Wundowie	Bakers Hill
Clackline	Burlong	Northam
Muluckine	Grass Valley	Meenaar
Meckering	Waeel	Cunderdin
South Tammin	Tammin	Kellerberrin
Doodlakine	Baandee	Hines Hill
Nangeenan	Merredin	Burracoppin
Walgoolan	Carrabin	Bodallin
Moorine Rock	Southern Cross	Ghooli
Yellowdine	Mount Palmer	Boorabbin
Wallaroo	Bullabulling	Coolgardie
Mount Burges	Kanowna	Binduli
Karlkurla	West Lamington	Kalgoorlie
Williamstown		

1.6 **Lot description**

The main conduit is across a substantial number private lots, road reserves, and easements.

1.7 **Local Government Area and Council contact (if known)**

The main conduit passes through the following local government areas:

Shire of Mundaring
Shire of Northam
Shire of Cunderdin
Shire of Tammin
Shire of Kellerberrin
Shire of Merredin
Shire of Westonia
Shire of Yilgarn
Shire of Coolgardie
City of Kalgoorlie-Boulder

1.8 **Time frame**

The proposed action is anticipated to commence in 2017. The proposed action will be undertaken in many phases over an indefinite number of years. This referral seeks approval for 50 years, though the proposed action could conceivably be completed in a shorter amount of time.

1.9	**Alternatives to proposed action**		No
		✓	Yes, please also complete section 2.2
1.10	**Alternative time frames, locations or activities**	✓	No
			Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3 and 5 (where relevant).
1.11	**Commonwealth, State or Territory assessment**	✓	No
			Yes, please also complete section 2.5
1.12	**Component of larger action**	✓	No
			Yes, please also complete section 2.7
1.13	**Related actions/proposals**		No
		✓	Yes, please also complete section 2.8
1.14	**Australian Government funding**	✓	No
			Yes, please provide details
1.15	**Great Barrier Reef Marine Park**	✓	No
			Yes, please also complete section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

The proposed action involves the main conduit of the Goldfields Water Supply Scheme (GWSS), a place included on the National Heritage List (place ID 106007). The Water Corporation is the principal supplier of water in Western Australia and the operator of the GWSS.

In the National Heritage List entry of the GWSS all extant features of the 1903 scheme are considered to be characteristic features of the place (criterion D). One of these characteristic features is locking bar pipe which currently makes up 43.4% of the pipe used in the main conduit, other sections have been replaced in various stages.

As well as being of heritage value, the locking bar used in the main conduit is part of a functioning water supply infrastructure. The locking bar pipe has less capacity and greater ongoing maintenance requirements than contemporary pipes. To maintain a safe and reliable water supply the Water Corporation has opted to construct replacement pipes below ground in parallel to the existing pipe of the main conduit. The new pipe will be completed in phases, the first completed being 5.8 km near Meckering in 2014. Once a section of contemporary pipe is complete the extant pipe is bypassed and decommissioned. The contemporary replacement sections are generally Mild Steel Cement Lined (MSCL) pipes laid below ground.

The original pipeline was located below ground. It was not until the 1930s that work began to raise the pipeline above ground as it is seen today. The replacement below ground pipe will continue to follow the path of the main conduit and the function as a water supply pipeline will not change.

The Water Corporation requires authorisation through the EPBC Act to remove decommissioned pipeline from the main conduit. Without this authorisation the Water Corporation would be obliged to maintain up to 560km of unused pipe indefinitely, a costly exercise that is outside its mandate as a water supplier. Without regular maintenance the decommissioned pipe would soon present safety risks to the public. As much of the pipeline is located on private land, access to some sections of decommissioned pipeline could lead to conflicts with private property rights.

As these scenarios are not satisfactory outcomes to the Water Corporation, the proposed action is a long term strategy to remove the extant sections of main conduit as they are bypassed and decommissioned. The above ground concrete anchors will also be removed as part of this action.

To mitigate the impact on the heritage values several sections of above ground locking bar pipeline will be retained as part of interpretation sites open to the public. These sites will be developed in stages as specific amounts of pipe are removed. The parameters of the interpretation is described in the attached Heritage Management Plan. To ensure an appropriate outcome heritage specialists will be involved in the development and execution of the interpretation.

As a secondary mitigation, removed fabric will be offered to interested parties before being otherwise disposed. A contact list of interested parties will be maintained and those listed will be alerted in advance of locking bar becoming available. The list of interested parties will begin with local governments and stakeholders and expand as additional parties are identified. Further details on this process are described in the attached Heritage Management Plan.

The proposed action is planned to commence in 2017 and continue in phases over 50 years. The proposed action is not reversible.

