

EIS assessment report
for the Surat Basin Carbon Capture and Storage Project



Queensland
Government

Prepared by Environmental Impact Assessment, Department of Environment, Science and Innovation

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Executive summary

This environmental impact statement (EIS) assessment report evaluates the EIS pursuant to Chapter 3 of the *Environmental Protection Act 1994* (Qld) (EP Act) for the Surat Basin Carbon Capture and Storage project (the project) proposed by Carbon Transport and Storage Corporation (CTSCo) Pty Limited (the proponent). CTSCo Pty Limited is a wholly owned subsidiary in Australia of Glencore Holdings Pty Limited (ABN 41 104 160 689), itself being a wholly owned subsidiary of Glencore plc.

The project as described in the EIS would be located on Greenhouse Gas Exploration Permit EPQ10, near Moonie in southern Queensland, approximately 400 kilometres west of Brisbane. The proponent is proposing to undertake a carbon capture and storage (CCS) trial with a long-term plan to conduct an industrial-scale storage project at the same location (which would be subject to separate assessment and approvals processes). The trial proposes injecting 110,000 tonnes of carbon dioxide (CO₂) per year for three years into the Precipice Sandstone aquifer (PSA) at a depth of approximately 2,300 metres below ground level. The CO₂ to be injected would consist of a captured greenhouse gas (GHG) stream from the Millmerran Power Station, transported to site via road.

The Department of Environment, Science and Innovation (DESI) as the administering authority of the EP Act, coordinated the EIS process for the project. The terms of reference (TOR) were released for public consultation from 6 April to 23 May 2022 and finalised on 12 July 2022. Public consultation on the EIS occurred between 5 December 2022 and 23 February 2023, with the EIS published on the proponent's and DESI's websites inviting submissions from interested parties.

During my analysis of the project, and particularly the project's potential impacts on groundwater resources in the Precipice Sandstone aquifer (PSA), I considered the requirements of the Environmental Protection Regulation 2019 (EP Regulation) and the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (Qld). Section 41 of the EP Regulation states that the administering authority must refuse to grant an application that involves the direct release of waste to groundwater under specific circumstances listed in s. 41(2) of the EP Regulation (i.e. is not being, or may not be, released entirely within a confined aquifer; or the waste is likely to result in a deterioration in the environmental values (EVs) of the receiving groundwater). Having determined that the CO₂ proposed to be injected into the PSA is a waste for the purposes of the EP Regulation, I considered the matter to be fundamental to the EIS process.

The original EIS contended that the PSA meets the requirements of the EP Regulation as it is confined, hydrogeologically isolated, and that the injection would not result in the deterioration of EVs in the aquifer. DESI sought technical review and advice from the Queensland Office of Groundwater Impact Assessment, the Independent Expert Scientific Committee on Unconventional Gas Development and Large Coal Mining Development and the Commonwealth Scientific and Industrial Research Organisation to inform the EIS process. Submissions received on the EIS, including DESI's submission, raised concerns about the project's potential impacts on groundwater resources and sought further information on these matters from the proponent. The proponent provided its responses to submissions and amended the EIS to address the submissions. The EIS, including the proponent's responses to submissions are available on the [proponent's website](#).

Section 59(c) of the EP Act requires me to make a recommendation in this assessment report on the suitability of the project to proceed. In doing so, I am required to consider matters outlined in s. 58 of the EP Act. I have completed this by undertaking a thorough analysis and robust scientific assessment of the EIS, detailed expert advice, all submissions, the proponent's response to submissions and amended EISs for the project. I have completed this assessment in accordance with relevant legislation, and regulatory requirements, including the standard criteria under the EP Act.

Based on the information presented in the EIS, I have formed the view that the PSA is not completely self-contained entirely within impermeable strata; and the injection of supercritical CO₂ into this aquifer would likely cause a deterioration in the EVs of the receiving groundwater within the targeted injection area and resulting plume extent. Therefore, I consider that the project as proposed in the EIS must be refused under s. 41 of the EP Regulation and is **not suitable to proceed**.

This assessment report must also address matters outlined in s. 59 of the EP Act. Section 6 of this assessment report presents my analysis of the adequacy of the EIS in addressing the requirements of the TOR. I consider that, except for groundwater and waste matters, the EIS impact assessment was sufficient to describe the potential environmental, social and economic impacts of the project. The EIS proposed measures to avoid and mitigate these impacts. Once it was clear to me that the project as described in the EIS could not meet the regulatory requirements of the EP Act, I made the determination that I would not provide a detailed evaluation of the proponent's proposed avoidance, mitigation and management measures or recommend any conditions of approval for the project.

Importantly, my determination is related only to the project as described in the EIS, proposed within EPQ10.

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List of acronyms and abbreviations

AEP	Annual exceedance probability
ATP	Authority to prospect
CC Act	<i>Carbon Credit (Carbon Farming Initiative) Act 2011 (Cwth)</i>
CCAs	Conduct and compensation agreements
CCS	Carbon capture and storage
CHMP	Cultural heritage management plan
CO ₂	Carbon dioxide
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTSCo	Carbon Transport and Storage Corporation Pty Limited
Cwlth	Commonwealth Government
DAF	Department of Agriculture and Fisheries
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DES	Department of Environment and Science (now DESI)
DESI	Department of Environment, Science and Innovation (formerly DES)
DHLGPPW	Department of Housing, Local Government, Planning and Public Works (formerly Department of State Development, Infrastructure, Local Government and Planning and Department of Communities, Housing and Digital Economy)
DRDMW	Department of Regional Development, Manufacturing and Water
Drinking GLs	NHMRC drinking guidelines
EA	Environmental authority
EIS	Environmental impact statement
EOW	End of Waste code
EP Act	<i>Environmental Protection Act 1994 (Qld) (8 March 2022)</i>
EP Regulation	Environmental Protection Regulation 2019 (Qld) (11 March 2022)
EPP (Noise)	Environmental Protection (Noise) Policy 2019 (Qld)
EPP (Water and Wetland Biodiversity)	Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (Qld)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)</i>
EPQ10	Greenhouse Gas Exploration Permit EPQ10
ERA	Environmentally relevant activity
ESA	Environmentally sensitive area
EVs	Environmental values
GAB	Great Artesian Basin
GABORA	Great Artesian Basin and Other Regional Aquifers
GDEs	Groundwater dependent ecosystems
GHG	Greenhouse gas
GHG Act	<i>Greenhouse Gas Storage Act 2009 (Qld)</i>
GL	Guidelines
HDD	Horizontal directional drilling
IAS	Initial advice statement
IESC	Independent Expert Scientific Committee on Unconventional Gas Development and Large Coal Mining Development
Irrigation GLs	ANZG irrigation guidelines
KtCO ₂ -e	Kilotonnes of carbon dioxide equivalent
LPG	Liquefied petroleum gas
MPa	Megapascals
MNES	Matters of national environmental significance
MPS	Millmerran Power Station
MSES	Matters of state environmental significance
NPI	National Pollutant Inventory

OGIA	Office of Groundwater Impact Assessment
PCA	Potential commercial area
PCC	Post-combustion capture
PSA	Precipice Sandstone aquifer
REs	Regional ecosystems
Resources	Department of Resources
RIDA	Regional interests development approval
RPI Act	<i>Regional Planning Interests Act 2014</i> (Qld)
SCL	Strategic cropping land
sCO ₂	Supercritical carbon dioxide
SIA	Social impact assessment
SSRC Act	<i>Strong and Sustainable Resource Communities Act 2017</i> (Qld)
Stock GLs	ANZG stock watering guidelines
TECs	Threatened ecological communities
TMR	Department of Transport and Main Roads
the project	Surat Basin Carbon Capture and Storage Project
the proponent	Carbon Transport and Storage Corporation (CTSCo) Pty Limited
TOR	Terms of reference
UQ	The University of Queensland
VM Act	<i>Vegetation Management Act 1999</i> (Qld)
Water Act	<i>Water Act 2000</i> (Qld)
WDRC	Western Downs Regional Council
WM-1	West Moonie-1
WM-2	West Moonie-2
WWTP	Wastewater treatment plant

1 Introduction

This EIS assessment report (assessment report) evaluates the EIS pursuant to Chapter 3 of the EP Act for the Surat Basin Carbon Capture and Storage Project (the project) proposed by Carbon Transport and Storage Corporation (CTSCo) Pty Limited (the proponent). CTSCo Pty Limited is a wholly owned subsidiary in Australia of Glencore Holdings Pty Limited (ABN 41 104 160 689), itself being a wholly owned subsidiary of Glencore plc. The Department of Environment, Science and Innovation (DESI) (formerly the Department of Environment and Science), as the administering authority of the EP Act, coordinated the EIS process. This assessment report has been prepared pursuant to ss. 57–59 of the EP Act.

In this assessment I have used the EP Act version dated 8 March 2022, and the EP Regulation version dated 11 March 2022. These were in effect on 14 March 2022 when the proponent submitted the draft TOR for the EIS which I considered is the relevant date for application of s. 20 of the *Acts Interpretation Act 1954*.

The objective of this assessment report is to:

- address the adequacy of the EIS in addressing the final TOR
- address the adequacy of any environmental management plan for the project
- make recommendations about the suitability of the project
- recommend any conditions on which any approval required for the project may be given
- consider another matter prescribed under a regulation.

The project is not a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). The project was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) on 7 January 2022 for assessment. On 9 February 2022, a decision was made that the project is not a controlled action under section 75 of the EPBC Act, (EPBC 2021/9122). Therefore, the project in its current form does not require assessment and approval under the EPBC Act.

Notwithstanding, on 2 November 2022, a specific request for specialist technical advice was made to the Australian Government Minister for the Environment and Water to seek agreement to enable DESI to request the advice of the Independent Expert Scientific Committee on Unconventional Gas Development and Large Coal Mining Development (IESC) on the project. On 15 December 2022, the Australian Government Minister for the Environment and Water agreed to the request. The IESC review ([IESC 2022-139](#)) was provided to DESI on the 5 February 2023 and published on the [IESC website](#).

This assessment report provides a summary of the key matters identified through the EIS process and discusses in more detail those issues of particular concern that were not resolved. Based on the information presented in the EIS, relevant legislation and the regulatory requirements under the EP Act, I have formed the view that:

- the PSA is not completely self-contained entirely within impermeable strata and
- the injection of supercritical carbon dioxide (sCO₂) into the PSA would likely cause a deterioration in the environmental values (EVs), as scheduled in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (Qld) (EPP (Water and Wetland Biodiversity)) of the receiving groundwater within the targeted injection area and resulting plume extent.

Therefore, I consider that the project as proposed in the EIS must be refused under s. 41 of the EP Regulation and is not suitable to proceed.

The giving of this assessment report to the proponent completes the EIS process under s. 60 of the EP Act.

2 Project description

A detailed project description is provided in EIS Chapters 1 Introduction and 2 Project Description. The proposed project is a carbon capture and storage (CCS) trial project. The proponent is seeking to conduct GHG stream injection testing into the PSA, within the Surat Basin, located within the greater Great Artesian Basin (GAB). The GHG stream is made predominately of sCO₂ with a minor component of other constituents. The EIS states that the aim of the injection testing is to provide sufficient information to prove the feasibility of future large-scale industrial GHG storage within the Surat Basin (which would be subject to separate assessment and approvals processes). If the trial were to be approved, the project would be located on Greenhouse Gas Exploration Permit EPQ10 (EPQ10) at West Moonie-1 (WM-1) injection well. The proponent proposes to conduct GHG stream injection testing of up to 110,000 tonnes per annum for three years into the PSA at a depth of approximately 2,300m below ground level.

The GHG stream would be captured via a yet-to-be constructed post-combustion capture (PCC) plant at the existing Millmerran Power Station (MPS). The GHG stream would be provided by the PCC at the MPS as a lower-pressure, low-temperature cryogenic liquid for transportation. The PCC plant infrastructure itself is not part of the project under consideration for the EIS and would require assessment under a separate approval process. The PCC plant would be owned by Glencore Carbon Capture Pty Limited, while the design is based on the Clean Energy Research Institute's (CERI's) Shanghai Shidongkou PCC plant in China. The project involves transportation of the GHG stream by truck from the MPS approximately 260km to the proposed Transportation Facility south of WM-1 injection well site within EPQ10 using existing public roadways (Figure 1).

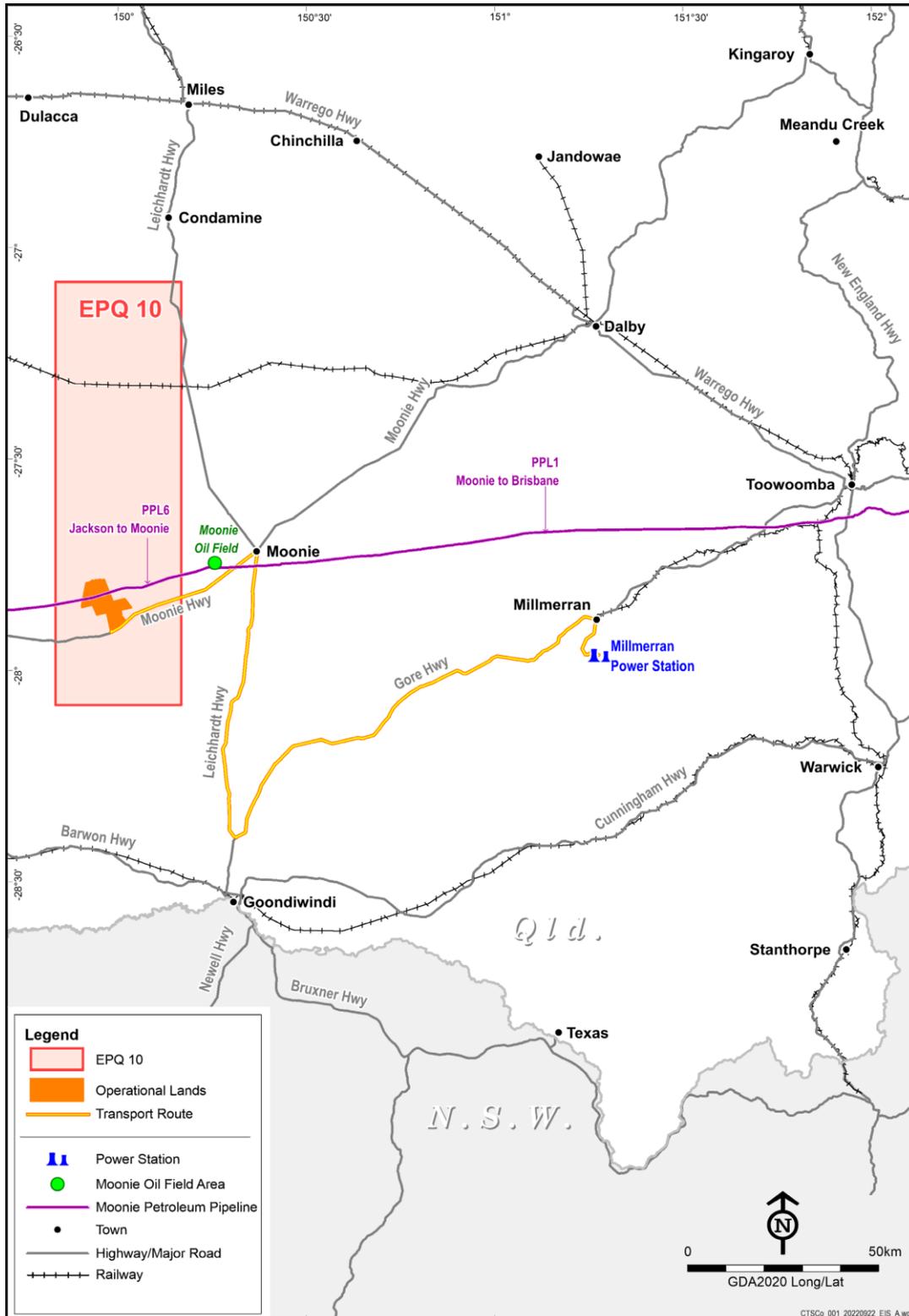


Figure 1 Location of EPQ10, operational lands and planned transport route (sourced from EIS Chapter 1 Introduction, Figure 1-1)

When the GHG stream arrives on-site it would be transferred from the delivery trucks to holding tanks at the planned Transportation Facility (EIS Executive Summary, Figure 7-7). To minimise vehicle interactions, traffic flow through the Transportation Facility would be one-way circulation, where the cryogenic GHG stream would be off-loaded into storage tanks, with each B-double truck delivering 36 tonnes per trip. The cryogenic GHG stream would be stored at the PCC plant in four 100 tonne CO₂ storage tanks.

The GHG stream processing involves liquefied petroleum gas (LPG) powered water heating and pressurising bath conversion of the GHG stream from cryogenic liquid at -20°C and held at 2.29 megapascals (MPa) to a supercritical (liquid-like) fluid at 31°C while at significantly higher pressures and compression (10MPa). This is then transferred via a flowline and deep aquifer injection. The water in the water baths does not mix with the GHG stream but acts as a heat transfer medium from the LPG burners to the outside of the pressurised tanks containing the GHG stream. The water bath heaters are a closed loop system, which would only require small top-ups of water during maintenance.

sCO₂ has many unique properties. It is a significantly denser form of CO₂, occupying far lesser volume than either cryogenic or gaseous forms of CO₂. However, it requires significant pressure tolerances for any holding or transfer infrastructure, e.g. the holding flowline. The transfer of the GHG stream to the planned WM-1 injection well would require active pumping and continuous monitoring of measures such as pressure, temperature, and CO₂ leakages. The proposed flowline would be buried across its entire 9.5km length (Figure 2).

Certain project infrastructure was constructed by the proponent in 2021 as permitted under Environmental Authority (EA) EPPG00646913. This included: WM-1 injection well and West Moonie-2 (WM-2) monitoring well (Figure 2), both targeting the PSA; and a water quality monitoring bore targeting the shallow Griman Creek formation at a depth of approximately 48m.

The project would involve construction or installation of:

- Monitoring bores targeting the Gubberamunda Sandstone aquifer at a depth of approximately 1,400m and the PSA approximately 1km to 1.5km south from WM-1 injection well, which is further described in section 2.1 (Places affected by the project) of this assessment report.
- A Transportation Facility (which would include the GHG storage and processing facilities) that covers approximately 7.35ha and approximately 9.5km of buried flowline to carry the GHG stream from the Transportation Facility to the WM-1 injection well. This includes sections planned to be dug or drilled under existing creek crossings via horizontal directional drilling (HDD).
- Access tracks to the well pads, air quality and atmospheric monitoring equipment, seismic monitoring equipment (2D and 3D seismic programs), including a buried 2D seismic monitoring network, and other elements that the proponent lists as currently authorised under the granted EA (EPPG00646913).

The Transportation Facility, flowline, and WM-1 injection well infrastructure would be remotely supervised, with limited on-site monitoring by on-site personnel. Monitoring data from all equipment in the Transportation Facility, along the flowline and at the injection testing GHG stream storage site would be collected into the data storage system in the on-site office and/or transmitted via telemetry to the proponent's Brisbane office. Remote control of infrastructure would include automated shut-down, alarms and notifications should injection operations deviate from designated control criteria. The crib room and amenities in the office would be available to all personnel permitted with access to the Transportation Facility, including delivery drivers, to allow for personal comfort and fatigue management.



Figure 2 Key features of the proposed project (sourced from EIS Chapter 2 Project Description, Figure 2-6)

2.1 Places affected by the project

The project is a greenfield site development located approximately 400km west of Brisbane in the southern Surat Basin, southern Queensland. The closest population centres are the town of Moonie (approximately 44km west) and Westmar township (approximately 27km east) in the Western Downs Regional Council (WDRC) local government area (Figure 1).

EPQ10 covers an area of 1,200 sub-blocks which equates to approximately 366,400ha. The EIS states the operational land for the project covers an area of approximately 7,766ha. The study area within the operational land would cover an area of approximately 1,079ha, with the nominated direct surface disturbance area being approximately 14.61ha.