The National Heritage List entry for the place also includes the six remaining original pump stations, the Mundaring and Mt Charlotte reservoirs, four regulating tanks, and four holding tanks. This referral does not propose any works that will affect these parts of the heritage listing.

2.2 Feasible alternatives to taking the proposed action

An alternative action considered was to replace above ground sections of the main conduit with contemporary above ground pipeline. However this was not deemed feasible because of the added cost and risk associated with an above ground pipeline compared to a below ground pipeline.

Detrimental factors include:

- Fluctuating temperatures causes pipes to expand and contract, the greater the temperature difference the more complex the design must be.
- Water traveling at higher temperatures also requires further treatment than cooler water would.
- An above ground pipe is also subject to potential damage from traffic and other accidents.

2.3 Alternative locations, time frames or activities that form part of the referred action
As the main conduit is an existing place there is no alternate location for the proposed action. The 50 year timeframe of the action allows the works to be at a pace determined by the Water Corporation without the need for additional referrals.

2.4 Context, including any relevant planning framework and state/local government requirements
The works will comply with relevant local government policy.

The works will consult with and gain all necessary approvals from the appropriate state departments

The works will follow the policies of the attached Heritage Management Plan.

2.5 Environmental impact assessments under Commonwealth, State or Territory legislation
The proposed action is not subject to any Commonwealth, State or Territory environmental assessment processes.

2.6 Public consultation (including with Indigenous stakeholders)
Stakeholders (including the National Trust (WA), local governments, and community groups) will be engaged to determine locations for retained and interpreted sections of pipeline.

2.7 A staged development or component of a larger action
All development phases included in this referral, not component of larger action.

2.8 Related actions
A related proposal was the removal of 5.8 km of pipeline west of Meckering. This proposal was pre-referred to the Department of Environment and deemed not to be likely to have a significant impact. It was suggested that the cumulative impact of the future removal of pipeline would likely require a full referral.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

N/A

Nature and extent of likely impact

N/A

3.1 (b) National Heritage Places

Description

The Goldfields Water Supply Scheme (GWSS) is an enormous engineering achievement that brought important benefits to the Goldfields, towns and later agricultural districts along its path. The pipeline was completed in 1903 and spans some 560km between Mundaring and Kalgoorlie. The system continues to operate today.

The main conduit is included on the National Heritage List (place ID 106007), the listing includes original pump stations, reservoirs and tanks. Ownership of the various parts of the system are segmented between different parties, with a number of historic non-operational steam pump stations vested with the National Trust of Australia (WA).

The pipeline was originally buried below ground, but frequent leaks led to it being excavated and raised above ground during the 1930s. The pipeline has been continually maintained and upgraded since the time of its construction, and almost half of the operational pipeline consists of original locking bar pipes.

The following description of the *Goldfields Water Supply Scheme, Western Australia* is extracted from its entry in the Australian Heritage Database:

> The Goldfields Water Supply Scheme is a late 19th century/early 20th century inter-basin transfer water system which extends from Mundaring Weir (Dam) in the west (approximately 41.5 km east of Perth), to Mount Charlotte Reservoir at Kalgoorlie in the east. The Scheme stretches from the Darling Ranges across the arid interior of Western Australia, a total distance of some 560 kilometres. Included are:
>
> - the main reservoirs: Mundaring Weir (Dam) and Mount Charlotte Reservoir;
> - the main conduit of the pipeline (including all locking bar pipe, wood stave pipe and continuously welded pipe) which stretches 560km from Mundaring in the west to Kalgoorlie in the east;
> - the remaining six of the eight original pump stations (Nos 1, 3, 5, 6, 7 and 8) including remaining equipment;
> - the remaining four associated holding tanks (located at Steam Pump Stations Nos, 2, 4, 7 and 8); and,
> - the four regulating tanks located at Bakers Hill, West Northam; Bullabulling and Toorak Hill.

Nature and extent of likely impact

Value: **Criterion A Events, Processes**
The Goldfields Water Supply Scheme runs for over 560km and was opened in 1903. It is significant as the impetus for agricultural expansion that was of lasting benefit to Western Australia and to the nation as a whole. Water from the pipeline became available just as the production of gold on the eastern goldfields was starting to decline, but the true value of the pipeline both to Western Australia and to Australia as a whole was the effect that regular water supplies had in opening up the south-western agricultural area to production. While activity on the goldfields declined between 1905 and the 1960s, the quantity and value of wheat produced increased steadily over the same period. Today the Western Australian wheatfields are the most productive in Australia, accounting for 42% of the nation's wheat crop. This comes mainly from the areas serviced by the goldfields pipeline, which has continued to operate as a water supply scheme since its inception. The pipeline, its extensions and associated infrastructure represent the initiative that opened up the south-western agricultural area to development.

Impact: Though the proposed action involves removing the original fabric of the main conduit, the purpose and

function of Goldfields Water Supply Scheme is unchanged. The pipeline will still continue to operate as a water supply to the Goldfields and Wheatbelt. This historical value is not impacted.

Mitigation: None required

Value: **Criterion D Principal characteristics of a class of places**
The Goldfields Water Supply Scheme incorporates the remaining elements of the former Coolgardie Goldfields Water Supply Scheme, as designed by engineer CY O'Connor and completed in 1903. The Goldfields Water Supply Scheme is an outstanding representative example of an inter-basin water transfer system while demonstrating a major development in water scheme design. It contains the principal characteristics of a water supply/transfer scheme including dams (pondages), extensive pipeline, tanks, reservoirs and pump stations. The pipeline continues to serve the needs of the communities between Mundaring and Kalgoorlie.

The characteristic features of the Goldfields Water Supply Scheme that express this value include the remaining extant features of the 1903 Scheme: the main conduit of the pipeline (the length of pipeline including **all locking bar pipes**, **wood stave pipe and continuously welded pipes** from Mundaring Weir to Mount Charlotte); with its surviving pumping stations (Pump Stations Nos 1, 3, 5,6 and 8) and their associated equipment (including the pumps, boilers, compressors, venturi meters and reservoirs located at Pump Stations 2, 4, 7 and 8), regulating tanks (located at Bullabulling, Toorak Hill, Bakers Hill and West Northam) and the Mundaring Weir (dam, including the valve houses, spillway, the weir wall profile and fabric) and the round Mount Charlotte Reservoir at Kalgoorlie.

Impact: Criterion D includes 'all locking bar pipes' as a characteristic feature of the GWSS. The proposed action will remove all locking bar pipe, excluding sections retained for interpretation.

The continuously welded pipes are included as a characteristic feature of the GWSS. There is no historic value behind the fabric of these pipes and the pipes that will replace them are of a similar type. There is no impact to this value.

The nature of the main conduit is not changed and is not impacted by this referral.

Other characteristic features of the Goldfields Water Supply Scheme are not impacted

Mitigation: Sections of locking bar pipe will be retained for interpretation at several sites along the length of the pipeline. These sites are open to the public and display information about the history and function of the GWSS.

Locking bar pipe removed as part of the proposed action will be offered to the community for appropriate reuse, including educational purposes, as described in the Heritage Management Plan. Example displays of locking bar pipe can be found at the Water Corporation headquarters in Leederville and the No.1 Pump Station museum in Mundaring.

The details of these mitigation strategies are further described in the attached Heritage Management Plan.

Note: The last wood stave pipes were removed from service in 1970 and will not be affected by the proposed action.

Value: **Criterion F Creative or technical achievement**
Both in the size of the project and in the use of new technology, the Goldfields Water Supply Scheme was an outstanding technological achievement for its time. The pipeline pumping scheme, consisting of the pipeline itself, the reservoirs, and the pumping stations, was regarded internationally as being the largest such engineering undertaking for its time. The amount of steel used in construction was greater than for previous large steel structures. The contracts for the supply of steel were the largest pipe contracts, and the most expensive Australian construction contracts, let to that time.

The pipeline also made use of **innovative Australian design in the locking bar pipe** invented by Mephan Ferguson.

The refurbishment of the pipeline in 1933 was also a major technical development. Lifting the pipeline out of the ground and re-laying it above ground placed the Goldfields Water Supply Scheme among the world leaders in pipeline technology for the second time in less than 40 years. During this refurbishment, the expansion forces were directed into reinforced **concrete anchor blocks built over the pipe at 50 metre intervals**, which prevented movement and transferred these forces into the ground.

This was the first time anywhere in the world that pipe anchorages of this type had been used to permit such a large diameter pipeline to be laid above ground.

The technical achievement of the Goldfields Water Supply Scheme was internationally recognised by the American Society of Civil Engineers as an International Historic Civil Engineering Landmark in 2009, marking the Scheme as one of the most significant engineering projects of the 20th century.

Impact: The proposed action will remove all locking bar pipe from operation.

The proposed action includes removing all above ground sections of pipeline including the concrete anchors. However as the main conduit was originally buried below ground, returning it to this state is not an impact.

Mitigation: Sections of locking bar pipe will be retained for interpretation at several sites along the length of the pipeline. These sites are open to the public and display information about the history and function of the GWSS.

Locking bar pipe removed as part of the proposed action will be offered to the community for appropriate reuse, including educational purposes, as described in the Heritage Management Plan. Existing displays of Locking bar pipe are currently at the Water Corporation headquarters in Leederville and the Pump Station No1 museum in Mundaring.