The Transportation Facility area located on lot 60 SP199322 would account for approximately 7.35ha of the direct surface disturbance (294m by 250m). The buried flowline would account for an area of approximately 4.55ha based on a 5m wide corridor along or adjacent to the boundaries on lots 60 SP199322, 33 PG223 and 32 PG223. A flowline area of approximately 0.13ha is proposed to allow access to the area from the Transportation Facility to the flowline corridor. An additional well pad of approximately 1ha would be constructed to site the proposed West Moonie-Sentinel Well and West Moonie-6 Soil Monitoring Bore.

An upgraded access road at the intersection of Harts Road and Moonie Highway is planned to traverse a portion of the site for approximately 640m and disturb approximately 0.58ha of land. Updated information provided by the proponent states that approximately 0.32ha of disturbance area (or approximately 32 linear kms of seismic receiver lines by 0.1m wide trench), is also planned for the proposed buried 2D buried seismic monitoring network.

The proponent does not own any freehold land within the project's study area or operational land. The land within the project footprint is currently used primarily for beef cattle grazing and some cropping. No stock routes are located within or immediately adjacent to the operational land. One certified organic farm is located on land adjoining the operational lands being lot 31 PG355.

Numerous petroleum tenements overlap or directly adjoin EPQ10, with further detail available in the EIS (Chapter 2 Project Description, section 2.5). Potential commercial areas (PCA) 342 and 343 have recently been applied for by Cypress Petroleum Pty Ltd over pre-requisite tenures Authority to Prospect (ATP) 2037 and ATP 2038. These PCAs are not currently identified in the EIS section 2.5 or on EIS Figure 2-4.

The project is located outside of zones mapped as Priority Living Areas, Priority Agricultural Areas, Priority Development Areas, and Strategic Environmental Areas. However, the project is located within mapped Strategic Cropping Land (SCL) as an Area of Regional Interest under the *Regional Planning Interests Act 2014* (Qld) (RPI Act). The EIS states that the proponent intends to enter into Conduct and Compensation Agreements (CCAs) with relevant landholders. At the time of this assessment report CCAs are in place or still need to be negotiated with landowners of lots 27 PG462, 30 PG222, 33 PG223 and 60 SP199322.

None of the proposed operational land parcels are listed on the DESI Environmental Management Register or Contaminated Land Register.

The project is located within the sub-catchments of the Stephens, South Branch Stephens, and Upper Moonie River, which flow in a westerly direction across the operational land. These waterways are all listed as ephemeral. These catchments sit within the broader Queensland Murray-Darling and Bulloo River surface water basins. The relevant Water Plans under the *Water Act 2000* (Qld) (Water Act) which apply to surface and groundwaters within the area of the project, are the Water Plan (Border Rivers and Moonie) 2019 and Water Plan (Great Artesian Basin and Other Regional Aquifers (GABORA)) 2017, respectively.

The project is within the GAB, with the PSA proposed for GHG injection being listed specifically as being part of the basal GAB Zones Eastern Central Area in the Queensland Murray-Darling and Bulloo River basins groundwaters and under the GABORA Water Plan.

The project operational land is within land zoned as 'Rural' under the WDRC Planning Scheme (2019).

The project is within the Bigambul People's Native Title application area (QC2009/002), but not within the Bigambul People's Native Title Determination (QCD2016/012 and QCD2017/003). The determination area includes lands in the vicinity of the operational land, but Native Title has been extinguished over all the operational land. The Bigambul People Part A and Part B, represented by the Bigambul Native Title Aboriginal Corporation, are the recognised native title holders and Aboriginal Party for the general project region.

3 Statutory requirements

This section of the assessment report describes the statutory requirements that apply to the project and its EIS process, including:

- the approvals the project would need to operate
- the matters the EIS needed to adequately address
- the matters DESI needed to consider when preparing this assessment report
- the content requirements for this assessment report.

3.1 Project approvals

Section 107 of the EP Act lists a GHG storage activity as a resource activity, and s.109 defines this as an activity that, under the *Greenhouse Gas Storage Act 2009* (Qld) (GHG Act), is an authorised activity for a GHG authority under the Act. On 15 June 2010, a tenure application was lodged by the proponent. On 9 December 2019, under provisions of the GHG Act, a GHG exploration permit (EPQ10) was granted to the proponent by the Department of Resources (Resources) for a 12-year period to explore the potential for GHG storage. On 27 January 2011, (effect date), an EA (EPPG00646913) (existing EA) was issued to the proponent under the EP Act for EPQ10 (and EPQ12) for the purpose of assessing the feasibility of the GHG stream storage. DESI notes an administrative error with the take effect date of the EA (EPPG00646913) and it should have stated effective on grant of tenure. The EA authorises the following activities: drilling of GHG appraisal wells, water production and injection tests and geophysical surveys. It does not authorise the carrying out of CO₂ injection tests. Given the historic nature of the existing EA (EPPG00646913), it does not list any other ancillary environmentally relevant activities (ERAs).

In July 2020, the proponent completed an initial assessment on the capacity of the GHG storage within EPQ10 tenement. The assessment found that the potential GHG storage capacity ranged from 83 to 730 million metric tonnes.

The project would require an amendment of the existing EA (EPPG00646913) to authorise the carrying out of CO₂ injection testing on EPQ10. Based on the information presented in the EIS, I consider that an EA for GHG ERA Schedule 3(8) and another ancillary Schedule 2 ERA would be required (with associated conditions). I consider that Schedule 2 ERA 57 Regulated waste transport would be the relevant ancillary ERA triggered by the proposal under s. 42 of the EP Regulation. I am satisfied that:

- The GHG stream planned for injection is defined as a ‘waste’ under s. 13 of the EP Act, as this is ‘left over, or unwanted by-product, from an industrial ... activity’.
- The predicated GHG stream presented in EIS Chapter 2, Table 2-2, contains various contaminants, including residual water (which forms acidic compounds when contained in the GHG stream) and inorganic sulphides in the form of hydrogen sulphide.

Testing of the GHG stream would be required to determine whether any additional Schedule 9, part 1 constituents are contained within the site specific MPS GHG stream.

Additional approvals would be required for the project to lawfully operate including those outlined in Table 1.

Table 1 Approvals required for the project

Approval	Legislation (Administering Authority)	Detail
Environmental authority granted by Queensland Government		
Environmental authority (EA)	Chapter 5, EP Act (DESI)	<p>The project would require an amendment of the existing EA (EPPG00646913) to authorise under schedule 2 and 3 of the EP Regulation:</p> <p>Schedule 3 (8) – A petroleum activity or GHG storage activity, other than an activity mentioned in any of the items 1 to 7, that includes 1 or more activities mentioned in schedule 2 for which an aggregated environmental score is stated (AES 126).</p> <p>The EA would also cover the following ERAs that are directly associated with, or facilitate or support, the proposed activities, and which would otherwise require approval under the EP Act as ‘prescribed ERAs’, listed under schedule 2 of the EP Regulation:</p> <p>Schedule 2 (57) – Regulated waste transport.</p>
Other approvals granted or required prior to project commencement by Queensland Government or local government		

Approval	Legislation (Administering Authority)	Detail
Injection Test Plan including a Monitoring and Verification Plan	s. 80 of the GHG Act and s. 6 <i>Greenhouse Storage Regulation 2021</i> (Qld) (Resources)	All GHG injection activities
Development approval (waterway barrier works)	<i>Planning Act 2016</i> (underpinned by the <i>Fisheries Act 1994</i>) (Department of Housing, Local Government, Planning and Public Works (DHLGPPW), Department of Agriculture and Fisheries (DAF))	The crossing of Stephens Creek and South Branch Stephens Creek by the flowline may constitute operational works under the <i>Planning Act 2016</i> , particularly if trenching is the construction method. Works would need to be done under a development approval or in compliance with the DAF <i>Accepted development requirements for operational work that is construction or raising</i> (DAF 2018).
Applicable provisions of Petroleum and Gas (Production and Safety) Act 2004	<i>Petroleum and Gas (Production and Safety) Act 2004</i> (Qld) and associated regulations (Resources) <i>Code of Practice for the construction and abandonment of petroleum wells and associated bores in Queensland Department (DNRME 2019)</i>	Well suspension, completion, monitoring. Flowline and infrastructure safety. Final rehabilitation of wells and flowline.
Overlapping tenement holders	<i>Petroleum and Gas (Production and Safety) Act 2004</i> (Qld) and associated regulations (Resources) <i>3A Mineral and Energy Resources (Common Provisions) Act 2014</i> (Qld) and RPI Act	The proponent would need to engage with overlapping tenements holders.
Water licence—for interfering with water in the PSA. Water license – for water take from the PSA.	Water Act (Department of Regional Development, Manufacturing and Water (DRDMW)). Note: Chapter 3 make good agreements (DESI) does not apply to the proposed GHG activities. Water Plan (GABORA) and the associated GABORA Water Management Protocol (DNRME 2017)	Following completion of the EIS process, the proponent would apply to DRDMW for water licences. Under the s. 84 of the GHG Act, a GHG permit holder cannot take or interfere with water as defined under the Water Act unless authorised.
Low-risk Species Management Program(s) and High-risk Species Management Program(s)	<i>Nature Conservation Act 1992</i> (NC Act) (DESI)	The EIS states that approvals under the NC Act may be required.
Cultural heritage management plan (CHMP) with Bigambul Native Title Aboriginal Corporation	<i>Aboriginal Cultural Heritage Act 2003</i> (Qld) Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and Art	A CHMP was approved on 18 July 2023.

Approval	Legislation (Administering Authority)	Detail
Regional Interests Development Approval (RIDA)	RPI Act (DHLGPPW)	The EIS identified that the project lies within a strategic cropping area and would require a RIDA under the RPI Act unless the requirements of an exemption can be met.
Approval of mitigation works	s. 33 of the <i>Transport Infrastructure Act 1994</i> (Qld) Department of Transport and Main Roads (TMR)	An approval for works on a state-controlled road corridor of the Moonie Highway associated with the Harts Road intersection would be required.
Social Impact Assessment (SIA)	<i>Strong and Sustainable Resource Communities Act 2017</i> (Qld) and <i>Social Impact Assessment Guideline</i> (March 2018) (Office of Coordinator General)	As required under the SSRC Act, the proponent prepared a social impact assessment (SIA) as part of this EIS process (see section 6.14 (Social) of this assessment report). The Coordinator-General has undertaken an evaluation of the social impacts of the project, which is available at: Social impact assessments for resource projects State Development and Infrastructure .
CCAs with landholders of the operational lands	<i>Mineral and Energy Resources (Common Provisions) Act 2014</i> (Qld) and RPI Act (DHLGPPW)	The proponent would need to negotiate and finalise these agreements in alignment with the relevant provisions. The CCA would need to consider the Part 2 Division 2 s. 22 of the RPI Act.
Infrastructure agreement with WDRC	<i>Planning Act 2016</i> (Qld) (WDRC)	An agreement for road upgrade activities with WDRC local government area would be required.
Approvals granted by or required prior to project commencement Australian Government		
Offset requirements for emissions avoidance	<i>Carbon Credits (Carbon Farming Initiative) Act 2011</i> (Cwlth) (CC Act) and associated regulations	The proponent plans to apply to be considered as an <i>emissions avoidance offset</i> under s. 53(1)(c) and to be a part of an eligible offsets project in accordance with the CC Act, s.22.
Legal requirements for the emissions and disposal of mercury containing waste/s	<i>Minamata Convention on Mercury</i> (International treaty). The Australian government ratified the Minamata Convention on 7 December 2021. DCCEEW leads Australia's involvement in the Minamata Convention. State government have an important role in managing emissions, releases and disposal of mercury and mercury compounds.	The proponent would need to apply and meet this convention. Not simply for 'product selection' of components (as stated in EIS Chapter 4 Approvals, section 4.3.5), but rather to meet the requirements of the convention on measured and confirmed level of mercury in the GHG stream (including liquids and particulate phases) which are planned for disposal into the PSA. MPS reports high mercury emissions (and other contaminants) to the National Pollutant Inventory (NPI) each year, however, this has not been specifically discussed in the EIS.

3.2 Criteria considered when preparing this assessment report

Section 58 of the EP Act lists the criteria that DESI must consider when preparing the assessment report. All those criteria were considered when preparing this assessment report. The criteria are:

- (a) the final TOR for the EIS
- (b) the submitted EIS
- (c) all properly made submissions and any submissions accepted by the chief executive
- (d) the standard criteria (see Schedule 4 of the EP Act)
- (e) another matter prescribed under a regulation.

For criterion (a), the final TOR were issued to the proponent on 12 July 2022. The final TOR have been considered when preparing this assessment report.

Documents considered for criteria (b) and (c) are described below.

3.2.1 The submitted EIS

The submitted EIS was considered when preparing this assessment report. The submitted EIS comprised the following documents:

- the original EIS (EIS version 1) received by DESI on 11 October 2022 that was made available for public submissions from 5 December 2022 to 23 February 2023
- the amended EIS (EIS version 2) and Response to Public Submissions (version 1) received by DESI on 20 October 2023
- the Response to Public Submissions (version 2 amended to include the required summary of submissions) received by DESI on 8 November 2023
- the amended EIS (EIS version 3) and Response to Public Submissions (version 3) received by DESI on 2 April 2024.

The term EIS in this assessment report refers to the submitted EIS (i.e. original EIS and all amended EISs).

3.2.2 Submissions

DESI received 69 properly made submissions under s. 55 of the EP Act. An additional 13 submissions were received after the submission period ended which I accepted under s. 55 (3) of the EP Act. DESI also provided a submission on the EIS to the proponent. In total, those submissions were received from 20 members of the public and the following stakeholders. Note: Departmental names reflect those at the time of their submissions:

- AgForce Queensland
- Australasian Centre for Corporate Responsibility
- Australian Country Choice
- Australian Lot Feeders Association
- Australian Pork
- Basin Sustainability Alliance
- Billinba Pastoral Company
- Brindley Park Feedlot (Australian Country Choice)
- BNF Farming Trust
- Cameron Pastoral Company
- Coggan Farms
- Colin Boyce
- Corporate Carbon
- DC Diamond Pastoral Company
- Department of Agriculture and Fisheries
- Department of Communities, Housing and Digital Economy
- Department of Energy and Public Works
- Department of Regional Development, Manufacturing and Water
- Department of Resources
- Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships
- Department of State Development, Infrastructure, Local Government and Planning
- Department of Tourism, Innovation and Sport
- Department of Transport and Main Roads
- DK AG Co
- Forty-One Road Farming Company
- Glendon Farming Company
- Golden Arrow Grazing Company
- Goondiwindi Regional Council
- Green Hills Grazing Company
- Green Shirts Movement Queensland
- Hancock Prospecting
- Hatcham Downs Cattle Co
- Hewitt Foods
- Kooroon Pastoral
- Lillyvale Feedlot
- Lock the Gate Alliance
- Lyons Livestock
- Mort and Co Ltd
- National Farmers Federation

- McNamee Group
- OK Station Pastoral Company
- Opal Creek Feedlot
- Packhorse Pastoral Company
- Property Rights Australia
- Queensland Ambulance Service
- Queensland Conservation Council
- Queensland Farmers Federation
- Queensland Police Service
- Queensland United Egg Producers and Pork Qld
- Smithfield Cattle Company
- Southend Cattle
- Southern Queensland Landscapes
- SunPork Group
- Teys Australia
- Tooloombilla Partnership
- Toowoomba Regional Council
- Tremere Cattle Company
- Western Downs Regional Council
- Wildlife Preservation Society of Queensland
- Willinga Park.

Advice was sought and received from the IESC, Office of Groundwater Impact Assessment (OGIA) and Commonwealth Scientific and Industrial Research Organisation (CSIRO) on the content and conclusions of the EIS in relation to groundwater and surface water matters.

The outcomes of several other detailed technical discussions between the proponent, State advisory bodies, CSIRO and DESI, together with the additional clarification provided at those meetings were partially captured by the proponent in amendments to the EIS and considered when preparing the assessment report.

In addition, there has been correspondence from stakeholders regarding the proponent's response to public submissions on the EIS and both versions of amended EIS. All submissions and other comments made by stakeholders on the EIS documents were considered when preparing this assessment report.

3.3 Required content of this assessment report

Section 59 of the EP Act specifies the required content of this assessment report, which must:

- (a) address the adequacy of the EIS in addressing the final TOR. This is addressed in section 6 (Adequacy of the EIS in addressing the TOR) of this assessment report.
- (b) address the adequacy of any environmental management plan
- (c) make recommendations about the suitability of the project. This is addressed in section 8 (Suitability of the project) of this assessment report)
- (d) recommend any conditions on which any approval required for the project may be given. This is addressed in section 7 (Recommended conditions) of this assessment report.
- (e) contain another matter prescribed under a regulation.

Section 2 (Project description) of this assessment report describes the project and the places affected by the project. Section 6 (Adequacy of the EIS in addressing the final TOR) of this assessment report summarises the project's proposed impacts and addresses the matters listed in items (c) to (d) above. Regarding (e), as per s. 5 (1) of the EP Regulation; Part 2 (EIS process, including s. 5-10), Schedule 1 of the EP Regulation does not apply to this assessment report.

4 The EIS Process

The proponent applied for a decision about whether an EIS would be required for an EA application for the project (a resource project). DESI decided that the proponent must prepare an EIS for the project using the process in Chapter 3 of the EP Act. Table 2 summarises the stages, timing and actions undertaken in the EIS assessment process for the project.