The details of these mitigation strategies are further described in the attached Heritage Management Plan.

Value: **Criterion H Significant people**
The Goldfields Water Supply Scheme is significant for its association with the work of Charles Yelverton O'Connor, Engineer-in Chief of the Western Australian Public Works Department from 1891 to his death in March 1902. O'Connor was the driving force behind the construction of the pumping scheme including the pipeline, pumping stations and equipment, reservoirs and tanks, and the Mundaring Weir, which provided great economic benefit to the state of Western Australia and to the nation as a whole. While the Coolgardie Goldfields Water Supply Scheme was originally intended to serve the immediate needs of the goldfields, Sir John Forrest considered that its longer-term future was to service agriculture. At the completion of the work, the Premier Sir John Forrest praised him as "the great builder of this work … to bring happiness and comfort to the people of the goldfields for all time".

Impact: Though the proposed action involves removing the original fabric, the purpose and function of Goldfields Water Supply Scheme is unchanged. The pipeline will still continue to operate as a water supply to the Goldfields and Wheatbelt and the historical value will not be impacted.

Mitigation: None required

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description
N/A

Nature and extent of likely impact

N/A

3.1 (d) Listed threatened species and ecological communities

Description
N/A

Nature and extent of likely impact

N/A

3.1 (e) Listed migratory species

Description
N/A

Nature and extent of likely impact

N/A

3.1 (f) Commonwealth marine area
(If the action is in the Commonwealth marine area, please complete 3.2(c) instead. This section is for actions taken outside the Commonwealth marine area that may have impacts on that area.)

Description
N/A

Nature and extent of likely impact

N/A

3.1 (g) Commonwealth land
(If the action is on Commonwealth land, please complete 3.2(d) instead. This section is for actions taken outside Commonwealth land that may have impacts on that land).

Description
N/A

Nature and extent of likely impact

N/A

3.1 (h) The Great Barrier Reef Marine Park

Description
N/A

Nature and extent of likely impact

N/A

3.1 (i) A water resource, in relation to coal seam gas development or large coal mining development

Description
N/A

Nature and extent of likely impact

N/A

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	**Is the proposed action a nuclear action?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (b)	**Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (c)	**Is the proposed action to be taken in a Commonwealth marine area?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))

3.2 (d)	**Is the proposed action to be taken on Commonwealth land?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))

3.2 (e)	**Is the proposed action to be taken in the Great Barrier Reef Marine Park?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))

3.3 Description of the project area and affected area for the proposed action

The project area is the entire main conduit of the Goldfield Water Supply Scheme, approximately 560km in length between Mundaring Weir and the Mount Charlotte Reservoir.

The following description of the conduit is extracted from the place's entry in the Australian Heritage Database:

> C. Y. O'Connor's 1903 pipeline is commonly referred to as the 'main conduit' of the Goldfields Water Supply Scheme and is approximately 560km in length[1]. It commences at Mundaring Weir and terminates at Mount Charlotte Reservoir. Much of the pipeline is aligned with the current Great Eastern Highway. The pipes were made of 30-inch diameter steel. Originally (1903) the pipeline was buried underground, however, refurbishment in the 1930s raised the pipeline and it now rests on reinforced concrete anchor blocks[2]. It is estimated that 60% of the pipeline is original.[3] Still in use today, the pipeline is in operating condition and continues to service the community.
>
> The pipeline is a visible icon stretching across Western Australia's arid interior. The pipeline consists of:
>
> - the length of the main conduit of the pipeline from Mundaring Weir (Dam) to Mount Charlotte Reservoir at Kalgoorlie;
> - the reinforced concrete anchor blocks;
> - caulked joints;
> - stop and reflux-valves; and
> - locking bar pipes.

Locking Bar Pipes
The locking bar pipe was invented in Australia by Mephan Ferguson in 1896, it consists of two steel plates bent into semi circles and joined by two 'locking bars', which were closed by pressure. The secured ends of the steel plates are chamfered in a way that resembles a dovetail joint. The 30-inch locking bar pipes for the GWSS were manufactured from ¼ inch thick steel plates. The pipes were completely coated in asphalt to protect from corrosion.

The pipes were originally joined with a ring joint sealed with caulked lead. When the pipeline was raised in the 1930s these joints were cut out and the pipes were welded together. The present day locking bar pipes are cement lined, however originally only a coating of asphalt protected the insides of the pipes from corrosion, it was during the pipe raising in the 1930s that cement linings were applied insitu.[4]

---

1 At the time of the National Heritage Listing (2011), now closer to 48% (2017).
2 Research Institute for Cultural Heritage Curtin University, *Conservation Plan for Goldfields Water Supply Scheme. Vol I.*
3 At the time of the National Heritage Listing (2011). The listing does not deal with later replacement works, which are part of the historic continuum.
4 Hartley, Richard G. *River of Steel*. Perth: Access Press, 2007. p.251

Kellerberrin Pipes
'Kellerberrin Pipes' are reconstructed locking bar pipes; they consist of two useable halves from condemned locking bar pipes that would be cut and welded together without the locking bar. This refurbishment process was devised by Frank Mather on his farm in Kellerberrin in 1937; he would go on to create the Electweld Steel Company, the only company to reconstruct pipes for the GWSS and did so from 1938 to 1958. With the locking bar removed Kellerberrin pipes were smaller with a diameter of 28¾ inch. These pipes were cement lined using a centrifugal process.

MSCL Pipes
Mild Steel Cement Lined pipes (MSCL) describe a variety of modern pipes suitable for transporting water. They are often stitched with longitudinal, lateral or spiral welds and are made of mild steel, a relatively malleable and ductile steel with low carbon composition. An interior cement lining is applied centrifugally to inhibit internal corrosion by preventing contact between the transported water and pipe steel.

Composition
In 2015, the main conduit was made up of 43.4% Locking Bar (1901-1920s) (280.0km), 4.6% Kellerberrin pipe (1938-1958) (29.5km), and 52% MSCL (335.0km) (1926-2016). 90.6% of the pipeline was above ground.[5]

Current Condition
The pipeline is operational and has been continuously upgraded and maintained since its inception, pipes have been replaced or repaired as necessary. Older pipes have had patches welded in place to seal previous leaks. Much of the original locking bar pipe has been replaced over its lifetime in response to failures or to increase pipeline capacity.

3.3 (a) Flora and fauna
Not relevant to the proposed action

3.3 (b) Hydrology, including water flows
The pipeline passes over

Avon River - Northam
Mortlock River - Northam
Mortlock River East - Meckering

3.3 (c) Soil and Vegetation characteristics
Not relevant to the proposed action

3.3 (d) Outstanding natural features
None

3.3 (e) Remnant native vegetation
N/A

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)
N/A

3.3 (g) Current state of the environment
N/A

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values
Goldfields Water Supply Scheme (NHL place ID 106007)

3.3 (i) Indigenous heritage values
The pipeline passes through a number of Registered Aboriginal Sites. Work proposed in these areas will comply with the *Aboriginal Heritage Act 1972* and the *Aboriginal Heritage Regulations 1974,* and consultation with Indigenous stakeholders will take place. The removal of the historic pipeline is not expected to affect any Indigenous heritage values.

The following Registered Aboriginal Sites are passed through:

3758 Helena River
3550 Coates Gully
3536 Swan River
3522 Northam Hill

5 Water Corporation. "Goldfields and Agricultural Water Supply Main Conduit Pipe Age."

4045 Bolgart: Bodegin
5604 Doodlakine
5902 Mooraine Rock
1745 568 Mile Peg

1422 Mulyinyu Rockhole
1542 Microwave Tower Hill
3010 Mt Charlotte
1421 Paddy Hannans Tree
1418 Karlkurla
1541 Nanny Goat Hill (Pilyurru)

3.3 (j) Other important or unique values of the environment
Parts of the pipeline pass through the several areas managed by the Western Australia state Department of Parks and Wildlife (DPaW). Water Corporation will consult with the DPaW before any works take place in these areas.

Beelu National Park
Woondowing Nature Reserve
Meenaar Nature Reserve
Unnamed WA 28562 Nature Reserve
Yellowdine Nature Reserve

3.3 (k) Tenure of the action area (e.g. freehold, leasehold)
The pipeline passes through freehold, leasehold and Crown land.

3.3 (l) Existing uses of area of proposed action
The existing land uses occupied by the pipeline include: Urban Zone, Reserved Lands, Rural Zone, Primary regional roads, Other regional roads, and Urban deferred Zone

3.3 (m) Any proposed uses of area of proposed action
No change

4 Environmental outcomes

Impacts to the national heritage values of the main conduit of the Goldfields Water Supply Scheme (GWSS) will be mitigated through a systems-based condition approach using the attached Heritage Management Plan.

The Heritage Management Plan:

- Will be implemented for all actions that involve the removal of existing fabric from the main conduit of the GWSS
- Considers the long term actions related to the decommissioning existing pipe included as characteristic parts of the main conduit by the national heritage values
- Defines whether after decommissioning whether fabric may be removed or must remain for interpretation and public access.
- Mitigates impacts to the national heritage values of the main conduit by mitigating the removal of fabric with the preservation and enhancement of remaining fabric.