Table 2 The key steps undertaken during the project EIS process

Step in the EIS process	Section of EP Act	Responsibility for taking step	Date completed
Proponent applied for a decision about whether an EIS would be required for an EA application for the project (a resource project).	s. 73A(1)(a)	Proponent	12/08/2021
DESI decided an EIS would be required for an EA amendment application for the project and issued a notice about the decision to the proponent.	s. 73(c)	DESI	13/09/2021 (notice)
The Australian Government declared the project not a controlled action under the EPBC Act. Referral number 2021/9122.	N/A	Australian Government	09/02/2022
EIS process commenced when the proponent submitted draft TOR and initial advice statement (IAS) for the project, accompanied by the fee prescribed under the EP Regulation.	ss. 41(1) & 41(2)	Proponent	14/03/2022
DESI gave the TOR notice to the proponent, which set the comment period at 30 business days.	ss. 42(1) & 42(2)	DESI	30/03/2022
DESI published the TOR notice on its website, to meet statutory publishing requirements.	s. 43(1)	DESI	06/04/2022
The draft TOR comment period started on 6 April 2022 and ended on 23 May 2022.	s. 42(3)	DESI	23/05/2022
DESI gave the proponent 24 sets of comments received during the comment period, including comments from DESI.	s. 44	DESI	02/06/2022
The proponent responded to the comments on the draft TOR.	s. 45 (and s. 11 of the EP Regulation)	Proponent	16/06/2022
DESI considered the proponent's response, produced the final TOR, and gave a copy of the final TOR to the proponent.	s. 46	DESI	12/07/2022
The proponent submitted the EIS to DESI.	s. 47	Proponent	11/10/2022
DESI decided that the EIS was suitable to proceed to public notification.	ss.49(1) & 49(3)	DESI	08/11/2022
DESI gave the proponent a notice of decision that the EIS was suitable to proceed to public notification, and that the submission period would be 45 business days.	s. 49(6)	DESI	22/11/2022
The proponent gave a copy of the EIS notice to interested and affected persons.	s. 51(2)(a)	Proponent	6/12/2022
The proponent published the EIS and the EIS notice on its website to meet statutory publishing requirements. DESI published the EIS notice on its website.	s. 51(2)(b)	Proponent	5/12/2022
The proponent gave DESI a declaration of compliance stating that a copy of the EIS notice had been given to interested and affected persons, and that the EIS notice had been published in appropriate newspapers.	s. 53	Proponent	08/12/2022
The EIS submission period started on 5 December	s. 52(2)	DESI	23/02/2023

Step in the EIS process	Section of EP Act	Responsibility for taking step	Date completed
2022 and ended on 23 February 2023.			
On 2 November 2022, the IESC was requested by letter from the Queensland Environment Minister and DESI to provide comment on the project's groundwater and surface water assessments. The IESC provided advice to DESI on the 5 February 2023.	s. 62	DESI	05/02/2023
On 1 November 2022, OGIA was requested by letter from DESI to provide comment on the project's groundwater assessments. The OGIA provided advice to DESI on the 15 March 2023.	s. 62	DESI	15/03/2023
DESI forwarded to the proponent 69 submissions about the EIS that were received and accepted during the submission period and 12 submissions that were accepted but received outside of the submission period. DESI also provided a submission on the EIS to the proponent.	ss. 55 & 56(1)	DESI	09/03/2023
DESI forwarded to the proponent an additional submission received on the 14 March 2023 that was accepted, but outside the submission period. Advice from OGIA was also forwarded to the proponent.	ss. 55(3)	DESI	23/03/2023
On the 20 June 2023, DESI requested CSIRO provide technical reviews and comments on the project's groundwater assessments. The CSIRO provided advice to DESI on the 5 October 2023. Advice from CSIRO was provided to the proponent on the 9 October 2023.	s. 62	DESI	5/10/2023
On the 3 April 2023, the proponent and DESI agreed a longer period for submitting a response to submissions until 8 November 2023. On 8 November 2023, the proponent submitted a response to submissions and the amended EIS. DESI sent a notification email and links to the copies of the documents to government agencies and landholders who provided a submission on the EIS.	ss. 56(2) & 56(3)	Proponent	08/11/2023
On 23 October 2023, DESI requested OGIA review and comment on the project's updated groundwater assessments. OGIA provided advice on the 20 November 2023 to DESI.	s. 62	DESI	20/11/2023
On 6 December 2023, DESI advised the proponent that there were matters the EIS had not adequately addressed. Consequently, on 6 December 2023 and 14 December 2023, the proponent requested extensions to the period for making the s. 56A decision, so that they could provide the outstanding information. DESI agreed to both requests for extensions, and the last date for making the s. 56A decision was agreed to be 1 May 2024.	ss. 56A(2) & 56A(3)	Proponent	06/12/2023
The proponent revised their response to submissions and submitted an amended EIS to DESI on 2 April 2024. The EIS was published online on 2 April 2024 (the next business day after the 31 March 2024).	ss. 56(2)	Proponent	02/04/2024
DESI considered the EIS and the proponent's response to submissions and decided to allow the EIS to proceed under division 5 (assessment report) and division 6 (completion of process).	ss. 56A(2)(b) & 56A(4)	DESI	12/04/2024

Step in the EIS process	Section of EP Act	Responsibility for taking step	Date completed
DESI issued to the proponent a notice of the decision to proceed.	s. 56(A)(5)	DESI	16/04/2024
DESI prepared the assessment report.	ss. 57 to 59	DESI	24/05/2024
DESI completed the assessment report and gave a copy to the proponent completing the EIS process.	s. 60	DESI	24/05/2024

5 Consultation program

5.1 Public consultation

In addition to the statutory requirements for advertising of the TOR and EIS notices and the mailing of the notices to interested and affected parties, the proponent undertook community consultation with members of the public and other stakeholders. A summary of the proponent's consultation process is presented in EIS Chapter 17 Social and discussed in section 6.14 (Social) of this assessment report. The submissions received have been itemised in section 3.2.2 (Submissions) of this assessment report.

I received numerous correspondence from the community, landholders, and stakeholders during the EIS process. A key concern that was consistently raised was the perceived lack of early and effective consultation by the proponent with local and regional landholders, particularly those landholders that were not identified by the proponent as directly 'affected persons' under the definition in s. 38 of the EP Act. It is my view that persons adjoining the operational land, adjacent resource operators, local companies, relevant community organisations, waste suppliers and councils would have an interest in the project given the potential impacts to groundwater resources. I consider the omission of some these people and organisations from early engagement on the project is a shortcoming of the EIS.

5.2 Advisory body

DESI invited the following organisations to assist in the development of the TOR and assessment of the EIS by participating as members of the advisory body for the project. Departmental names reflect those at the time of DESI seeking their advice:

- AgForce Queensland
- Department of Aboriginal and Torres Strait Islander Partnerships (now Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and Art)
- Department of Agriculture and Fisheries
- Department of Agriculture, Water and the Environment (now Department of Climate Change, Energy, the Environment and Water)
- Department of Communities, Housing and Digital Economy (now Department of Housing, Local Government, Planning and Public Works)
- Department of Education
- Department of Employment, Small Business and Training
- Department of Energy and Public Works (now Department of Housing, Local Government, Planning and Public Works, and Department of Energy and Climate)
- Department of the Premier and Cabinet
- Department of Regional Development, Manufacturing and Water
- Department of Resources
- Department of State Development, Infrastructure, Local Government and Planning (now State Development and Infrastructure, and part of Department of Housing, Local Government, Planning and Public Works)
- Department of Tourism, Innovation and Sport (now Department of Tourism and Sport and part of DESI)
- Department of Transport and Main Roads
- Goondiwindi Regional Council
- Office of Groundwater Impact Assessment (part of DRDMW)

- Office of Industrial Relations and Workplace Health and Safety
- Powerlink Queensland
- Queensland Ambulance Service
- Queensland Fire and Emergency Services
- Queensland Great Artesian Basin Advisory Council (part of DRDMW)
- Queensland Health
- Queensland Police Service
- Queensland Treasury and Department of Trade and Investment
- Resources Safety and Health Queensland
- Sunwater
- Toowoomba Regional Council
- Wildlife Preservation Society.

5.3 Public notification

In accordance with the statutory requirements, a public notice to notify the availability of the draft TOR was published on the DESI website on 6 April 2022. A public notice to notify the availability of the EIS for review and public comment was published on the DESI website on 5 December 2022. The draft TOR and EIS were not required to be publicly notified in newspapers as the project was not required to be assessed through an accredited assessment process nor under a bilateral agreement under the EPBC Act.

The draft TOR and EIS were made available at the following locations during their respective public comment and submission periods:

- Queensland Government website (draft TOR, final TOR and IAS)
<https://www.qld.gov.au/environment/management/environmental/eis-process/projects/current-projects/surat-basin-carbon-capture-and-storage-project>
- CTSCo Pty Limited's website <https://www.ctsco.com.au/about#eis>.

I consider that the proponent met the statutory public notification requirements of the EIS process.

6 Adequacy of the EIS in addressing the final TOR

Except for groundwater and waste matters, I consider that the EIS largely addressed the TOR requirements. The subsections of this chapter present outstanding matters, and discuss the findings of the EIS regarding them, summarise the relevant impacts, and outline those environmental protection commitments made by the proponent. As I have formed the view that the project is not suitable to proceed, a detailed evaluation of potential impacts and avoidance, mitigation and management measures is not required. No conditions are recommended for the project.

6.1 Introduction to the EIS

The EIS provided an adequate introduction to the project, its objectives and scope. It identified several necessary approvals required for the project and outlined the assessment and approval processes. Additional approvals and assessment processes may be relevant for the project which have not been detailed in the EIS given the unique nature of CCS projects in the regulatory context.

6.2 Project description

The EIS adequately described the location, scope, and phases of the project. An outline of the project is provided in section 2 (Project description) of this assessment report.

6.3 Project need and alternatives

The EIS described the alternatives to the project and environmental benefits of the project in terms of net GHG emission reduction. This is discussed further in section 6.9.1 (Greenhouse gas emissions) of this assessment report.

The EIS contended that the project would assist the Queensland Government in meeting its scope 1 and 2 emissions targets of a 30% reduction below 2005 level by 2030 and zero net emissions by 2050.

The EIS identified that the PSA has the potential as an industrial-scale CCS target repository. This hypothesis is supported by research from organisations, including the University of Queensland (UQ) and CSIRO. Additionally,

the EIS indicated that Geosciences Australia identified the PSA as potentially suitable for CCS in the Hydrological Atlas of the Great Artesian Basin (2015). The PSA is listed to have inherent geological and physical features which could be advantageous for large-scale CCS development, specifically its porous geology which may accommodate large volumes of GHG stream. This project is proposed as a trial to gather data and information to enhance the knowledge base for CCS in the Surat Basin, specifically the PSA to inform the impact assessment and investment decisions for potential industrial-scale projects.

The EIS suitably addressed how the project's operations would contribute to local, regional, state and national economies through the provision of taxes, charges and wages. The project would only require a small workforce across all project phases, which would create some opportunities for business and workers in the local area and wider region. The project would not impart direct benefits via royalties to the Queensland or Australian governments, however, the proponent plans to claim carbon offsets as a commercial benefit to support the project.

6.3.1 Project alternatives

The EIS presented several consequences of not proceeding with the project (i.e. 'do nothing option'). This included potential lost opportunities for improved scientific knowledge on CCS, potential CCS expansion and reducing CO₂ emissions, particularly for carbon intensive 'hard to abate' industries such as cement and steel manufacturing.

The EIS largely addressed feasible project alternatives to the location of the project's surface infrastructure and methodology. The EIS assessed the following project alternatives:

- The construction of a pipeline containing the GHG stream from the MPS to the Transpiration Facility was considered. The EIS assessment concluded the pipeline construction as cost prohibitive, due to: the relative short duration of project operations (3 years); the relatively small injection volume of GHG stream (being up to 330,000 tonnes); and significant land disturbance associated with pipeline construction, including potential impacts on private and community infrastructure. I consider the construction of a dedicated pipeline to carry the GHG stream would likely reduce some of the identified impacts on public road use, noise nuisance, and minimise GHG emission from the truck transportation, but would likely increase surface disturbance impacts. I agreed with the proponent that the construction of a pipeline to carry a GHG stream to EPQ10 would likely only be feasible if it were part of an industrial-scale GHG stream storage project proposal, and that was not the subject of this EIS assessment.
- The preferred location of the 9.5km (1.5m deep x 0.5m wide) flowline corridor from the Transport Facility to the WM-1 injection well (within EPQ10) was adequately described in the EIS. The flowline is planned to follow the western boundary of the project area that has been historically cleared of vegetation to install boundary fences and firebreaks. The flowline alignment suitably described minimising potential impacts on terrestrial and aquatic flora and fauna, and agricultural activities. However, no alternative flowline alignment route was presented in the EIS.
- Heating the GHG stream from cryogenic liquid to a sCO₂ fluid using LPG powered electricity generation was assessed against the use of a combined photovoltaic (PV), battery energy storage and solar hot water generation system. I agree with the EIS conclusion that the use of a PV, battery storage and solar hot water generation system is commercially cost prohibitive for the project's short three-year operational phase.
- Workforce accommodation alternatives were considered in the EIS. No new housing, worker accommodation facilities, camps or villages are proposed to be constructed. The EIS concluded that utilising existing regional accommodation was the most feasible option for all project phases as only a small number of employees would be required for the short project duration.

While I consider that the EIS described the matters considered in siting the planned Transportation Facility, I note that the EIS did not present alternative layout or location(s).

I consider that the proponent should have provided a detailed assessment of feasible or practical alternatives to the PSA as the target for GHG stream injection. The EIS described EPQ10 as being selected as a suitable site for GHG stream injection from a series of cited geoscience and hydrogeological studies. I consider the EIS did not adequately discuss the feasibility of the proposed GHG stream injection activity targeting abandoned or depleted gas or petroleum geological formations or saline confined aquifers either in the underlying Bowen Basin or elsewhere in Queensland.

I note, internationally, most CCS projects target injection of GHG stream into saline confined aquifers, offshore formations, or already depleted oil and gas formations. These formations are typically characterised by poor water quality and or low to no potential for direct human water resources use. In contrast, the PSA is a regional sandstone aquifer and a regional source of water for a variety of users, including water supply for human drinking, standard and intensive stock industries, farm supply and crop irrigation. From a review of literature and information in the EIS, I have established that no similar proposal can be cited that specifically targets a currently usable groundwater resource that is important for agricultural and human use.

This issue was raised in my letter to the proponent dated 8 December 2023 and earlier in many EIS submissions, including from DESI, DRDMW and DAF. In response to submissions, the proponent endeavoured to further substantiate the feasibility and viability of the project. This included a review of national and international CCS projects, including the similarities and differences between those projects. The proponent's response to the 8 December 2023 letter suggested that a comparative analysis to an underlying aquitard of the Surat Basin (the Moolayember Formation) was a suitable response. I acknowledge the EIS presented additional information about the porosity of the Moolayember Formation and concluded that it is not suitable for CCS.

I conclude that the EIS should have presented and assessed alternate groundwater aquifers or geological formations which align with the effect of s. 41 of the EP Regulations, including aquifers meet the following:

- inherently saline
- geologically suitable and stable to host GHG
- not subject to scheduled EVs and possible interactions with surface water or groundwater dependent ecosystems
- considered confined in accordance with current legislation
- considerate of community and stakeholder views regarding aquifer use and values of the target or surrounding aquifers.

6.4 Climate

The EIS adequately described how climate impacts could affect the potential for environmental impacts and the management of operations at the site. No on-site weather monitoring station was installed on the proposed operational land. However, the EIS used rainfall and temperature climatic data derived from the Bureau of Meteorology, Surat and Goondiwindi Airport weather stations which I considered are representative of the operational area.

The EIS identifies the project area to be located within the Eastern Downs region climatic zone which has a temperate climate with hot summers and cool winters. The annual average potential evaporation rate is more than twice the local annual average rainfall. Additionally, rainfall is highly seasonal and irregular, with the highest rainfalls generally noted in the summer season. The area is characterised by relatively low soil moisture and has a significant reliance on access to groundwaters to support human uses including for primary industries and potable water supplies. For further information refer to section 6.7 (Water) of this assessment report.

The EIS stated that unmitigated climate change affects are predicted to increase the frequency, intensity and severity of extreme weather events such as drought and floods alongside changes in sea surface levels and temperatures, increasing fluctuations in air temperature and rainfall. The frequency and the duration of hot days will likely result in harsher bushfire weather in the region. Rainfall variability is likely to remain an issue for the region, and predictions suggest that rainfall variability may worsen due to climate change over time.

The project's GHG emission impact assessment and Decarbonisation Plan is discussed in section 6.9.1 (Greenhouse gas emissions) of this assessment report. Risks related to severe weather conditions, such as cyclone, flood, heatwave, and bushfire risks, have been addressed in EIS Chapter 15 Hazards and Safety, and discussed further in section 6.12 (Hazards and safety) of this assessment report.

6.5 Land

The EIS adequately described those aspects of the site and project relating to the existing and proposed qualities and characteristics of the operational land and adjoining land and how they would interact with, and affect, the potential impacts of the project. The following subsections address those qualities and characteristics in more detail and list measures proposed by the proponent to avoid or minimise impacts related to land use.

I am satisfied that there is low likelihood of a complete groundwater to surface exposure pathway associated with potential GHG plume leakage or migration, once injected. Therefore, potential impacts to landscape character and surface disturbance are unlikely, however, some uncertainty remains regarding the presence of any geological structures in the caprock above the target injection area.

I consider the EIS adequately addressed most aspects of the land impact assessment requirements and that the project would not result in significant land disturbance. As I have formed the view that the project is not suitable to proceed, further evaluation of the potential land impacts, avoidance, mitigation and management measures and EA conditions is not presented. I do not recommend any conditions of approval for the project.

6.5.1 Topography

The EIS adequately described and illustrated the existing topography of the land. The EIS described the operational land, and land adjoining the operational land, as generally flat with slight undulations. Ground

elevations predominantly range between 235m and 245m Australian Height Datum. I am satisfied that given no significant changes are proposed to the existing topography, potential adverse topography impacts are not anticipated.

6.5.2 Geology and geomorphology

The EIS described the broader geology and geomorphology of the EPQ10 site and its surrounding area. This section should be read in conjunction with section 6.7.2 (Groundwater) of this assessment report.

The project site is located within the GAB, a large, complex, and deep geological basin formed millions of years ago. The GAB is the largest Australian groundwater basin and lies beneath parts of the Northern Territory, Queensland, South Australia and New South Wales, including the Eromanga, Surat and Carpentaria geological basins (IESC 2014).

The PSA is a regional sandstone aquifer, representing the deepest and oldest aquifer of the Surat Basin. It is conceptually sealed by the Evergreen Formation on the top and Moolayember Formation on the base (Figure 3). The overlying Evergreen Formation and underlying Moolayember Formation are heterogeneous but consist predominantly of fine-grained lithologies assumed to lead to effective, tight, regional aquitards with significant vertical resistance to groundwater flow. The Hutton Sandstone aquifer is the overlying aquifer above the Evergreen Formation, as shown below in the conceptual schematic diagram of the various aquifers and aquitards of the GAB (Figure 4). The PSA forms part of the basal layer of the GAB and sits between 2,258m and 2,336m below ground level at the WM-1 injection well.

The WM-1 injection well is located on the eastern slope of the Mimosa Syncline (Figure 5). The EIS identified no known fractures or faults should be present in the Evergreen Formation near the WM-1 injection well with the closest known fault being the Moonie-Goondiwindi Fault zone, located approximately 23km east of the WM-1 injection well. This is discussed further in section 6.7.2 (Groundwater) of this assessment report. However, the EIS did not present any results for confirmational 3D seismic baseline assessment. After a thorough analysis of the EIS information and consideration of expert advice, I consider further geophysical surveys and modelling would be required to better understand the geological subsurface structures and hydrogeology of the project area. I consider robust 3D seismic baseline characterisation of the local stratigraphy is required to adequately confirm the stratigraphy and absence of fractures or faults near the site.