5 Measures to avoid or reduce impacts

The attached Heritage Management Plan details the mitigation procedures that will be included as part of this action. These include:

- Several sections of above ground locking bar pipeline will be retained as part of interpretation sites open to the public. These sites will be developed in stages as specific amounts of pipe are removed. The parameters of the interpretation is described in the attached Heritage Management Plan. To ensure an appropriate outcome heritage specialists will be involved in the development and execution of the interpretation.

- Removed fabric will be offered to interested parties before being otherwise disposed. A contact list of interested parties will be maintained and those listed will be alerted in advance of locking bar becoming available. The list of interested parties will begin with local governments and stakeholders and expand as additional parties are identified. Further details on this process are described in the attached Heritage Management Plan.

6 Conclusion on the likelihood of significant impacts

6.1 Do you THINK your proposed action is a controlled action?

✓	No, complete section 5.2
	Yes, complete section 5.3

6.2 Proposed action IS NOT a controlled action.

Locking bar will be retained at interpretation sites

Sites will be located at key positions along length of pipeline

These sites will be open to the public and encourage understanding of the historical significance of the GWSS

Works to remove sections of locking bar pipe will have no impact on any of the historic steam pumping stations or other aspects of the GWSS

The GWSS will continue to function as an operational water supply scheme and the proposed works will no change the use of the scheme

6.3 Proposed action IS a controlled action

	Matters likely to be significantly impacted
	World Heritage values (sections 12 and 15A)
	National Heritage places (sections 15B and 15C)
	Wetlands of international importance (sections 16 and 17B)
	Listed threatened species and communities (sections 18 and 18A)
	Listed migratory species (sections 20 and 20A)
	Protection of the environment from nuclear actions (sections 21 and 22A)
	Commonwealth marine environment (sections 23 and 24A)
	Great Barrier Reef Marine Park (sections 24B and 24C)
	A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
	Protection of the environment from Commonwealth actions (section 28)
	Commonwealth Heritage places overseas (sections 27B and 27C)

National Heritage values related to the Locking bar pipe will be impacted by the removal of the heritage fabric.

7 Environmental record of the person proposing to take the action

		Yes	No
7.1	**Does the party taking the action have a satisfactory record of responsible environmental management?** **Provide details** The Water Corporation has been responsible for the safe treatment and distribution of drinking water; collection, treatment and disposal of domestic wastewater; and the transport of drainage water in Western Australia for over 100 years. Over this period the organisation has been at the forefront of environmental management in Western Australia: implementing Environmental Management Systems for elements of the business, becoming one of the first water utilities to sign up for the Greenhouse Challenge in 1999 and more recently, committing to full carbon neutrality by 2030. Sustainability principles were developed and agreed to at a Board level and are now being integrated into all levels of decision making across the Corporation.	✓	
7.2	**Provide details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:** **(a) the person proposing to take the action, or** **(b) if a permit has been applied for in relation to the action - the person making the application.** **If yes, provide details**		✓
7.3	**If the person taking the action is a corporation, please provide details of the corporation's environmental policy and planning framework and if and how the framework applies to the action.** The Water Corporation has Environmental Standards in place to ensure that all activities are carried out with minimal environmental impact. The Water Corporation will put in place management actions to minimise any environmental impact expected from the proposed action. In addition, all works will be carried out in accordance with the Water Corporation's Environmental Policy (see http://www.watercorporation.com.au/_files/PCY230_EnvironmentalPolicy.PDF).	✓	
7.4	**Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?** **Provide name of proposal and EPBC reference number (if known)** 2016/7786 Water Corporation/Water Management and Use/Approximately 22km north-north west of Perth/Western Australia/Groundwater Replenishment Scheme (GWRS) Stage 2 2015/7421 The Water Corporation/Water management and use/Ellenbrook approx 20kms NE of Perth/WA/Ellenbrook Reliable Water Storage Project, WA 2014/7329 Water Corporation/Water management and use/Shire of Ashburton, WA/WA/Onslow Water Supply Infrastructure Upgrade Project, Onslow, WA	✓	