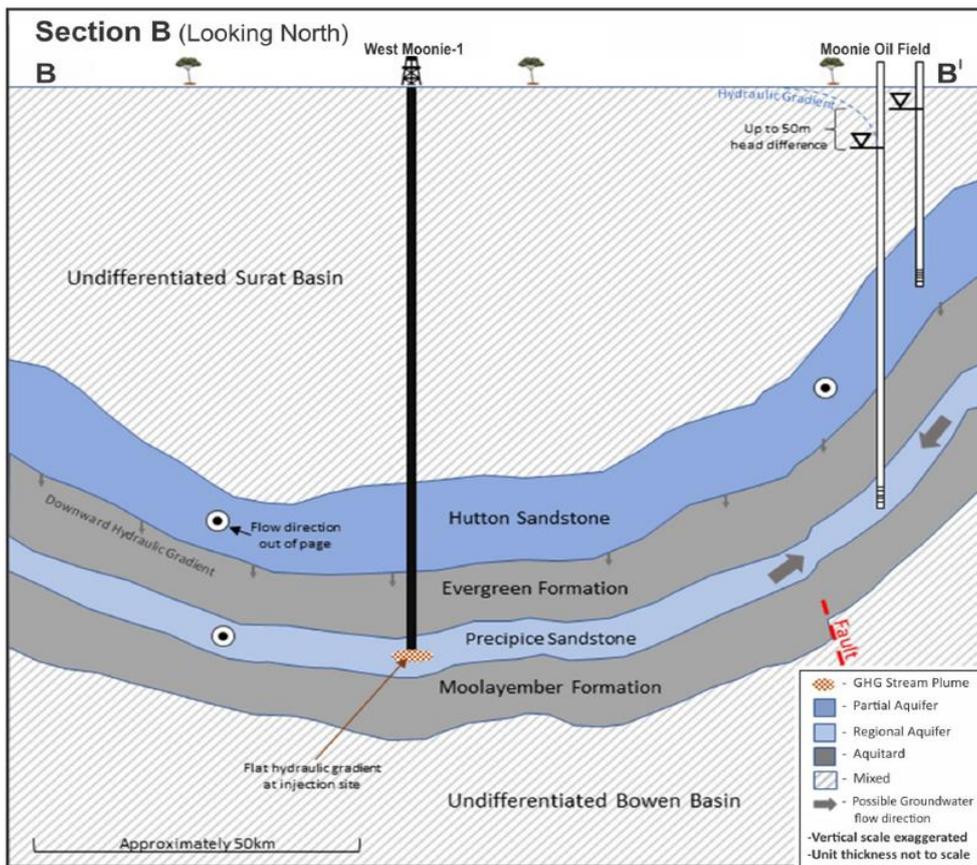


Figure 3 Regional north-east to south-west structural section of GAB formation (sourced from EIS Chapter 9 Geology, Figure 9-14)

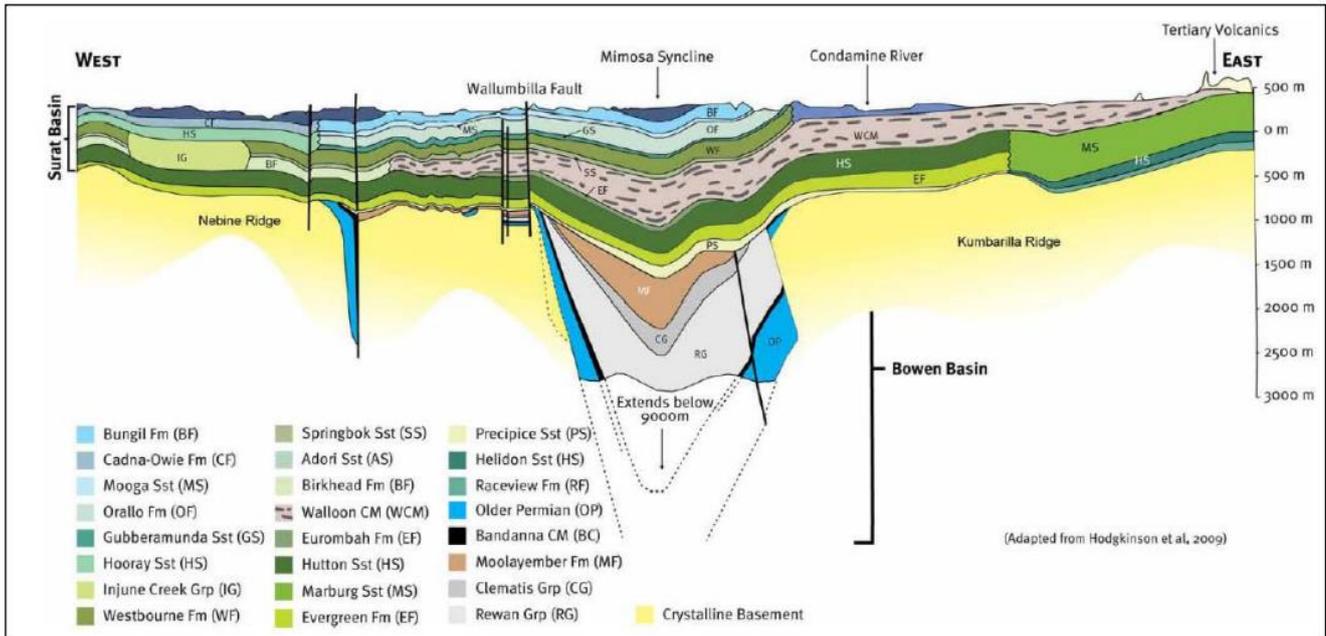


Figure 4 Schematic west-east cross section across the southern regions of the Bowen Basin overlain by the Surat Basin (sourced from IESC 2014 (QWC 2012))

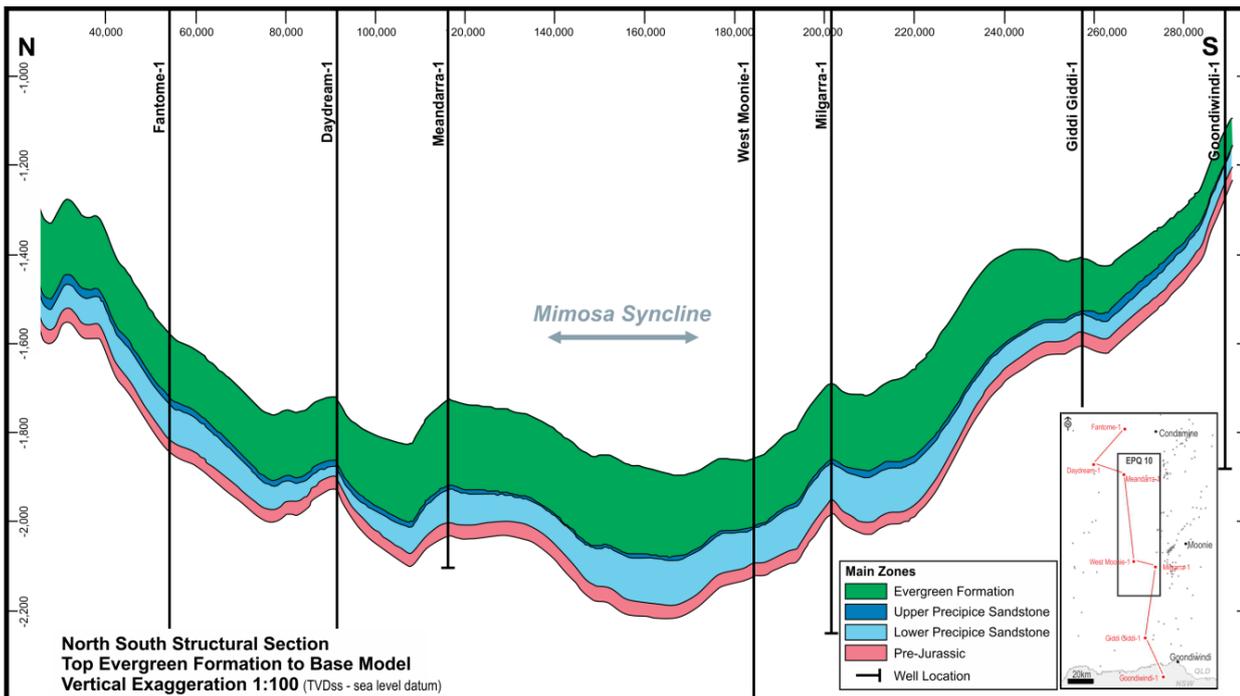


Figure 5 Representative regional north-south structural section – vertical exaggeration 1:100 (sourced from EIS Chapter 8 Geology, Figure 8-9)

The proponent used a suite of models to predict injected GHG stream behaviour and assess the containment risk including:

- seismic geophysical predictive modelling for subsurface geological structure including faults, however, this was not characterised specifically for WM-1 injection well within EPQ10, but based on other locations of the GAB
- petrophysics modelling to determine rock properties including porosity, permeability and fluid saturation
- static geological modelling for overall geological properties as a whole system

- geomechanical modelling for prediction of maximum allowable injection pressure, earth stresses, fracture initiation and reactivation.

The EIS identified that potential impacts include fracture initiation in the Evergreen Formation seal due to pressure increase, and the potential for leakage of GHG stream from the PSA into the overlying Hutton Sandstone aquifer or other overlying aquifers. Based on the modelled outcomes, the EIS predicted that both impacts are unlikely. However, site specific characterisations of the geological seal above the PSA are a notable omission from the EIS. This is a TOR requirement and was the subject of submissions from DESI, DRDMW, and expert advice to DESI from CSIRO, OGIA and the IESC. In response, the proponent made a commitment to undertake a 3D seismic characterisation post EIS.

The EIS partially assessed the potential connection between the PSA and the overlying aquifers within the GAB relevant to the targeted WM-1 injection well. The assessment of connectivity related to water resources is discussed further in section 6.7 (Water) of this assessment report. The potential pressure impacts from GHG stream and plume associated with geochemistry on the PSA and groundwater are discussed in section 6.7.2 (Groundwater) of this assessment report.

Seismic impact assessment indicated the potential for GHG plume injection causing earthquakes. This is further discussed in section 6.12 (Hazards and safety) of this assessment report.

6.5.3 Soils

The EIS adequately described the soils of the project site based on desktop assessment. The three mapped soil types identified in the desktop assessment and that would be disturbed by project activities are:

- Chromosols: generally, soils that have texture contrast profiles with a clear boundary between the surface loamy soil and the clay subsoil.
- Sodosols: are found in poorly drained sites. They are sodic which leads to high erodibility, poor structure and low permeability.
- Vertosols: (associated with gilgai) are considered cracking clay soils, meaning they display strong cracking when dry, and shrink - swell properties during wetting and drying phases.

The Department of Resources' submission on the EIS noted the lack of site-based soil assessment presented to inform the EIS. In response, the proponent made a commitment to develop a site-based soil assessment post EIS prior to construction. I consider that as per the TOR requirements and leading practice impact assessment, site-based soil assessment and management measures should have been provided in the EIS.

The EIS notes the risk of exposure of sodic soils to erosion and the importance of progressive rehabilitation to cover and treat sodic soils. Vehicle access restrictions on cracking clay soils when saturated was also identified as a site limitation in the EIS. The EIS states an erosion and sediment control plan would be developed in accordance with the International Erosion Control Association best practice guidance documents (2008).

I note the EIS proposed the installation of two soil vapour monitoring bores. These would be used to establish a baseline for identifying CO₂ concentrations above natural metabolic activity to detect changes in CO₂ concentrations above background levels potentially indicating gas releases from depth.

6.5.4 Subsidence

The EIS did not provide any information on the likelihood, location, scale or impact of subsidence because of the project, or a clear explanation why this TOR requirement was considered not applicable. The risk of seismic and geomechanical movements induced by the project activities were considered in EIS Chapter 15 Hazards and Safety and EIS Chapter 8 Geology and deemed negligible. However, no explicit connection was then made to the likelihood and risks of surface subsidence and the issue is left unaddressed. Advice from both OGIA and CSIRO also identified omissions in the assessment of potential impacts from geochemical changes on geomechanics because of the project. I consider that the EIS conclusions on geomechanics such as induced seismicity were not adequately substantiated. I, therefore, cannot reach a definitive understanding of potential subsidence impacts. This is discussed further in sections 6.12 (Hazards and safety) and 6.5.2 (Geology and geomorphology) of this assessment report.

6.5.5 Land use

The EIS mostly addressed temporary and permanent changes to land uses for the project. The EIS appropriately identified changes to current grazing and cropping activities which would be temporary and reversible, with the exception being proposed road infrastructure improvements, installation of the flowline and the 2D seismic receiver lines. At the end of operations, decommissioning of the flowline would require the flowline to be disconnected from the Transportation Facility and WM-1 injection well and filled with cement. I note that that the 2D seismic receiver

lines would be left in-situ unless agreement with landholders necessitates their removal. The remaining impacted land would be rehabilitated to pasture consistent with the improved pasture in the surrounding area. This is discussed further in EIS Chapter 19 Rehabilitation and section 6.6 (Rehabilitation) of this assessment report.

6.5.6 Land suitability

The EIS mostly described and assessed the potential impacts on land suitability. The EIS identified that the project lies within an SCA and would require a RIDA under the RPI Act unless the requirements of an exemption can be met. The EIS further identifies s. 22 of the RPI Act as being applicable to the proposal, however, insufficient evidence was provided in the EIS to determine if requirements of this exemption would be met. The EIS confirmed that CCAs, which are required for the exemption, have not yet been finalised with all landowners. I consider further consultation with DHLGPPW would be required to confirm the suitability of this exemption for the project and potential impacts from 2D seismic receiver lines. Additionally, I note reference to the project's disturbance area was not amended from 13.6ha to 14.61ha as part of response to submission updates in EIS Chapter 7 Land. It is unclear if this change significantly impacts assessment of the percentage of SCL impacted by the project.

6.5.7 Landscape character and visual amenity

The EIS mostly described and assessed the potential impacts on the existing landscape character and visual amenity. The EIS described the general character of the operational land as rural agricultural. At a wider scale, the Moonie oil field, small towns and protected areas are also observed. Given the flat nature of the topography, there are no defined or prominent viewpoints of the operational land. No photographic perspectives from roadside viewpoints were presented to provide line-of-sight of the project. The EIS did not recommend any additional vegetation planting and/or screening around the site as a factor to reduce the potential for visual impacts from the Moonie Highway scenic route.

A range of above ground infrastructure would be constructed and would influence the visual amenity and landscape character of the project site. Members of the public could view the Transportation Facility from either the Moonie Highway or Harts Road. Although some vegetative screening would be present, prominent features would be the anemometer located at the WM-1 injection well site and the LPG tanks and office within the Transportation Facility. The EIS considers potential project impacts on visual amenity in consideration of the WDRC Planning Scheme (2019), but also notes the project's exemption from assessment under this scheme. Although the Moonie Highway is a key tourist and transport route near the project site, the EIS identified no adverse impacts on the Moonie Highway scenic route and did not propose any mitigation measures.

6.6 Rehabilitation

The EIS has partially addressed the rehabilitation impact assessment requirements of the TOR. EIS Chapter 19 Rehabilitation mostly identifies rehabilitation success criteria, progressive rehabilitation stages and topsoil management and revegetation requirements for land.

The EIS also addressed the rehabilitation of the GHG wells and flowline (see section 6.5.5 (Land use) of this assessment report). At the end of the operational phase, the EIS commits that the GHG wells, WM-1 injection well, WM-2 monitoring well and West Moonie sentinel well, would be suspended, shut in, and used for monitoring. The EIS explains that the final rehabilitation of these GHG wells would involve the wells being plugged and abandoned per the *Code of Practice for the construction and abandonment of petroleum wells and associated bores in Queensland – Petroleum and Gas Inspectorate* (DNRME 2019). This would involve installation of cement abandonment plugs, cutting of casing below surface and removal of the wellhead from site.

The EIS fails to describe the potential for long-term corrosive actions on abandoned subterranean wells which may result in leakages of GHG stream into overlying aquifers over long timeframes. The potential for long-term impacts to groundwater from unintended GHG emissions and storage loss through indirect means is a key residual risk that is not adequately addressed in the EIS.

There is insufficient information provided in the EIS to adequately address residual risks and rehabilitation impact assessment for groundwater aspects. However, as I have formed the view that the project is not suitable to proceed, further evaluation of potential rehabilitation impacts, avoidance, mitigation and management measures and EA conditions, is not presented. I do not recommend any conditions of approval for rehabilitation for the project.

6.7 Water

6.7.1 Surface water resources

The EIS partly addressed the TOR with respect to surface water resources and quality. I am satisfied that the impact assessment was conducted as per relevant guidelines including the EPP (Water and Wetland Biodiversity).

The project is located within the Upper Moonie River sub-catchment (mapped on plan WQ4171 (DES 2020a) within the Queensland Border Rivers and Moonie River basins (DES 2020b). The EIS identified the relevant EVs and water quality objectives. Specifically, these relate to:

- aquatic ecosystem protection (moderately disturbed ecosystems)
- primary industries including irrigation, farm supply/use and stock watering
- human consumption
- primary, secondary and visual recreation
- drinking water
- cultural, spiritual and ceremonial values.

I note that the proponent did not identify the high ecological value areas scheduled for surface waters adjacent to the planned Transportation Facility and flowline location (and associated with the Currajong State Forest). However, I consider this low risk as no direct or indirect disturbance is proposed for this area.

The EIS only partly addressed the TOR requirement to undertake baseline assessments for surface water quality indicators in the relevant waterways. The EIS submissions on these matters were also not fully addressed in the EIS.

The EIS adequately identified the site's rainfall, catchments, and surface hydrology in its assessment of impacts on water resources, including matters related to:

- sediment generation during construction and rehabilitation phases
- unintentional releases of hazardous substances during all project phases
- potential impacts on water quality related to flooding of site infrastructure during all project phases.

The project does not propose any discharges to surface waters or the take of surface waters for use on-site, therefore a license or allocation under the Water Act and associated Water Plan (Border Rivers and Moonie) 2019 would not be needed.

The EIS identified that drinking water would be supplied by rainwater captured from the roof of the office within the Transportation Facility or brought in by truck. Water to top-up the water bath heater would be potable water supplied by a third-party provider as required.

No regulated structures, dams or water storages are planned to be constructed or managed as part of the project activities on the site. The EIS states that any existing or future farm water storages located within the broader operational lands are unlikely to be impacted by the project.

The EIS presents a brief assessment of water-dependent ecological assets, including riparian and floodplain ecosystems. I consider this assessment to be adequate and commensurate with the likely minimal impacts predicted from the project on these matters.

I note that proposed infrastructure would be located to minimise any physical disturbance to beds or banks of Stephens Creek and South Branch Stephens Creeks, including the planned flowline creek crossings. Crossings would be preferentially constructed using HDD but the EIS suggests conventional trenching for spool and reel installation may be needed across Stephens Creek. Instream crossing works may be operational works under the *Planning Act 2016*, particularly if trenching is the construction method. Trenching that is operational works, would need to be done under a development approval or in compliance with the DAF *Accepted development requirements for operational work that is construction or raising waterway barrier works* (DAF 2018). It is understood that there are currently no proposed above ground creek crossings or potential impacts to wetlands. The depth of planned HDD drilling is not specified in the EIS, and a suitable impact assessment from any HDD interaction with groundwaters is an EIS omission.

The EIS adequately described the history of flooding at the site and assessed its vulnerability to future flooding based on the planned location of the Transportation Facility, flowline and well bore locations. The EIS did not present or adequately describe a range of annual exceedance probabilities (AEP) up to the probable maximum flood for the project site which was required in the TOR. While the Transportation Facility is located outside the spatial range of the presented 1% AEP flood hazard overlay mapping, other infrastructure including the flowline and injection wells and various monitoring equipment are mapped within the spatial extent of the presented flood overlay.

The EIS commits that all hazardous substances are to be stored in designated and marked areas, however, commitments were lacking regarding effective storing in adequately bunded areas. Spill kits would be made available at the Transportation Facility and within vehicles. The EIS states that all construction and rehabilitation activities would be undertaken in dry weather conditions and/or seasons where possible, to reduce the releases of disturbed sediments to local waterways. If a flood event were to occur during operational phase, all GHG stream transport, conversion, transfer, and injection would be suspended according to automated protocols using sensors and remote telemetry. The EIS does not commit to any temporary sediment and erosion control structures that may be required during construction or rehabilitation phases.

In terms of treated sewage wastewater, refer to section 6.11.2 (Wastewater and treated effluent) of this assessment report.

Based on the information provided, I consider that the potential for impacts to surface waters and existing surface water entitlement holders from the project is relatively low. The project, in its current form, does not predict adverse impacts, via direct or indirect impacts to the EVs of surface waters (including environmental surface flows). I am satisfied that PSA associated natural springs which outcrop on the surface approximately 240km north of the project injection location, would not be adversely impacted by the project as described in the EIS.

I note that the proposed water conditions in EIS Chapter 22 Proposed EA (EPPG00646913) Condition Amendments include water infrastructure and releases of wastes and wastewaters to land. This is inconsistent with the rest of the EIS. In addition, the proposed conditions lack robust scientific supporting information and do not demonstrate effective ongoing specific monitoring and management programs for surface waters.

I am satisfied that there is low likelihood of a complete groundwater to surface exposure pathway associated with potential GHG plume leakage or migration, once injected. Therefore, potential impacts to any surface ecological system are not considered likely and are not discussed further.

I consider the EIS has partially addressed the surface water impact assessment requirements. As I have formed the view that the project is not suitable to proceed, further evaluation of potential surface water impacts, avoidance, mitigation and management measures and EA conditions is not presented. I do not recommend any conditions of approval for the project.

6.7.2 Groundwater

This section should be read in conjunction with section 6.5.2 (Geology and geomorphology) of this assessment report as well as EIS Chapter 8 Geology and Chapter 9 Groundwater.

The EIS adequately described desktop research into the project geology and groundwater resources.

The EIS described the:

- aquifers overlying the PSA, being the Hutton Sandstone, Gubbermunda Sandstone, Mooga Sandstone and Grimman Creek Formation
- the storage complex, being the Evergreen, Precipice and Moolayember Formations, with the PSA being the main aquifer and proposed GHG storage reservoir for the GHG storage injection testing. The impact assessment was presented as either:
 - within the predicted GHG plume zone of the PSA or
 - outside the predicted GHG plume zone of the PSA.

The EIS characterised the GAB hydrogeological units and presented preliminary data on groundwater levels, pressure, and quality from a limited number of site-specific bores. The EIS did not undertake broader or sufficient baseline characterisations required by the TOR and submissions.

The EIS broadly divided the assessment of groundwater within:

- the area immediately surrounding the WM-1 injection well
- within the operational land of the project
- to a radius of 50km surrounding the WM-1 injection well
- within the Surat Precipice groundwater sub-area.

Physical and chemical properties of the proposed GHG stream for injection are presented in sections 3.1 (Project approvals) and 6.11.1 (GHG stream) of this assessment report.

The EIS partly described baseline conditions and potential impacts of GHG stream injection into the PSA including:

- hydrogeological properties incorporating groundwater pressure and flow
- groundwater chemistry and water quality
- groundwater EVs, existing users and potential future users.