2014/7277	Water Corporation/Water management and use/Harris River State Forest/WA/Stirling to Harris Dam Pipeline construction		
2013/6720	The Water Corporation/Water management and use/Approximately 350km south-east of Perth/WA/Mount Barker to Albany Water Supply Pipeline		
2012/6632	The Water Corporation/Water management and use/Between Millstream Dam and the town of Greenbushes/WA/Millstream to Greenbushes Link Mains		
2012/6379	The Water Corporation/Water management and use/Pilbara/WA/Millstream 20GL Pipeline, Bungaroo, Borefield Integration		
2012/6329	The Water Corporation/Water management and use/Scarp Road, Waroona/WA/Samson Brook Dam Remedial Works		
2012/6315	The Water Corporation/Water management and use/341 Mundaring Weir Road /WA/Mundaring Outlet Works Upgrade - Stage 1		
2012/6248	The Water Corporation/Waste management (sewerage)/Rockingham and Peron /WA/Sepia Depression Ocean Outlet Landline Duplication		
2011/6096	Water Corporation of Western Australia/Water management and use/DEC Perth Hills District Office and Depot, Mundaring /WA/Fire Control Access Track		
2011/6077	Water Corporation/Water management and use/South Dandalup Dam to Dwellingup, WA/WA/Dwellingup Water Supply New Source and Supply Pipeline WA		
2010/5614	Water Corporation/Water management and use/Lot 1 near Tuia Road, Southampton, approx 260 km SE of Perth/WA/Millstream Dam Expansion		
2010/5345	The Water Corporation/Water management and use/Mundaring /WA/Perth Hills District Office & Depot Relocation		
2009/5193	The Water Corporation/Water management and use/Mundaring/WA/Mundaring Water Treatment Plant and Mundaring C Pump Station Project		
2009/4970	Water Corporation/Water management and use/East Rockingham/WA/Wastewater Treatment Plant		
2008/4545	Water Corporation/Waste management (sewerage)/Broome/WA/Wastewater Treatment Plant		
2008/4173	Water Corporation/Water management and use/Lots 32, 33 and part Lot 8 Taranto Rd, Binningup/WA/Southern Seawater Desalination Project		
2007/3532	Water Corporation/Transport - water/Armadale/Gosnells/WA/Wungong Transfer Mains Project		
2007/3259	Water Corporation of Western Australia/Waste management (sewerage)/Alkimos/WA/Development of new Alkimos Wastwater Treatment Plant		
2006/2507	Water Corporation WA/Water transport/Port Hedland/WA/Bulgarene Borefield		
2005/2073	Water Corporation/Water transport/Blackwood Plateau, southwest WA/WA/Yarragadee Water Supply Development		
2005/1971	Water Corporation of Western Australia/Water management and use/Perth/WA/Perth Seawater Desalination Project: Thomsons Lake to Kogolup Pipeline		
2003/1010	Water Corporation of Western Australia/Water management and use/Vasse and Wonnerup Estuaries/WA/Replacement Floodgates		

8 Information sources and attachments

(For the information provided above)

8.1 References

Hartley, Richard G. *River of Steel: A History of the Western Australia Goldfields and Agricultural Water Supply 1903-2003.* Perth: Access Press, 2007.

Research Institute for Cultural Heritage Curtin University. *Conservation Plan for Goldfields Water Supply Scheme. Vol I.* Perth, 1999.

Australian Heritage Database. "Australian Heritage Database - Goldfields Water Supply Scheme." Accessed March, 2016. www.environment.gov.au/heritage/publications/australian-heritage-database.

Water Corporation. "Goldfields and Agricultural Water Supply Main Conduit Pipe Age". Report: April, 2015.

National Trust of Australia (WA). *Golden Pipeline Interpretation Plan.* Perth, 2001

8.2 Reliability and date of information

The information has been prepared by heritage professionals Griffiths Architects and the Water Corporation of Western Australia.

8.3 Attachments

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the locality of the proposed action (section 1)	✓	MainConduit_GIS.zip
	GIS file delineating the boundary of the referral area (section 1)		
	figures, maps or aerial photographs showing the location of the proposed action in respect to any matters of national environmental significance or important features of the environments (section 3)	✓	PM-#12669359-v1-GAWS_-_Main_Conduit_Pipe_Age.pdf
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)		
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)		
	copies of any flora and fauna investigations and surveys (section 3)		
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3) conclusions in the referral (section 3 and 4)	✓	PM-#12670011-v1-GAWS_-_Main_Conduit_Pipe_Age.XLSX 16112 - GWSS - Conduit Management Plan rev06
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		

9 Contacts, signatures and declarations

Proposed action title: Removal of Existing Pipe From GWSS Main Conduit

9.1 Person proposing to take action

Name and Title:	The Water Corporation (Contact: Daniel Stevens, Senior Project Planner Procurement & Property)
Organisation	The Water Corporation
Trust deed	☐ attached; OR ☑ not applicable
~~ACN~~ / ABN	28 003 434 917
Postal address:	PO Box 100 Leederville WA 6902
Telephone:	(08) 9420 3383
Email:	Daniel.Stevens@watercorporation.com.au;
I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:	☐ an individual; OR ☐ a small business entity (within the meaning given by section 328-110 (other than subsection 328-119(4)) of the *Income Tax Assessment Act 1997*); OR ☑ not applicable.
If you are small business entity you must provide the Date/Income Year that you became a small business entity:	
I would like to apply for a waiver of full or partial fees under regulation 5.21A of the EPBC Regulations. Under regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made:	☑ not applicable.
Declaration:	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.
Signature:	Date: 27/4/17