I consider that the EIS did not adequately address all submissions regarding potential impacts of the proposal such

as variability testing, model boundaries, and modelling scenarios, which were identified in advice to DESI from OGIA, IESC, and CSIRO. This is discussed further in section 6.7.2.3 (Potential impacts) of this assessment report.

In summary, I consider the EIS has partially addressed the impacts to groundwater quality and resources. The following sections expand on the adequacy of the EIS’s assessment of groundwater EVs and existing conditions, potential impacts on groundwater, and lists the proposed avoidance and mitigation measures presented in the EIS. As I have formed the view that the project is not suitable to proceed, further evaluation of groundwater impacts, avoidance, mitigation, and management measures and conditions, is not presented. Therefore, I do not recommend any conditions of approval for the project.

6.7.2.1 Groundwater characterisation

The EIS characterised the GAB hydrogeological units, including the overlying and underlying formations using existing datasets and data extrapolated from distant locations compared to the project area.

The EIS partially characterised the groundwater environment in the project area with the presentation of hydrogeological units and regional faults conceptually and schematically (Figure 6 and Figure 7). Additionally, preliminary data on groundwater levels, pressure, flow and quality from a limited number of site-specific bores (see sections 6.7.2.3 and 6.7.2.4 of this assessment report) was also presented.



Figure 6 Simplified hydro stratigraphic classification of aquifers and aquitards showing overburden depths intersected at West Moonie-1 injection well, modified from OGIA (2019) (sourced from EIS Chapter 9 Groundwater, Figure 9-3)

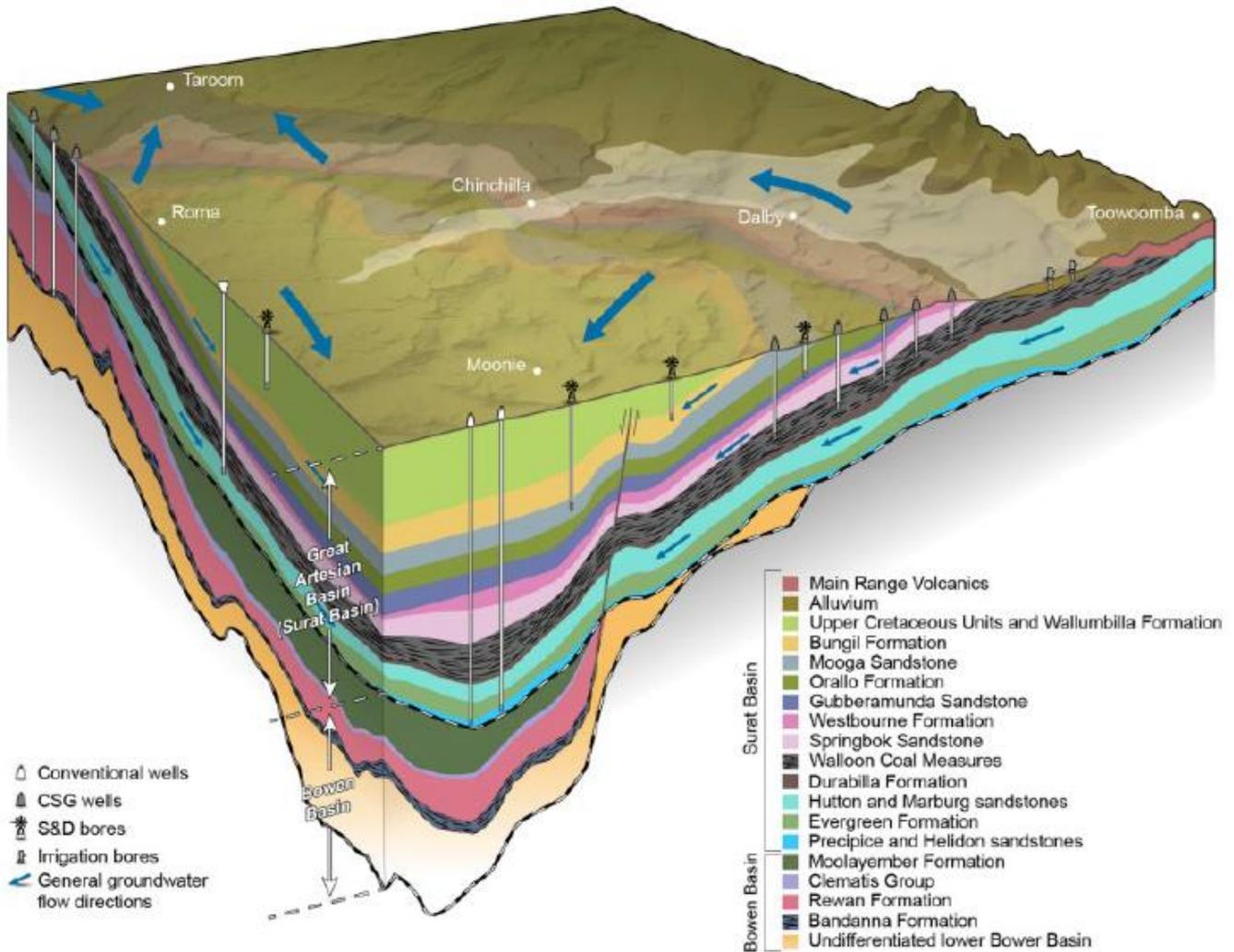


Figure 7 Schematic diagram of the Surat Basin groundwater system (sourced from EIS Chapter 9 Groundwater, Figure 9-13)

The PSA is a regional sandstone aquifer that extends over a significant area and is part of a complex somewhat interconnected artesian basin, with existing water users and allocations for various human, agricultural and industrial uses. The overlying Evergreen Formation and the underlying Moolayember Formation are considered aquitards (see section 6.5.2 of this assessment report). While the Moonie-Goondiwindi Fault zone may act as a partial barrier for groundwater movement in one lateral direction (approximately 23km east of the WM-1 injection well) within the PSA (in an easterly direction), further research or rationale is required to confirm this as an effective cap.

The EIS states that the PSA within EPQ10 is a confined aquifer, with the overlying and underlying strata considered aquitards that confine groundwater in the PSA and prevent vertical mixing with other aquifers above and below. However, because groundwater can still move laterally within the PSA, I do not consider this fully satisfies the legislative definition under s. 41(2)(a) of the EP Regulation which requires the receiving groundwater to be contained entirely within impermeable strata.

As discussed in section 6.5.2 (Geology and geomorphology) of this assessment report, the EIS did not present any results for 3D seismic baseline assessment. Additionally, the EIS did not present further groundwater quality data, pressure, and levels in response to the submissions and TOR requirements. The proponent proposed draft EA amendment conditions that could be applied following the EIS process to obtain sufficient data to accurately represent the existing geological conditions of the proposed GHG storage complex, identifying any local faults, fractures or other geological structures using 3D seismic survey methods. However, I do not support this approach occurring post the EIS process due to uncertainties and potential impacts on local groundwaters. Additionally, uncertainties remain due to the unique nature of this proposal and the limited precedents for comparison. This is discussed further in section 6.3.1 (Project alternatives) of this assessment report.

The EIS did not present any site-specific sampling data in the overlying Hutton aquifer, and limited data from other aquifers, including the PSA, Grimman Creek and Gubberamunda formations. I note the TOR required a baseline condition assessment of the geological and groundwater environment to understand the baseline condition and natural variability of these measures on a bore and aquifer basis. Without this information, DESI could not comprehensively assess the potential impacts of the project on the EVs of groundwater. This is considered a notable EIS omission because the water resources of the GAB are a valued and protected resource under the EP Act and the Water Act.

I consider a comprehensive characterisation of the proposed receiving waters and surrounding aquifers is crucial for the EIS assessment process. The TOR, relevant guidelines, and numerous submissions describe the need for specific water quality and pressure characterisation for the project. This matter remains outstanding.

6.7.2.2 Groundwater uses and environmental values

Groundwater use within the Surat Basin portion of the GAB is regulated under the Water Act to ensure planning, supply, allocation management and restrictions of water resources meet economic, social and environmental outcomes. Generally, consumptive use of groundwater from the GAB requires a water licence, except for domestic and some stock purposes. The proposed injection of the GHG stream into the PSA on EPQ10 is located within the GABORA Water Plan area, therefore, interference with groundwater associated with the project must demonstrate that it meets the outcomes specified in the GABORA Water Plan. In addition, any associated interference with groundwater quality that affects intended uses or any potential impact on groundwater dependent ecosystems (GDEs), must also consider the framework under the GABORA Water Plan.

The EIS presented an on-ground survey and desktop assessment of registered and unregistered bores within the PSA GHG plume area which could potentially create a pathway to overlying aquifers or result in surface leaks. No existing bores target the PSA within the study area. The nearest existing water supply bores within a 50km radius to WM-1 injection well are discussed and shown in EIS Chapter 9 Groundwater, section 9.7.1 and Figure 9-15.

Under the EP Act and subordinate legislation including the EP Regulation and EPP (Water and Wetland Biodiversity), groundwater quality in the PSA and associated scheduled EVs are to be enhanced or protected. Part 3, Division 1 of the EP Regulations defines the environmental objective and performance outcomes to protect groundwater in Queensland. Performance outcomes to protect groundwater under the contents of schedule 8 of the EP Regulation applicable to groundwater include that there would be no direct or indirect releases of contaminants to groundwater from the operation of the activity (1(a)) and that there would be no actual or potential adverse effect on groundwater from the operation of the activity (1(b)). This part also refers to s. 41 of the EP Regulation.

The EIS accurately identified and incorporated the relevant scheduled EVs and water quality objectives for the PSA listed in the EPP (Water and Wetland Biodiversity).

The EPP (Water and Wetland Biodiversity) framework lists:

- scheduled EVs for the PSA under s. 6(1) – (2)
- locally relevant EVs and water quality objectives for groundwaters for the Queensland Murray-Darling and Bulloo River basins under Schedule 1
- identifies the EVs and water quality objectives to be enhanced or protected for the PSA waters as:
 - aquatic ecosystems
 - irrigation
 - farm supply/use
 - stock water
 - drinking water
 - industrial use
 - cultural, spiritual, and ceremonial values.

The scheduled EVs for the overlying aquifers under the Queensland Murray-Darling Basin and Bulloo Basin groundwaters were also adequately presented in the EIS.

I note that during the EIS process, the proponent did not adequately address the scheduled EVs in the PSA at the WM-1 injection well and modelled GHG plume extent. The rationale presented in the EIS indicated:

- there are no known water licenses for taking of groundwater from the PSA locally near WM-1 injection well
- the depth to the PSA groundwater for the project excludes economic viability of the resource for future agricultural or drinking water use
- the injection testing would unlikely impact water availability within the PSA for the operation of efficient water markets
- the existing groundwater in the PSA meets many but not all indicator specific criteria within relevant

- water quality guidelines for aquatic ecosystem, irrigation, or human drinking value
- the PSA is a saline formation at and near WM-1 injection well
- the exceedance of fluoride levels (against the low risk stock water quality) at WM-1 injection well was sufficient to limit further assessment of this EV in the PSA despite groundwater sourced grazing being the most common land use.

The EIS presented an inadequate assessment of potential impacts of the proposed activity on surrounding water entitlements. The EIS notes three active water entitlements have been granted in the PSA within a 50km radius of WM-1 injection well (95ML/y volumetric entitlement at 9.6km, 200ML/y volumetric entitlement at 27km, and 220ML/y volumetric entitlement at 44km). Registered bores to extract water from the PSA are yet-to-be drilled, however, I note a development permit to drill the bore associated with the 95ML/y water licence was granted in February 2023.

In response to submissions, the EIS identified:

- additional approved water allocations close to WM-1 injection well should be specifically included in impact assessment
- existing water bores targeting depths similar to the WM-1 injection well depth are currently in use or are planned
- the proposal would impact water quality and availability inside the GHG plume in perpetuity and therefore have some impact to the water market availability
- the GHG plume extent may require an exclusion zone or separation distance for future water take
- the PSA is described as brackish and would not be considered particularly poor quality
- the PSA at WM-1 injection well can be effectively managed and is considered safe in terms of fluoride concentrations and the water quality guidance for stock watering.

The EIS proposes the concept of an attenuation zone to differentiate the location of the WM-1 injection well and surrounding GHG plume extent from the wider PSA given that the EIS did not predict direct impacts to water quality outside the GHG plume. Limited water quality monitoring or verification was proposed for water quality indicators outside the predicted GHG plume, in either the PSA or overlying aquifers. I consider that the plume area and the wider PSA are interconnected via porous sandstone and that groundwater flow paths in the PSA at EPQ10 are not well understood. Because of this, I do not consider an attenuation zone in the PSA to be appropriate, and that uncertainty remains regarding the GHG plume extent in the long-term should water take from the PSA or overlying Hutton Sandstone increase in the future.

The EIS presented a review of fluoride levels in stock water which acknowledged that water contained within the PSA meets this EV for stock water. A conservative threshold value (2.0 mg/L) has been established for stock watering by the Australian and New Zealand Environment and Conservation Council (ANZG 2018). This has been adopted nationally and represents a low/zero risk recommendation for all livestock breeds. Submissions received on the EIS outlined how water with fluoride concentrations above 2.0 mg/L in the PSA is currently used for stock watering in other locations in the GAB. The EIS Appendix 9E confirmed that stock water with fluoride concentrations less than 8.0 mg/L can be effectively managed for stock watering. The PSA at EPQ10 and Moonie measured median fluoride concentrations of 6.0 and 5.1 mg/L, respectively.

I do not consider the proponent adequately assessed scheduled EVs in the PSA within the GHG plume and EPQ10 during the EIS. The proponent has not put forward a scientifically based robust justification for the failure to adequately address scheduled EVs as part of the EIS.

6.7.2.3 Potential impacts

The injection of GHG stream into deep aquifers to achieve long-term hydrogeological and/or geological storage is considered to occur via several chemical or mechanical trapping processes (referred to as migration assisted trapping and described in EIS Chapter 9 Groundwater). The EIS presented an evaluation of the potential impacts to groundwater chemistry and water quality and pressure within the GHG stream plume.

The EIS estimates potential impacts from the project using various modelling predictions for water movement, water pressure and geochemical reactions. Additionally, laboratory batch experiments and previous findings from other locations have been used to support the evidence of GHG injection predictions. The models were developed to predict the GHG plume movement, geochemical reactive transport processes and pressure changes, within the PSA.

The EIS GHG stream for injection is expected to contain 95 – 98% sCO₂. sCO₂ is a fluid-like, gas-like state of CO₂ held at or above its critical temperature and pressure. To remain supercritical, CO₂ needs to be held at a very high pressure (10MPa) in a highly compressed form, which occupies less than 1% of the volume it would typically occupy at standard atmospheric pressure. It is colourless, odourless, relatively inert, non-flammable, and a newly discovered solvent for various applications, showing potential for industrial use and in certain food processing applications (e.g. decaffeinating coffee). It requires specific engineering measures and controls, including storage

consistently maintained otherwise it rapidly expands and freezes the immediate surrounding area to return to its preferred gaseous state (at atmospheric conditions).

CO₂ has a notable and rapid acidifying effect in water, as it readily dissolves to form carbonic acid. A similar effect is noted in regularly consumed carbonated drinks, where the drink is acidified by the addition of bubbles of CO₂. Consequently, this may result in high corrosion to any storage and transport infrastructure. Additionally, in groundwater aquifers, acidifying the water results in increased heavy metals and metalloid mobilisation from the local geology into waters and dissolution of existing minerals and precipitation of other minerals. These potential geochemical effects formed the basis of the project's impact assessment for groundwater. The EIS also notes that changes in pressure from the injection of the GHG stream would occur over time which are described as relatively minor (2-11 psi increase) when compared to the existing water pressure in the PSA.

To inform the assessment, the EIS presents detailed research undertaken by UQ, which includes various laboratory batch experiments utilising core samples from the PSA along with the overlying and underlying formations. These samples were exposed to various acidic solutions (using acetic acid solutions buffered at various pH scale) or laboratory scale mock-ups of the CO₂ direct injection process to run short-to medium-term experiments to determine leachate contaminant levels.

The reactive transport modelling (RTM) presented in the EIS suggests that the maximum extent of the dissolved CO₂ plume to be within 500m to 600m of the WM-1 injection well for the duration of the project. However, the RTM noted that pH and water chemistry impacts may extend some 800m to 900m from the injection well after 100 years (see EIS Appendix 9D). I note the RTM models were not run for a longer period than 100 years and the plume may expand laterally in the PSA over longer time periods. I have determined, based on the information presented in the EIS, that a level of change may occur to water quality after 100 years. However, I acknowledge that the EIS indicates this would not be the case. I also note that the EIS determined that migration assisted trapping is considered as an effective chemical reaction process which would likely reduce the lateral extension of water quality impacts from the GHG plume over time.

The predicted water quality changes following GHG stream injection are described in EIS Chapter 9 Groundwater. The EIS compared modelling against the Aquatic ecosystem 95th percentile trigger values (ANZG 2018) in the GHG plume extent. However, in this assessment report I have made the decision to focus the assessment on the primary industry guidelines because of the substantial distances between the proposed GHG stream injection, surface water expressions, and submissions which raised concerns regarding co-uses of groundwaters in the PSA.

DESI analysis of the provided worst case modelling and predictions regarding GHG stream interaction with groundwater in the PSA and other geological formations at EPQ10 is summarised in Table 3. It is important to highlight that actual water quality changes may be different to those modelled and compared to relevant guidelines. The EIS presented a series of scenarios to determine the range of predicted or possible outcomes from the detailed modelling and laboratory studies. The analysis in Table 3 is a summary based on the information in the EIS. I note that the presentation of total and dissolved heavy metals results and modelling predictions is inconsistent in the EIS chapters and appendices, which hinders direct comparisons. Guidelines for irrigation, stock and human drinking water are based on totals for metals (as per the definition in ANZG 2018), and the modelling predictions relate to dissolved metals. The analysis in Table 3 may represent an underestimation of the proposal's increase in totals and magnitude of water quality deterioration. Magnesium and bicarbonate were modelled for potential change but did not alter concentrations sufficiently to trigger concern under the human use guidelines. The EIS clearly states, however, that GHG stream injection is likely to result in a deterioration of water quality within the resulting plume extent and that the human use EVs guidelines are highly unlikely to be met in that area. Modelling indicates that certain indicators would be exceeded when compared to guideline values at 100 years post-injection commencement.

Table 3 DESI analysis of predicted consequence to PSA EVs from GHG stream injection

Water quality indicator	Human-use EV guidelines at WM-1 injection well currently met	Predicted consequence to PSA EVs from GHG stream injection (based on worst case modelling and predictions in the EIS)
pH	Yes	GHG stream injection predicted to acidify resulting plume extent up to 100 times more than the ANZG Irrigation Guidelines (2023) (Irrigation GLs) and Australian Drinking Water Guidelines (NHMRC), 2011 updated in 2022) (Drinking GLs) for aesthetics. High corrosion potential exist for waters <pH5 which would impact stock watering equipment and use. These guidelines for pH are predicted to remain exceeded at 100 years post injection commencement in the plume extent and influence area.
Salinity	Partly^ Suitable for stock watering EV	GHG stream injection predicted to increase Electrical Conductivity, but not change sufficiently to exceed the Stock GLs. The TDS guidelines for some stock species may be exceeded.
Cadmium (total)	Yes	GHG stream injection predicted to increase dissolved cadmium in the resulting plume extent up to 16 times greater than Irrigation and Stock GLs; and 80 times greater than Drinking GLs for health. Cadmium GLs are predicted to remain exceeded at 100 years post injection commencement.
Cobalt (total)	Yes	GHG stream injection predicted to increase dissolved cobalt in the resulting plume extent between 12-24 times greater than Irrigation GLs and marginally exceeding Stock GLs (based on Figure 91 modelling in EIS Appendix 9C ANLEC, and ANLEC worst case). Cobalt GL for irrigation is predicted to remain exceeded at 100 years post injection commencement.
Copper (total)	Yes	GHG stream injection predicted to increase dissolved copper in the resulting plume extent between 20-40 times greater than Irrigation GLs, 10-20 times greater than Stock GLs (based on Figure 91 modelling in EIS Appendix 9C ANLEC, and ANLEC worst case) and 2-4 times greater than Drinking GLs for health. Copper GLs are predicted to remain exceeded at 100 years post injection commencement.
Lead (total)	Yes	GHG stream injection predicted to increase dissolved lead in the resulting plume extent up to 10 times greater than Stock GLs (ANLEC worst case) and 100 times greater than Drinking GLs for health. Lead GLs are predicted to remain exceeded at 100 years post injection commencement.
Arsenic (total)	Yes	GHG stream injection predicted to increase dissolved arsenic in the resulting plume extent up to 5 times greater than Irrigation GLs, equalling the Stock GLs (ANLEC worst case) and 50 times greater than Drinking GLs for <i>health</i> .
Nickel (total)	Yes	GHG stream injection predicted to increase dissolved nickel in the resulting plume extent between 10-20 times greater than Irrigation GLs, 2-4 times greater than Stock GLs (based on Figure 92 modelling in EIS Appendix 9C ANLEC, and ANLEC worst case) and 100 times greater than Drinking GL for health. Nickel GLs are predicted to remain exceeded at 100 years post injection commencement.
Zinc (total)	Yes	GHG stream injection predicted to increase dissolved zinc in the resulting plume extent between 5-10 times greater than Irrigation GLs (based on Figure 92 modelling in EIS Appendix 9C ANLEC, and ANLEC worst case). Zinc GLs are predicted to remain exceeded at 100 years post injection commencement.