9.2 Designated proponent

Name of proposed proponent:	Water Corporation (Contact: Daniel Stevens, Senior Project Planner Procurement & Property)

9.3 Person preparing the referral information (if different from section 9.1)

Name:	Jordan Russell
Title:	
Organisation:	Griffiths Architects
ACN / ABN	91 277 671 706
Postal address:	1/315 Rokeby Road
Telephone:	08 9381 1666
Email:	jordan.russell@griffithsarchitects.com.au
Declaration:	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence.

Signature:  Date: 04 May 2017

Geographic Information System (GIS) data supply guidelines

If the area is less than 5 hectares, provide the location as a point layer. If the area greater than 5 hectares, please provide as a polygon layer. If the proposed action is linear (eg. a road or pipeline) please provide a polyline layer.

GIS data needs to be provided to the Department in the following manner:

- Point, Line or Polygon data types: ESRI file geodatabase feature class (preferred) or as an ESRI shapefile (.shp) zipped and attached with appropriate title
- Raster data types: Raw satellite imagery should be supplied in the vendor specific format.
- Projection as GDA94 coordinate system.

Processed products should be provided as follows:

- For data, uncompressed or lossless compressed formats is required - GeoTIFF or Imagine IMG is the first preference, then JPEG2000 lossless and other simple binary+header formats (ERS, ENVI or BIL).
- For natural/false/pseudo colour RGB imagery:
    - If the imagery is already mosaiced and is ready for display then lossy compression is suitable (JPEG2000 lossy/ECW/MrSID). Prefer 10% compression, up to 20% is acceptable.
    - If the imagery requires any sort of processing prior to display (i.e. mosaicing/colour balancing/etc) then an uncompressed or lossless compressed format is required.

Metadata or 'information about data' will be produced for all spatial data and will be compliant with ANZLIC Metadata Profile. (http://www.anzlic.org.au/policies_guidelines#guidelines).

The Department's preferred method is using ANZMet Lite, however the Department's Service Provider may use any compliant system to generate metadata.

Attachment B

Privacy and Confidentiality Notice

The Department is required under section 74(3) of the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) to publish the information (including personal information of the author and/or third parties) provided in this referral on the internet. The information published may include your personal information.

Information including your personal information included in this referral will be used for the purposes of administering the EPBC Act. The information may be provided to various Commonwealth, State and Territory agencies for the purposes of administering the Act or other Commonwealth, State or Territory legislation. For example, if the proposed action (or a component of it) is to be taken in the GBRMP, the Minister is required to provide a copy of your referral to GBRMPA (see section 73A, EPBC Act). For information about how the GBRMPA may use your information, see http://www.gbrmpa.gov.au/privacy/privacy_notice_for_permits.

The Department will collect, use, store and disclose the personal information contained in this referral in a manner consistent with its obligations under the *Privacy Act 1988* and the Department's privacy policy.

The Department's privacy policy contains details about how respondents may access and make corrections to personal information that the Department holds about the respondent, how respondents may make a complaint about a breach of an Australian Privacy Principle, and how the Department will deal with that complaint.

A copy of the Department's privacy policy is available at: http://environment.gov.au/privacy-policy.

The Department is not obliged to publish information that the Minister is satisfied in commercial-in-confidence. If you believe that this referral contains information that is commercial-in-confidence, you must clearly identify such information and the reason for its confidentiality at the time of making the referral. The Minister cannot be satisfied that particular information included in a referral is commercial-in-confidence unless you demonstrate to the Minister (by providing reasons in writing) that:

- release of the information would cause competitive detriment to the person; and
- the information is not in the public domain; and
- the information is not required to be disclosed under another law of the Commonwealth, a State or a Territory; and
- the information is not readily discoverable.

The Department is subject to certain legislative and administrative accountability and transparency requirements of the Australian Government including disclosures to the Parliament and its Committees. While the Department will treat all referral information provided in this referral sensitively, any information contained in or relating to a referral, including information identified by a person as commercial-in-confidence, may be disclosed by the Department:

- to its employees and advisers in order to evaluate or assess a referral;
- to the Parliamentary Secretary;
- within the Department or other agencies where this serves the legitimate interest of the Australian Government;
- in response to a request by a House or Committee of the Parliament of the Commonwealth of Australia;
- where information is authorised or permitted by law to be disclosed; and
- where the information is in the public domain other than by the Department's disclosure of that information.