^ Investigated at the site with several representative indicators, considered brackish. Sodium and chloride levels at WM-1 injection well do not support direct use for irrigation or human drinking water. However, the TDS and sodium/chloride levels are suitable and less than half the acceptable guidelines for stock watering for beef cattle (and meets the guidelines for direct use for poultry, pig, sheep and horse watering) (ANZG Stock Watering Guidelines (2023)) (Stock GLs).

Regarding plume modelling, I note that the EIS presented supplementary modelling, including the introduction of additional scenarios in the hydrogeological model to evaluate the influence on plume migration from groundwater extraction within the PSA under certain hypothetical scenarios. The lateral extent of the GHG plume was originally predicted to be no more than 525m in diameter. In response to submissions, the EIS presented revised modelling scenarios that showed a significant increase to the potential extent from 525m up to 1,500m to 1,600m in diameter.

Although I consider the risk of the plume migrating to nearby water bores (>9km) is likely to be low, additional assessment was considered necessary to confirm the extent of the plume would likely be limited to the predicted extents. Submissions also identified deficiencies in the modelling which would be required to be addressed to effectively evaluate potential risks prior to proposed GHG injection. The EIS did not provide this additional detailed assessment.

I note the EIS does not present updated modelling and uncertainty analysis requested by DESI and advice agencies (i.e. CSIRO, IESC and OGIA), but does acknowledge that additional uncertainty remains in the actual observed lateral extent of the proposed GHG plume. Submissions specifically requested plume modelling updates using larger modelling domains, with a series of realistic and worse case assumptions for density driven groundwater flow, lateral connectivity in the PSA and reactive transport processes.

The EIS states that the behaviour and movement of the GHG plume and dissolved plume is uncertain, and it is unclear from the EIS if the proposed monitoring regime has been designed to suitably account for this uncertainty. Also, the EIS did not demonstrate that parameter values used in the dynamic (plume) model are conservative, nor was an uncertainty analysis undertaken to explore the range of possible outcomes. Additionally, EIS Appendix 9D Comparison of the Results of RTM and RPM identified that the location of the WM sentinel monitoring well in the PSA should be informed by the RTM model approaches. While the EIS indicated that it should be located at least 900m away from the WM-1 injection well and consistent with the dominant direction of the GHG plume, this has not been suitably supported in the EIS. Instead, I note the predicted preferred direction of RTM movements (west to south-west) differ from the predicted directional movement of the GHG plume (east to north-east).

I consider uncertainty remains with the size, extent, location, directional movement, and temporal behaviour of the project's predicted GHG plume and dissolved plume.

6.7.2.4 Proposed mitigation and monitoring measures

The project proposes two monitoring programs; containment monitoring, and conformation monitoring. The containment monitoring focuses on the overlying geology and the PSA storage reservoir outside of the predicted maximum extent of GHG plume. This is to ensure that the GHG stream is contained within the GHG storage reservoir. Conformation monitoring focuses on verification of the behaviour of the GHG plume during the injection to compare the predicted modelled GHG plume behaviour to the actual observed plume behaviour.

Project monitoring and mitigation measures described in EIS Chapter 9 Groundwater, section 9.10 include:

- A 2D seismic monitoring network to assess the GHG plume movement through the PSA.
- Aquifer pressure monitoring by propagating wave of pressure that would exceed the dimensions of the GHG plume itself.
- Pulsed neutron capture logs to measure water saturation as a consequence of the presence of CO₂.
- Groundwater quality monitoring commencing at least 12 months prior to the commencement of GHG stream injection and, continuing every six months during GHG stream injection. This monitoring would be undertaken at a limited network of bores in the German Creek Formation, Gubberamunda Sandstone aquifer, Hutton aquifer and PSA.
- Groundwater chemistry and water quality trigger values, to be determined.

The proposed monitoring measures would be utilised to confirm the effectiveness of containment of the GHG plume and to adapt to unexpected trends.

As I have formed the view that the project is not suitable to proceed, further evaluation of potential impacts, avoidance, mitigation and management measures and conditions, is not presented.

6.8 Ecology

The EIS identified the study area as the land within a 500m buffer around the proposed disturbance area, this encompasses an area of approximately 1,079ha.

The EIS adequately described desktop research undertaken into the project area's ecology. The EIS also undertook two seasonal field surveys (autumn and summer) of the terrestrial and aquatic ecology found in the project area. The EIS adequately identified the ecological values of the study area but did not survey the surrounding area of the tenement.

I consider the EIS has mostly addressed the ecological impact assessment requirements, including those concerns

raised by the community and local landholders.

I am satisfied that there is a low likelihood of a complete groundwater to surface pathway associated with potential GHG plume leakage or migration, once injected, and hence the potential impacts to any surface ecological system (s. 41(2)(b) of the EP Regulations) are not considered likely.

The following sections expand on the adequacy of the EIS's assessment of EVs, potential impacts on ecology and list proposed avoidance and mitigation measures. As I have formed the view that the project is not suitable to proceed, further evaluation of potential impacts, avoidance, mitigation and management measures and conditions, is not presented. I do not recommend any conditions of approval for the project.

6.8.1 Terrestrial ecology

The project site is in the Brigalow Belt bioregion. The study area is dominated by cleared agricultural land used for cattle grazing with disturbed woodlands and an understorey comprised mainly of introduced Buffel grass, *Cenchrus ciliaris*, and Guinea grass, *Megathyrsus maximus*.

Terrestrial fauna and flora surveys were conducted over five days between 26 and 30 April 2021 (autumn season), and 14 and 18 February 2022 (summer season) in accordance with relevant State and Commonwealth guidelines.

The EIS only undertook quaternary vegetation surveys. However, two threatened ecological communities (TECs) were identified on-site, brigalow and poplar box, which should have been surveyed comprehensively at a secondary or tertiary level in accordance with the *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland, Version 6.0, 2022*.

The EIS recognised that the flora survey results should not be regarded as evidence that a threatened flora species does not occur in the study area. The study area was limited in extent and surveys were not undertaken in the wider operational lands. The study area only included an area of 500m buffered around the disturbance area of all the key features.

The EIS identified 12 regional ecosystems (REs) within the study area (Table 4).

Three REs are within the disturbance area:

- RE 11.3.17 is associated with the riparian habitat adjacent the two watercourses of Stephens Creek and South Branch Stephens Creek
- RE 11.4.3 is a patch of brigalow that would be avoided by using HDD to pass the flowline under the vegetation
- RE 11.5.1 is a woodland community that would be subject to minor clearing of approximately 0.06ha to provide access to the Transportation Facility.

Table 4 Remnant regional ecosystems within the study area

Regional ecosystem	Description	VM Act status
RE 11.3.17	<i>Eucalyptus populnea</i> woodland with <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> on alluvial plains	Of concern
RE 11.3.18	<i>Eucalyptus populnea</i> , <i>Callitris glaucophylla</i> , <i>Allocasuarina luehmannii</i> shrubby woodland on alluvium	Least concern
RE 11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	Least concern
RE 11.4.3	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> shrubby open forest on Cainozoic clay plains	Endangered
RE 11.4.10	<i>Eucalyptus populnea</i> or <i>E. woollsiana</i> , <i>Acacia harpophylla</i> , <i>Casuarina cristata</i> open forest to woodland on margins of Cainozoic clay plains	Endangered
RE 11.5.1	<i>Eucalyptus crebra</i> and/or <i>E. populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces	Least concern
RE 11.5.1a	<i>Eucalyptus populnea</i> woodland with <i>Allocasuarina luehmannii</i> low tree layer	Least concern
RE 11.5.4	<i>Eucalyptus chloroclada</i> , <i>Callitris glaucophylla</i> , <i>C. endlicheri</i> , <i>Angophora leiocarpa</i> woodland on Cainozoic sand plains and/or remnant surfaces	Least concern
RE 11.5.5	<i>Eucalyptus melanophloia</i> , <i>Callitris glaucophylla</i> woodland on Cainozoic sand plains and/or remnant surfaces. Deep red sands	Least concern

RE 11.5.13	<i>Eucalyptus populnea</i> +/- <i>Acacia aneura</i> +/- <i>E. melanophloia</i> woodland on Cainozoic sand plains and/or remnant surfaces	Of concern
RE 11.7.4	<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp., <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust	Least concern
RE 11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest to woodland on fine-grained sedimentary rocks	Endangered

No protected plant trigger areas are mapped, and no threatened flora species were recorded on the project site. Suitable habitat for three flora species: Belson's panic, *Homopholis belsonii*, Bluegrass, *Dichanthium setosum*, and Woolly Wrinklewort, *Rutidosia lanata*, exists within the study area. These species were not recorded and were considered unlikely to occur in the disturbance area due to the low-quality habitat of the proposed disturbance area.

The seasonal surveys were not repeated to capture inter-year variability. The ability to see and identify cryptic flora species is limited without repeated sampling within the same season across different years.

Fauna habitat for koala, *Phascolarctos cinereus*, and squatter pigeon, *Geophaps scripta scripta*, occurs within the study area. The squatter pigeon was recorded near the study area and evidence of koala use from tree scratches were recorded adjacent to Harts Road.

Several threatened species were considered by the EIS as having potential to occur within the study area. Of those species, only one was recorded – Latham's snipe, *Gallinago hardwickii* – in a wetland of South Branch Stephens Creek.

The EIS identified the following terrestrial ecological values that have the potential to be impacted:

- RE 11.5.1 (least concern) remnant vegetation: approximately 0.06ha to be cleared for access to the Transportation Facility
- the RE 11.5.1 vegetation clearing would be less than 10m wide and is potential fauna habitat for koala and squatter pigeon
- koalas are also likely to be impacted by vehicle strike from the increased truck trips on the Moonie Highway
- a patch of brigalow TEC may be indirectly impacted by being bored under by HDD to place the flowline beneath it
- a patch of RE 11.3.17 (but not meeting the Poplar box TEC diagnostic criteria) may be indirectly impacted by being bored under by HDD to place the flowline beneath it
- riparian vegetation within 5m of the defined bank of the South Branch Stephens Creek and Stephens Creek would be cleared.

The Currajong State Forest is a Category C environmentally sensitive area (ESA) as per the *Streamline model conditions for petroleum activities* (DESI 2024) and is located adjacent to the west of the project site, but no works are proposed within the State Forest. Construction and disturbance activities associated with the access road, Transportation Facility and flowline construction would occur within the designated 200m protection zone and/or 500m buffer zone of the ESA.

The nearest Matters of state environmental significance (MSES) protected area is Southwood National Park located approximately 6km to the east of the disturbance area. Southwood National Park is adjacent to the operational land and would not be directly impacted.

A high-risk Species Management Program is required under the NC Act for clearing that may impact animal breeding places for the squatter pigeon and grey snake.

The following measures are proposed to avoid and mitigate potential impacts:

- the risk of injury or mortality to koalas from truck movements is considered by the EIS to be low due to speed limit restrictions on-site, and no truck movements would occur during the night (when koalas are most active)
- pre-clearance surveys would confirm no individuals of threatened wildlife such as the grey snake as present within the disturbance area prior to clearing
- the use of fauna/ spotter catchers to supervise clearing works including the inspection of excavations or trenches
- the use of exclusion fencing and signage around identified squatter pigeon nests
- avoiding impacts to brigalow, watercourse vegetation and wetlands via the use of HDD for construction of the flowline. The depth of the HDD is to be at least 5m beneath ground level to reduce the risk of damaging tree roots and disturbing clay soils in gilgais
- rehabilitating the Stephens Creek bed and banks post construction to reduce the risk of erosion and scouring.

I consider the EIS has adequately addressed the terrestrial ecology impact assessment requirements. As I have

formed the view that the project is not suitable to proceed, further evaluation of avoidance, mitigation and management measures and conditions, is not presented.

6.8.2 Aquatic ecology

The project site is located approximately 5km south of the Moonie River, which has significant aquatic ecological values. Aquatic ecology was surveyed at four sites within, upstream and downstream of the project area over three days in the period 8-10 June 2021. Some aquatic ecology survey sites were conducted in road reserves due to private land access restrictions. The EIS described this survey as a late post-wet season due to the six months of rainfall preceding the survey. A stygofauna survey was conducted at a shallow monitoring bore at an additional site. No surveys were conducted within the surface area specifically corresponding to any potential surface flow paths from the modelled plume area.

The EIS identified the following aquatic ecological values that have the potential to be impacted by the project:

- the Moonie River, located to the north of the project site
- two wetland sites, one located close to the Moonie River and one located to the west of the site
- two watercourses – Stephens Creek and South Branch Stephens Creek.

The five surveyed sites assessed the EVs of water quality, aquatic habitat, aquatic plants, macroinvertebrates, fish, and turtles. Stygofauna was assessed at one groundwater bore that intersected the Grimman Creek formation aquifer but no species were recorded. No surface expression GDEs were identified or considered to be impacted at the five field sites. Three common species of native fish were recorded from the field survey. Murray cod, *Maccullochella peelii*, was the only matter of national environmental significance (MNES) species identified as potentially occurring in the locality (Moonie River) but it has not been recorded within 200km of the site. No turtles were recorded.

The following impacts may occur due to the project:

- clearing of riparian vegetation may cause bank instability with erosion and localised higher sediment loads leading to higher turbidity and poor water quality
- during construction of the flowline waterway crossings over Stephens Creek and South Branch Stephens Creek, there is the potential to create barriers to fish passage
- fuel and oil spills may contaminate watercourses and the EIS considered potential impacts would most likely occur during the construction phase of the 9.5km flowline
- the risk of the GHG stream leaking from the flowline was considered by the EIS to be unlikely. No contamination of wetlands and waterways were stated as likely to occur due to the possible flowline rupture of CO₂ impacting EVs (see section 6.12 (Hazards and safety) of this assessment report)
- the risk of the GHG stream leaking from the PSA is addressed in section 6.12 (Hazards and safety) of this assessment report. Leakage into groundwater and potential adverse impacts from contamination through surface pathways to wetlands and watercourses is considered unlikely from technical advice from OGIA and IESC
- aquatic weeds may be accidentally introduced from vehicles and machinery in the construction phase of the flowline.

The following impact was considered as not likely to occur:

- Shallow alluvial aquifers and the sandstone sections of the Grimman Creek formation are considered likely to provide suitable habitat for stygofauna. However, the EIS considered that significant impacts to stygofauna would be unlikely to occur within the PSA due to the much greater depth of the groundwater and the groundwater temperature of 75°C is three to six times higher than that reported to be suitable. The EIS concluded that the aquatic ecological values of the PSA are negligible.

The following measures would avoid, mitigate, or offset project potential impacts:

- Measures proposed to reduce impacts to fish passage include using HDD instead of trenching for the flowline under the waterways, and conducting works when there is no flow in the waterways. Any waterway barrier works would need to be completed under a development approval or in compliance with the DAF *Accepted development requirements for operational work that is construction or raising* (DAF 2018).
- Remediation works to bed and banks would be undertaken if erosion occurs due to construction works.
- Measures proposed to reduce the risk of contamination of watercourses from fuel and oil spills include compliance with regulatory standards for handling and storage of relevant materials, no refuelling of vehicles on-site and no on-site storage of chemicals or fluids required for equipment maintenance.
- Vehicles and machinery would need to comply with biosecurity hygiene protocols. Aquatic weed monitoring and control measures would be implemented.

DAF in its submission recommended that local waterways should be monitored for any adverse impacts from

contamination of groundwater.

I consider the EIS has adequately addressed the aquatic ecology impact assessment requirements. As I have formed the view that the project is not suitable to proceed, further evaluation of avoidance, mitigation and management measures and conditions, is not presented.

6.8.3 Matters of state environmental significance

The EIS assessed that the area potentially impacted by the project contains the following MSES relating to terrestrial and aquatic environmental values:

- regulated vegetation
 - prescribed REs that are endangered or of concern
 - an RE that intersects with an area shown as a wetland on the vegetation management wetlands map (survey site 3)
 - an RE located within a defined distance from a relevant watercourse
- protected wildlife habitat
 - koala
 - squatter pigeon
 - grey snake
- waterway providing for fish passage
 - Stephens Creek and
 - South Branch Stephens Creek.

Minor impacts to koala, squatter pigeon and grey snake habitat were recognised but no significant residual impacts have been assessed for any MSES using the *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* (DEHP, 2014). As a result of this assessment, I consider offsets are not required.

Other environmental values that are not prescribed environmental matters are the Currajong State Forest located adjacent to the project site to the west and is mapped as an ESA Category C feature. No direct or indirect impacts on the State Forest have been identified.

I consider the EIS has adequately addressed the MSES impact assessment requirements. As I have formed the view that the project is not suitable to proceed, further evaluation of avoidance, mitigation and management measures and conditions, is not presented.

6.8.4 Matters of national environmental significance

On 9 January 2022, the proponent referred the project to DCCEEW for a controlled action decision on matters protected under Part 3 of the EPBC Act (EPBC Number: 2021/9122). Referral material included reports on terrestrial ecology, aquatic ecology and matters of MNES based on desktop and field-based ecological assessments. MNES considered relevant to the project based on a likelihood of occurrence assessment included:

- Listed threatened species and ecological communities (section's 18 and 18A of the EPBC Act)
 - two birds: squatter pigeon and painted honeyeater
 - two mammals: koala and Corben's long-eared bat
 - two TECs: brigalow (*Acacia harpophylla* dominant and codominant) and poplar box grassy woodland on alluvial plains.
- Listed migratory species (section's 20 and 20A of the EPBC Act)
 - three migratory birds: rufous fantail, fork-tailed swift and white-throated needletail.

No MNES were assessed to be significantly impacted by the proposed habitat clearing for the construction of the Transportation Facility and underground flowline. The proposed clearing of approximately 0.06ha of remnant vegetation was considered by DCCEEW not to have a significant impact to the koala. The proposed clearing of approximately 1.5ha of suitable breeding and foraging habitat for the squatter pigeon was considered by DCCEEW not to have a significant impact. The TECs would not be impacted due to the HDD mitigation measure. Significant impacts to migratory species were considered unlikely.

Based on an assessment of this referral material, DCCEEW decided on 9 February 2022 that the proposed action is not a controlled action. On 21 February 2024, a Statement of Reasons for the controlled action decision was published on the EPBC Act Public Portal. The delegate for the Commonwealth Minister for the Environment and Water concluded that the proposed action was unlikely to have a significant impact on matters protected by Part 3 of the EPBC Act. The project did not trigger an assessment of the MNES for a *water resource in relation to coal seam gas development and large coal mining development (section's 24D and 24E)*, due to the project not being either a coal seam gas development or a large coal mining development.

However, on 2 November 2022, the IESC was requested by letter from the Queensland Environment Minister and

DESI to provide comment on the project's groundwater and surface water assessments, as part of the department's EIS process. DESI recognised that the expertise of the IESC was required in relation to the novel technology of the project and requested the advice under section 505D (2) of the EPBC Act.

The IESC provided advice on 5 February 2023 to DESI which stated the EIS assessment had been cursory in relation to the water-dependent ecological assets, GDEs (including stygofauna), riparian and floodplain ecosystems and associated threatened species habitats. The IESC concluded that the potential impacts on these assets were likely to be minimal for the proposed small-scale trial.

6.8.5 Biosecurity

The EIS adequately surveyed and described the current distribution and abundance of pest animals, weeds, and disease vectors on the project site. It adequately assessed the potential biosecurity risks and potential impacts of the project's construction and operations on the spread of pest animals, weed species, contaminants and disease, including the proponent's biosecurity obligations under the *Biosecurity Act 2014*.

The EIS identified eight weed species and nine pest animal species within the study area. The project has the potential to introduce new invasive species or pathogens through the movements of:

- contaminated machinery and vehicles during construction and rehabilitation phases
- contaminated trucks during operation
- people and equipment entering the project area.

The EIS proposed the following measures to avoid or mitigate the potential impact or spread of pest species and disease vectors as follows:

- undertake weed control for declared priority weeds under the *Biosecurity Act 2014* during and after construction
- certified weed washdowns of all vehicles, plant and equipment
- certification of any imported earth materials to be weed free
- personnel training on importance of clean work gear prior to entering the project area
- declaring travel outside of Australia in areas with hand, foot and mouth disease.

There were several submissions that raised concerns in relation to farm biosecurity.

I consider the EIS has adequately addressed the management of identified biosecurity risks and impact assessment requirements, including those concerns raised by the community and local landholders. As I have formed the view that the project is not suitable to proceed, further evaluation of potential biosecurity risks or avoidance, mitigation and management measures, is not presented.

6.9 Air quality

The EIS adequately described the existing air environment for the project and the surrounding region. All potential sources of air emissions from the project including point and diffuse sources and fugitive emissions were identified. The EIS provided a satisfactory emissions inventory and described the characteristics of contaminants or materials that would be released. The EIS also identified the relevant *human health and wellbeing*, *protecting agricultural use of the environment* and *health and biodiversity of ecosystems* environmental values and air quality objectives from Schedule 1 of the EP Regulation. Relevant indicators for the project were total suspended particles, PM₁₀, PM_{2.5}, nitrogen dioxide, and carbon monoxide.

The EIS used appropriate qualitative methods to assess dust and dust deposition impacts during construction phase and determined that dust impacts would be minimal for the operation and rehabilitation phases.

Air quality modelling was adequate for assessing potential impacts on *human health and wellbeing of people*, *protecting agricultural use of the environment* and *health and biodiversity of ecosystems* in the surrounding area.

The potential impacts were assessed in accordance with relevant guidelines, the Environmental Protection (Air) Policy 2019 (Qld), and the EP Regulation. The EIS adequately considered the sensitivity and assimilative capacity of the receiving environment and the cumulative impacts. The air quality modelling showed that air quality objectives would be met at all sensitive receptors including the closest receptors (Currajong State Forest and SR1; see EIS Appendix 12A, Figure 5). The EIS stated that the potential for total suspended particulate emissions and dust generation by vehicles on unpaved roads was low.

The main features of the proposed mitigation measures are as follows:

- utilise dust suppression for construction
- design GHG stream (CO₂) couplings to minimise fugitive air emissions
- weld relevant fittings and utilise built-in return gas lines to minimise leaks or losses

- undertake regular leak detection and integrity management program
- install and maintain automated emergency cut-off and isolation valves at the Transportation Facility, flowline, WM-1 injection well and WM-2 monitoring well.

Additionally, the EIS committed the proponent to undertaking the following monitoring measures:

- consult and inform landowners of air quality complaints reporting method
- undertake continuous CO₂ monitoring at fixed detectors at the Transportation Facility and WM-1 injection well site
- implement a trigger, action and response plan for CO₂
- require personnel to wear CO₂ detectors for continuous monitoring and alerts
- amend EA conditions to modernise EA (EPPG00646913) for air quality monitoring, notifications and compliance
- implement an annual receiving environment monitoring program for air quality indicators.

I consider the EIS has adequately addressed the air quality impact assessment requirements. As I have formed the view that the project is not suitable to proceed, further evaluation of potential air quality impacts, avoidance, mitigation and management measures and EA conditions, is not presented. I do not recommend any conditions of approval for the project.

6.9.1 Greenhouse gas emissions

The EIS adequately addressed the TOR and relevant guidelines relating to GHG emissions. The assessment included project duration, criteria for cumulative impact assessment and mathematical comparisons to state and national inventories and targets. The EIS provided adequate estimates of scope 1, 2 and 3 emissions associated with each project phase and adequately addressed EIS submissions regarding the methods used to estimate emissions.

This project is proposed under the GHG Act to assist with reducing the impact of GHG emissions on climate change, principally via GHG geological storage. Additionally, under the CC Act, the proponent describes the project as an 'emissions avoidance project' and plans to apply for approvals and credits under the CC Act. The cumulative net emissions reduction over the whole three-year trial is listed as 0.1% contribution to the Queensland 30% reduction target. This is after accounting for incurred GHG emissions, i.e. the emissions for building the capture plant and energy used to actively capture carbon from the MPS flue gas, transport it and inject to the aquifer for storage. I note that numerous EIS submissions contended the project's GHG emissions net benefit would be negligible. I consider the EIS has not consistently described whether future carbon credits under the CC Act would be paid on the cumulative 'net' GHG emissions reductions (57 kilotonnes of carbon dioxide equivalent (ktCO₂-e)) or on the uncorrected total emissions reductions (330 ktCO₂-e), with EIS Chapter 18 Economics presenting a financial benefit analysis based on the uncorrected total emissions reduction.

With total annual MPS emissions estimated at 5.1 Megatonnes of carbon dioxide equivalent (which is the lower end of the range presented in the National Greenhouse and Energy Reporting dataset from between 2017 and 2022), the EIS proposes to capture and store approximately 2% of MPS emissions over the three-year project lifespan, excluding incurred emissions. The EIS presents modelling in EIS Chapter 5 Climate, Table 5-4, that up to 81% of the operational planned geological stored GHG emissions (330 ktCO₂-e) would be emitted as incurred emissions (266 ktCO₂-e). The PCC process, with significant energy required to capture CO₂ from coal fired MPS emissions, contributes up to 91% of project emissions.

The EIS adequately considered alternative methods to avoid or minimise GHG emissions when proposing the preferred method/s. Due to the short project duration and high commercial costs for installing solar electric systems and regional CO₂ pipelines, the proponent provided suitable technical analysis and rationale for LPG burning at the Transportation Facility and CO₂ haulage via roads. The EIS presented decarbonisation commitments, including ongoing reporting under the *National Greenhouse and Energy Reporting Act 2007* (Cwlth), but dismissed the need for energy or new technology audits or reports due to the project's short duration. I consider that any detailed assessment should fully consider these matters.

The EIS Decarbonisation Plan highlights that GHG deep aquifer injection itself is an atmospheric decarbonisation process, with net emissions predicted to reduce overall GHG emissions and contribute to the Queensland State Government Targets. While I consider the proposed potential industrial scale-up of the project (which would be subject to separate approval processes) may result in a more favourable net GHG emissions reduction, the implied benefits to GHG emissions reduction (from assumed scale-up) cannot be considered as part of the suitability assessment of this EIS assessment and should be fully assessed separately.

It is also unclear from the EIS, if the overall efficiency rate of CO₂ capture and storage processes at MPS would continue to result in only approximately 20-24% of captured CO₂ predicted to achieve a net benefit in terms of emissions reduction overall. If EIS Chapter 5 Climate were to consider the GHG emissions related to original coal

mining fugitive emissions and transport of the coal used to power MPS prior to CCS processing, it is unclear if any significant net benefit would remain. Additionally, as I have determined that the trial is incompatible with s. 41 of the EP Regulation it is unlikely the industrial scale-up for CO₂ injection and GHG storage into the PSA at WM-1 injection well site would be suitable to proceed (in its current form).

Greenhouse gas emissions through indirect means (i.e. leaking from the deep aquifer storage) remains a potential residual environmental risk of the project, with the DESI EIS submission noting that these risks are not adequately described in terms of the methodology applied and the issue of ownership and responsibility after the operational duration of the project. I consider that there is insufficient detailed information provided in the EIS to adequately address the residual risks of GHG emissions from the PSA via indirect means.

I consider the EIS has partly addressed GHG impact assessment requirements. As I have formed the view that the project is not suitable to proceed, further evaluation of potential GHG impacts, proposed avoidance, mitigation and management measures and EA conditions is not presented. I do not recommend any conditions of approval for the project.

6.10 Noise and vibration

The EIS adequately identified all potential sources of noise and vibration from the project, including low frequency noise.

The EIS adequately identified *health and wellbeing in relation to the ability to sleep* as EVs of the acoustic environment that may be impacted by the project, under the Environmental Protection (Noise) Policy 2019 (EPP (Noise)). The EV of *health and biodiversity of ecosystems* associated with protected areas as sensitive receptors is not identified in the EIS as being potentially impacted by the project. The Southwood National Park was excluded from noise modelling due to its location being approximately 7km from the Transportation Facility.

The EIS adequately identified three sensitive receptors close to the proposed Transportation Facility and flowline. The closest sensitive receptors identified are located approximately 1.3km to the northeast of the Transportation Facility (NSR1) and approximately 1.3km east of the flowline (NSR3; see EIS Chapter 13 Noise and Vibration Figure 13-2). The relevant acoustic quality objectives for those sensitive receptors that should apply in accordance with the EPP (Noise) are detailed in Table 5. The predicted noise emission levels are based on the conservative assumption that all plant items would operate simultaneously.

Table 55 Predicted Transportation Facility operational noise levels (sourced from EIS Chapter 13 Noise and Vibration, Table 13-20)

ID	Sensitive place	EA Evening and Night-time Period Noise Limit	Predicted Noise Emission Level (LAeq,adj,T dBA)	
			Neutral	Adverse
NSR1	60SP199322 south	25	19	24
NSR2	60SP199322 north	25	14	20
NSR3	33PG223	25	<10	<10

Background noise monitoring was conducted adjacent to the proposed Transportation Facility site using a combination of long-term (continuous) unattended and short-term attended noise measurements. The monitoring found that background noise levels were typical of a quiet rural environment whilst ambient noise levels were largely influenced by intermittent vehicle movements along the Moonie Highway. Background vibration levels were not measured as part of the EIS as there were no significant sources of vibration near the identified sensitive receptors beyond what is generated by heavy vehicle movements on nearby roads.

I consider the noise modelling reported in the EIS was adequate for assessing potential noise and vibration impacts and developing noise and vibration management measures. The predicted Transportation Facility operational noise levels from the modelling indicate compliance with the proposed evening and night-time period EA noise limit of 25dBA under neutral or adverse (i.e. temperature inversion) meteorological conditions.

The EIS lacks any site-specific measurement data in relation to vibration. However, I consider the risk of vibration impacts (excluding seismic survey) is low based on the limited vibration generating activities involved in the project.

The proponent asserts that seismic surveys are authorised within EPQ10 under the existing EA as geophysical surveys. Therefore, potential noise and vibration impacts from seismic activities associated with the project do not require assessment as part of the EIS. I note that the EIS does provide some assessment of seismic activities and states that noise and vibration impacts of seismic surveys are expected to be compliant with the proposed noise and vibration criteria. Proposed vibration conditions appear to be a modernisation of the existing EA vibration condition (condition 47) to better manage the potential impacts of seismic surveys. Given that seismic activities are

already authorised and do not require assessment as part of the EIS, I will not provide any further assessment on this matter.

I consider that the proponent did not assess cumulative impacts of the project with other emissions of noise or vibration from any existing or future development due to the geographical separation of the components associated with the project.

The proposed mitigation measures to address noise and vibration impacts include:

- notification to interested and affected persons
- development of a complaints process
- undertaking noise and vibration generating works during daylight hours, where possible
- sealing of the Moonie Highway intersection with Harts Road and a section of Harts Road
- ensuring plant and equipment meet plant sound power levels
- design (or acoustic housing) LPG generator set and pumps to mitigate noise impacts
- conduct noise compliance testing of plant and equipment to validate noise modelling and ensure compliance with noise criteria.

I note that the proposed EA conditions in the EIS do not include comprehensive mitigation measures as outlined in the EIS nor do the proposed conditions specify acoustic quality objectives or compliance monitoring specifically for identified sensitive receptors.

I consider the EIS has largely addressed noise and vibration impact assessment requirements and that potential impacts of noise and vibration from the proposal are relatively low. As I have formed the view that the project is not suitable to proceed, further evaluation of the potential avoidance, mitigation and management measures and EA conditions, is not presented. I do not recommend any conditions of approval for the project.

6.11 Waste

The EIS adequately identified the main waste streams that would be produced or captured by the project, other than the GHG stream, noting outstanding estimates for construction phase plant and equipment waste. Those waste streams comprise:

- **GHG stream** captured at the MPS: 330,000 tonnes in total over the project's life. The GHG stream is classified as a waste under s. 13 of the EP Act or more recently in the Dictionary (Schedule 4) of the EP Act and then by reference to the *Waste Reduction and Recycling Act 2011* (Qld) (Waste Act)
- **treated effluent** from on-site wastewater treatment plant (WWTP): up to 21 equivalent persons with effluent to be disposed on-site to land within the Transportation Facility (with 10 persons during construction, 2-5 persons during operations and monitoring, 15 persons during rehabilitation)
- **plant and equipment waste** (including regulated wastes such as tyres, batteries, oil, coolants, fuels, lubricants, solvents, hydraulic fluids and cleaning fluids):
 - nil during construction phase stated in EIS due to no 'servicing on-site'
 - up to 3000 litres of oils and lubricants (over 3 years) and tyres (during operations and monitoring)
 - up to 1000 litres of oils and lubricants (during rehabilitation)
- **general waste** (including food scraps, recyclables, green waste, used packaging):
 - 175 tonnes (construction)
 - 95 tonnes (operations and monitoring)
 - 57 tonnes (rehabilitation).

Except for the GHG stream, I consider the EIS adequately described methods for the disposal of wastes and proposed mitigation measures to avoid or minimise the potential impacts from waste disposal. The EIS and relevant legislation identify that the GHG stream planned for injection at the WM-1 injection well site (within EPQ10) is described as a 'waste' under s. 13 of the EP Act. I consider that there are no mitigation or management measures or conditions which could prevent the deterioration in the EVs of the receiving groundwater within the targeted injection area and resulting plume extent. Further information is provided in sections 6.11.1 (GHG stream) and 6.7.2 (Groundwater) of this assessment report.

As I have formed the view that the project is not suitable to proceed, further evaluation of potential impacts from waste disposal, avoidance, mitigation and management measures and EA conditions is not presented. I do not recommend any conditions of approval for the project.

6.11.1 GHG stream

I consider that the EIS did not adequately characterise:

- the GHG stream planned for injection at WM-1 injection well within EPQ10

- the associated fate and transport processes of other constituents in the MPS GHG stream once injected into deep aquifers
- waste type or contaminant class under the EP Act and EP Regulation (including if it meets the requirements of a prescribed water contaminant when added to water).

Regarding the characterisation of the GHG stream, I consider insufficient evidence or analysis was provided to support the contention in the EIS that the MPS GHG stream would be consistent with either 'industrial grade' or 'food grade' CO₂. While the EIS presents predicted GHG stream composition based on other sites, no science-based verification, site-specific modelling, or characterisation of potential contaminants for the MPS GHG stream is presented. No project commitments or draft EA conditions are proposed by the proponent to undertake follow-up site-specific GHG stream characterisations.

I note that the reports to the NPI on the MPS identifies arsenic and mercury compounds, other heavy metals, metalloids, and particulate-associated organics are associated with the MPS flue gas waste streams. The EIS does not characterise or discuss the risk profile and subsequent chemical processes involved with the proposed amine-based CCS technologies on the GHG stream chemical composition.

I have formed the view that the MPS GHG stream is a 'waste' for the purposes of this assessment. I consider:

- The EIS and relevant legislation identify that the GHG stream planned for injection at WM-1 injection well within EPQ10 is described as a 'waste' under s. 13 of the EP Act, as this is 'left over, or unwanted by-product, from an industrial ... activity'.
- The GHG stream is not exempted based on a relevant authorised End of Waste (EOW) code resource determination. To clarify, *The Coal Combustion Products End of Waste Code ENEW07359717* administered under the Waste Act *does not* apply to the GHG stream. This EOW code only applies under stringent and specific circumstances, for a prescribed list of end uses (such as bound uses in various solidified products), and only to certain coal combustion products, namely, fly ash, furnace bottom ash and/or cenosphere(s).
- That the GHG stream presented in EIS Chapter 2 Project Description, Table 2-2, contains various contaminants including residual water (which forms acidic compounds when contained in the GHG stream) and inorganic sulphides in the form of hydrogen sulphide. I have, therefore, identified that ERA 57 - Regulated waste transport is applicable. Testing of the GHG stream would be needed to determine whether any additional Schedule 9, part 1 of the EP Regulation constituents are contained within the site specific MPS GHG stream.
- The project's primary activity is a 'resource activity' as per Chapter 5 s. 107(b) of the EP Act rather than a 'petroleum activity'. Therefore, this exception in s. 41(2)(a) of the EP Regulation regarding petroleum activities does not apply to the project.

6.11.2 Wastewater and treated effluent

The project did not apply for any licensed discharges to surface waters or land.

The EIS did not estimate the expected potable water needs or production volumes of sewage and grey water from on-site toilets and kitchen facilities. However, such wastewater would be processed on-site at a proposed WWTP and the project would typically involve a relatively low water usage rate sourced from rainfall collection from roof tops at the Transportation Facility and stored in water tanks. The EIS states the effluent from the WWTP would achieve quality standards suitable for on-site disposal within the Transportation Facility area in accordance with the existing EA conditions. No water quality criteria were provided in the EIS, including in the proposed EA conditions. However, the project does not trigger an ERA under the EP Regulation due to being classified as less than 21 equivalent persons.

6.11.3 Plant and equipment waste

The project would produce a variety of wastes from the maintenance of plant and equipment, including vehicles. Some of those wastes (such as tyres, batteries, and used oil) are regulated wastes listed in Schedule 9 of the EP Regulation.

No specific waste management plan is proposed in the EIS to identify regulated waste types, nor track any regulated wastes. Conditions on the existing EA stipulate that regulated wastes can be temporarily stored (under certain circumstances), must be recorded and tracked, must be removed and transported by a licensed contractor, and must be received by a facility that is lawfully able to accept the wastes under the EP Act. The EIS fails to list any appropriately licensed facility which would receive these regulated wastes, or whether any nominated facility in the region has capacity to lawfully accept the regulated waste (in EIS Chapter 6 Waste, Table 6-9).

I consider the proposed waste management system for regulated wastes is partially addressed for the purposes of addressing the TOR requirements.

6.11.4 General waste

The EIS does not propose to dispose of general waste on-site. While the EIS presented a detailed list of potential waste facilities, it did not demonstrate that the Millmerran Waste Facility, Dalby Waste Facility and Recycling Centre or Orgro Toowoomba sites have sufficient capacity to accept general waste for the life of the project.

6.12 Hazards and safety

The EIS adequately identified the potential hazards and safety risks that may result from the project, as follows:

- short-term exposure to CO₂ at elevated concentrations
- the formation of 'dry ice'
- increased potential of road incidents
- hazards associated with earthworks
- hazards associated with HDD
- working in close proximity to a watercourse
- personnel working alone
- interactions between personnel and machinery or trucks
- interactions with wildlife or stock
- manual handling
- heat stress
- short-term exposure to or ignition of LPG
- exposure to hazardous substances.

The EIS adequately addressed the hazards and risks associated with climate change, extreme weather and flooding, and natural disasters. The EIS adequately described that an automated system shutdown, alarms and notifications would be triggered in the event of extreme conditions, including flooding or earthquake activity. Potential wildlife hazards and factors that might promote the breeding of pest animals and disease vectors were also adequately considered in the EIS.

The EIS proposed mitigation and management measures to address hazards and safety risks. However, the residual risks following application of the proposed measures were not suitably identified. I consider that the EIS is lacking an adequate assessment of the overall acceptability of the impacts of the project considering the residual uncertainties and risk profile.

The proposed mitigation and management measures for the project include:

- designing, constructing, operating, and decommissioning all plant, machinery, and equipment in accordance with the required Australian or international standards and guidelines
- B-double trucks used for transport of GHG to be licensed, fit-for-purpose, inspected and maintained in accordance with the Transport Operations (Road Use Management – Dangerous Goods) Regulation 2018 and the proponent's inspection and maintenance regimes and policies
- reducing the risk of land contamination from project activities through design and construction of the facilities and rehabilitation
- training of key staff in GHG stream leakage management, spills prevention and clean up
- provision of spill clean-up kits at strategic locations as part of site emergency planning
- using screens, enclosures, and/or an exclusion zone (or minimum separation distance) around the work area and flowline transect
- regular inspection of all infrastructure
- implementing practices for control of ignition sources on-site
- continuous monitoring of pressure wellhead and injection point, temperature and leak detection sensors
- developing a detailed standard for emergency preparedness and response
- developing an Emergency Response Management Incident Plan addressing major emergencies and incidents that could impact upon surrounding land uses in consultation with Queensland Emergency Services. This would include reference to disaster management techniques and the following preparedness measures:
 - emergency response plans
 - risk assessments
 - detailed evacuation and site access plans
 - emergency drills and responses
 - fire management.

I recognise that there are multiple hazard and safety risks that have only been partially addressed in the EIS. A key concern identified in submissions is GHG injection-induced pressure causing a seismic event (earthquake) which is

a potential impact noted from certain international precedents involving CCS. The EIS states that the chance of induced seismicity because of the planned GHG stream injection is negligible and therefore no avoidance or mitigation measures have been proposed. This is not supported by an evidence-based discussion in the EIS. The EIS does not adequately address how the site-specific variables and the GHG stream proposal would suitably avoid or mitigate this potential impact or commit to seismic event monitoring.

I note that the commitments presented in the proposed EA conditions and EIS Chapter 6 Waste, section 6.7.1 do not adequately address the effective storage of hazardous substances in bunded areas.

In response to submissions, the proponent provided additional information in EIS Chapter 15 Hazards and Safety regarding the unique hazard potential for sCO₂ pipelines, if ruptured. More detailed explanations of the modelled minimum separation distances (previously referred to as 'exclusion zones' in the EIS) is presented in the amended EIS. Additional sensitive receptor mapping and a series of new EIS flowline mitigation and monitoring commitments have been provided. The proponent committed to a more detailed and updated modelling and assessment using the best available research and PHAST modelling from Det Norske Veritas®. I note that certain sensitive receptors are currently modelled and mapped to be within or proximal to the 'exclusion zone' extents from presented modelling relating to flowline ruptures. I consider that detailed assessment, including best practice modelling for 'heavier than air' for CO₂ rupture scenarios, incorporating the local topography, and approvals under the *Petroleum and Gas (Production and Safety) Act 2004 (Qld)*, *Petroleum and Gas (Production and Safety) Regulation 2018* and the legislated standards, including AS2885.6, would be required. This should include an adequate reassessment of the planned location of the underground flowline in relation to nearby proximity of sensitive receptors, such as the nearby State Forest and public roads.

I consider the EIS has largely addressed the hazards and safety impact assessment requirements. As I have formed the view that the project is not suitable to proceed, further evaluation of potential hazards and safety impacts, avoidance, mitigation and management measures and EA conditions, is not presented. I do not recommend any conditions of approval for the project.

6.13 Cultural heritage

6.13.1 Aboriginal cultural heritages

The EIS adequately addressed the TOR with respect to Aboriginal cultural heritages and provided a CHMP in accordance with the relevant legislation. The CHMP was approved on 18 July 2023. In accordance with the CHMP, cultural heritage field surveys would be conducted on the project's disturbance area and other disturbance areas associated with exploration and appraisal activities. The surveys would be undertaken together with the Bigambul Native Title Aboriginal Corporation, the registered Aboriginal party for the area of potential impact.

6.13.2 Non-Indigenous cultural heritages

A search of the Queensland Heritage Register found no listing of any heritage places within the project area.

Desktop searches of the relevant statutory and non-statutory heritage registers were undertaken for the EIS and found no places of historical or archaeological significance within the boundaries of the project area. However, there is still the potential for unidentified sub-surface deposits to exist across the area.

The EIS did not propose any measures to avoid or mitigate against potential impacts to non-Indigenous cultural heritage.

I consider the EIS has largely addressed the non-Indigenous cultural heritage assessment requirements. As I have formed the view that the project is not suitable to proceed, further evaluation of the absence of avoidance, mitigation and management measures of non-indigenous cultural heritage, is not presented. I do not recommend any conditions of approval for the project.

6.14 Social

The EIS included an SIA for the project that was consistent with the requirements of the SSRC Act and the Coordinator-General's Social Impact Assessment Guideline (DSDMIP 2018). The SIA was developed in consultation with the Office of the Coordinator-General, Department of State Development and Infrastructure.

The Coordinator-General has undertaken an evaluation of the social impacts of the project. Key matters relating to the evaluation of the SAI are summarised below.

The SIA has adequately addressed the impacts, and provided mitigation measures, to address the five key matters as defined by the SIA Guideline:

- community and stakeholder engagement
- workforce management
- housing and accommodation
- local business and industry procurement
- health and community wellbeing.

6.14.1 Key matters

The SIA has adequately established an ongoing consultation framework and has engaged with a wide range of stakeholders. In response to submissions, the proponent updated the identified Interested Persons and Affected Persons, to ensure engagement adequately captured a wide representation of all stakeholder interests. Whilst consultation has been undertaken with an expanded list of stakeholders, concerns remain in relation to possible impacts of the project on groundwater from predominately agricultural interests. The proponent has committed to ongoing engagement with stakeholders through the Community and Stakeholder Engagement Plan.

The project requires a small workforce across all project phases. The SIA indicates that the on-site operational and monitoring personnel are likely to be sourced from the local region, where skilled workers are available, and that there is capacity in the local townships of Moonie, Westmar and Southwood and towns in the broader region. The local area also includes Millmerran as a possible location of workers for the project (i.e. truck drivers).

The SIA indicates that employees from the local area would return home each night, and personnel from outside of the local area would be housed at existing short-term accommodation options, at which there is availability.

The SIA indicates that where possible, plant, materials and equipment would be sought locally. This includes local contractors and suppliers for the required road upgrades and road improvement activities, including earthworks contractors, various trades, gravel, concrete, bitumen and truck haulage.

The SIA affirms that the project, due to its low workforce requirements, is not expected to impact on health and community well-being, existing related services or delivery of those services.

The Coordinator-General is satisfied the potential social impacts of the project could be adequately managed and minimised through the Proponent Commitments.

6.15 Economic

The EIS adequately assessed the potential adverse and beneficial economic impacts of the project on the local and regional area and the state. The project was assessed in accordance with the Coordinator-General's *Economic impact assessment guideline* (DSD 2017).

The EIS addressed each stage of the project, including construction, operation, and decommissioning. It also adequately analysed the project's contribution to climate change-related economic and financial risks and benefits to Queensland based on best practice assessment frameworks.

The EIS assessed the total economic impacts and benefits of the project, including the flow-on or indirect effects at the regional, state, and national level. The project is predicted to contribute income and company tax to the Australian Government and payroll tax revenues to the Queensland Government. The EIS stated that the adverse economic impacts from the project would be minimal.

The EIS adequately analysed the economic costs to agricultural activities on the land, including any impacts to supply chains. The area within and surrounding the project area is zoned rural land under the respective local categorising instruments and mostly consists of cleared land for beef cattle grazing on improved pasture, with some areas used for broadacre or dryland cropping. The EIS assessed that the project would result in temporary and reversible change to the operational lands. The land use assessment also indicated that the rural zoned land adjacent to the project area is unlikely to be significantly affected.

The project does have the potential to impact landholders' bores either within or surrounding the project area. However, this would only occur if unintended leakages or migration of the GHG plume were to occur into overlying groundwater aquifers and only if resultant rehabilitation activities were unsuccessful. This is not stated as a likely or a probable outcome from described modelled and planned operational impacts in the EIS.

Typically, resource tenure holders have obligations under Chapter 3 of the Water Act to establish *make good* water management agreements with potentially impacted landholders. This framework provides for effective monitoring, assessment and *make good* arrangements, if adverse impacts are observed. However, legislated *make good* matters do not specifically relate to GHG activities under the current legislative framework. I note this matter was the subject of several EIS submissions. The proponent responded that a *make good* agreement was not required for the project. I note that there is no legislative obligation for the proponent to enter into *make good* agreements. However, I consider that it would have been in the public interest for the proponent to have addressed these

concerns e.g. commit to voluntary agreements with potentially impacted landholders.

The EIS states that positive impacts resulting from the project include direct employment opportunities for 27 full-time equivalent employees (excluding those employees already employed directly by the proponent) during operation with additional employment opportunities for contractors during construction, annual monitoring, and the rehabilitation phase of the project. I note that the direct employment opportunities described in EIS Chapter 18 Economics are higher than those described in other chapters of the EIS. EIS Chapter 17 Social states that there would be direct employment opportunities for only 5 full-time equivalent employees during operations. I also note that the EIS does not present information on any potential employment opportunities for Aboriginal and Torres Strait Islander Peoples.

The primary economic benefit that the EIS presents is the reduction of CO₂ emissions to the atmosphere, valued using Australian Carbon Credit Units. However, the EIS does not consider the incurred GHG emissions from the project when calculating the net economic benefits of the project.

The EIS adequately explains that the project would facilitate direct and indirect contributions to the regional, state and national economies through supplies and services to the project. However, I consider the potential positive impacts to be relatively low based on the estimated value added to the regional economy over the life of the project.

I consider the EIS has mostly addressed economic impact assessment requirements. As I have formed the view that the project is not suitable to proceed, further evaluation of the potential economic impacts, avoidance, mitigation and management measures and EA conditions is not presented. I do not recommend any conditions of approval for the project.

6.16 Transport

The EIS adequately described the transport requirements for the project, including supplies, products, and workforce inputs and outputs, during the construction, operational and decommissioning phases of the project. In summary, a construction traffic demand of 13 vehicles, 10 being heavy vehicles and three being light vehicles, is expected. During project operations, the 260km heavy vehicle transport route of the GHG stream would be from the MPS to the project's Transportation Facility site. It is anticipated that up to nine B-Double type vehicles would be used for GHG stream delivery, making a total of up to 9 roundtrips per day (one round-trip per truck), up to 6 days a week (Monday to Saturday). During rehabilitation, up to 15 light vehicles would arrive and leave site, on a given day.

The EIS adequately assessed the choices for modes of transport that would ensure efficiency and minimise impacts on the community. While I consider that moving GHG stream via a pipeline could have provided long-term advantages in terms of emissions reductions and reduced traffic impacts, I agree that trucking would be the more economically viable transport mode given the short-term nature of the project.

The EIS appropriately identified that transport of the GHG stream would be subject to the [Transport Operations \(Road Use Management\) Act 1995](#), as well as the [Transport Operations \(Road Use Management – Dangerous Goods\) Regulations 2018](#) and the [Australian Code for the Transport of Dangerous Goods by Road and Rail](#) (seventh edition, as amended). Vehicles transporting the GHG stream, associated equipment, and the vehicle's driver would be required to be licensed or otherwise accredited to carry dangerous goods.

The EIS provided sufficient information to allow an independent assessment of how existing transport infrastructure would be affected by the proposed modes of transport at the local and regional level (e.g. local roads and state-controlled roads).

An unsignalised (i.e. no boom gates) level crossing currently exists across the Gore Highway in Millmerran. The proponent's correspondence with Queensland Rail identified that this railway line is currently not in use (however, can be activated with a 96-hour notice). The EIS concluded that an Australian Level Crossing Assessment Model assessment could not be undertaken with a train traffic input of zero. TMR advised that geometric considerations of vehicles at the crossing are less dependent on rail movements and assessment should consider if vehicles are able to manoeuvre safely and not block the crossing should it be activated. I note that while the transport route means vehicles would not be turning at this intersection and would have visibility of stacking, this can be further considered as part of an approval resulting from a notifiable road use agreement with the road authority, if required.

The Road Link Capacity Assessment identified that the project generated traffic would increase the demands on the following links to greater than the 5% intervention threshold for the Moonie Highway section between Leichhardt Highway and Harts Road and Harts Road section between Moonie Highway inclusive of the access and egress tracks. The EIS identified the following corresponding risks and mitigation measures:

- While the traffic volumes and vehicle movements associated with the project are below the design thresholds, the proponent proposed to improve the existing Basic Auxiliary Right Turn intersection of the

Moonie Highway and Harts Road intersection by widening the access to Harts Road, sealing the formation or similar and signage to improve intersection safety.

- Existing crash data identified driver fatigue as a contributing factor that could be amplified by project related traffic. The proponent proposed to upgrade the cross-section of Harts Road to a compliant road cross-section in consultation with WDRC and TMR

Emergency service providers, TMR and the WDRC would need to be notified and the suitability of proposed mitigation measures would need to be negotiated as part of a potential road use direction and possible resulting road compensation agreement and infrastructure agreement.

I consider the proponent has adequately addressed the transport assessment requirements as part of the EIS. As I have formed the view that the project is not suitable to proceed, further evaluation of the potential transport avoidance, mitigation and management measures and conditions, is not presented.

7 Recommended conditions

Any further EIS amendments and recommended conditions to address remaining EIS omissions are not likely to remedy the regulatory issue with s. 41 of the EP Regulation for this project as described in the EIS. Hence, no recommended conditions have been presented in this assessment report.

8 Suitability of the project

The detailed information provided as part of this EIS process about the project, and its potential impacts on the identified environmental values, has been assessed by the administering authority (DESI) and relevant agencies of the Queensland, and Australian governments. The information has also been reviewed by local governments, industry stakeholders, interest groups and members of the public through an open, public review process. While the EIS adequately addressed certain aspects of the TOR, key omissions for critical matters, particularly groundwater and waste, were identified during the assessment process. This is discussed further in section 6 (Adequacy of the EIS in addressing the final TOR) of this assessment report.

I am required under s. 59(c) of the EP Act, to make a recommendation on the suitability of the project. A fundamental consideration that arose during my analysis of the project was the implications of s. 41 of the EP Regulation. This section of the EP Regulation states that the administering authority must refuse to grant an application that involves the direct release of waste to groundwater under specific circumstances listed in s. 41(2) of the EP Regulation as follows:

(41) Activity involving direct release of waste to groundwater

(1) This section applies to the administering authority for making an environmental management decision relating to an activity that involves, or may involve, the release of waste directly to groundwater (the receiving groundwater).

Example of direct release of waste to groundwater—

an activity involving the release of contaminated water to groundwater through a well, deep-well injection or a bore

(2) The administering authority must refuse to grant the application if the authority considers—

(a) for an application other than an application relating to an environmental authority for a petroleum activity—the waste is not being, or may not be, released entirely within a confined aquifer; or

(b) the release of the waste is affecting adversely, or may affect adversely, a surface ecological system; or

(c) the waste is likely to result in a deterioration in the environmental values of the receiving groundwater.

(3) In this section—

confined aquifer means an aquifer that is contained entirely within impermeable strata.

Detailed consideration of the EIS has included the scientific assessment undertaken by the proponent, submissions, the proponent's response to submissions, amended versions of the EIS, relevant legislation, regulatory requirements, including the standard criteria under the EP Act and other detailed expert advice.

I consider the project as described in the EIS does not meet the requirements of s. 41 of the EP Regulation. This section of the EP Regulation provides that the administering authority (DESI) must refuse to grant a proposal to release 'waste' directly to groundwater, in the circumstances described by s. 41 of the EP Regulation. I consider these circumstances apply to the project as proposed, which includes the injection of sCO₂ waste directly in the PSA, which I have determined is not entirely within a confined aquifer under s. 41 of the EP Regulation, and that the waste is likely to result in a deterioration in the environmental values of the receiving groundwater. Therefore, I consider the project is **not suitable to proceed**.

In forming the view that the project as described in the EIS is unsuitable to proceed, I have come to the following conclusions and assumptions:

1. The effect of EP Act s. 226A and subordinate legislation and policies are that the project's potential impacts to groundwater quality should be described and the likely magnitude of impacts on the environmental values included for the receiving waters of the PSA and under s. 28 of the EP Act, the scheduled EVs are to be enhanced or protected.
2. The EIS and relevant legislation identify that the GHG stream planned for injection within EPQ10 is described as a 'waste' under s. 13 of the EP Act (as it was as of 8 March 2022 when the TOR was first submitted to DESI).
3. Evidence, including that supplied by the proponent as part of their assessment, indicates that any waste that is injected in the PSA within EPQ10 can migrate outwards (laterally and horizontally) from the injection site.
4. Given that the PSA is a continuous regional porous aquifer across a large area in the GAB, this indicates that the aquifer is not a geologically confined aquifer, as defined by s. 41 (3) of the EP Regulation as an aquifer contained entirely within impermeable strata, which would preclude any outward movement of material (including waste), and hence the proposal must be refused under the provisions of s. 41(2)(a) of the EP Regulation.
5. The injection of sCO₂ in the PSA would likely cause an irreversible or long-term change in water quality and aquifer characteristics within the targeted injection area and resulting plume extent.

These matters are further described in detail in the subsections below.

8.1 Protection of environmental values – groundwater

In Queensland, the EP Act and subordinate legislation, including the EP Regulation and EPP (Water and Wetland Biodiversity) provide the legislative basis for protecting groundwater quality. Therefore, groundwater quality in the PSA and associated scheduled EVs, are to be enhanced or protected. EVs are the values or uses of the environment that are conducive to public benefit, welfare, safety, or health and that require protection from the effects of pollution, waste discharges and deposits (NEPC 1999). Several different EVs may be relevant for a particular water resource. In many Queensland regions, EVs have been determined and scheduled as part of the EP Regulation and EPP (Water and Wetland Biodiversity). Performance Outcomes to protect groundwater under the contents of schedule 8 of the EP Regulation include that there would be no direct or indirect releases of contaminants to groundwater from the operation of the activity (1(a)) and that there would be no actual or potential adverse effect on groundwater from the operation of the activity (1(b)). Regulatory requirements for environmental management decisions are also listed in chapter 4, parts 2–3 of the EP Regulation, including s. 41 of the EP Regulation for an activity involving direct release of waste to groundwater.

8.2 Waste definition

The EIS and relevant legislation identify that the GHG stream planned for injection at WM-1 injection well within EPQ10 is described as a 'waste' under s. 13 of the EP Act (as it was when the EIS was submitted for consideration), as this is 'left over, or unwanted by-product, from an industrial ... activity' and is not exempted based on a relevant authorised EOW code resource determination. Additionally, as the EIS indicates that the GHG stream would contain inorganic sulphides in the form of hydrogen sulphide and other contaminants, I have identified that ERA 57 - Regulated waste transport is applicable. Furthermore, as the proposal's primary activity is a 'resource activity' as per chapter 5 s. 107(b) of the EP Act rather than a 'petroleum activity', this exception in s. 41(2)(a) of the EP Regulation regarding petroleum activities does not apply to the project.

8.3 Confined aquifer considerations

The effect of s. 41(2)(a) of the EP Regulation is to prevent waste being released directly to receiving groundwater unless, as a minimum, the relevant geological formation is completely self-contained in impermeable strata. The effect of this provision is so that a waste or the contamination caused by the release of that waste does not spread or contaminate beyond a completely confined underground area.

Previous versions of the EIS and associated documentation submitted by the proponent stated that the PSA within EPQ10 is a confined aquifer because it meets the technical hydrogeological definition. Following receipt of submissions on the original EIS, I note the proponent made changes to the EIS to acknowledge that hydrogeological definitions alone cannot fully satisfy s. 41 of the EP Regulation, because the terminology 'confined aquifer' has been defined conclusively as a matter of law as contained entirely within impermeable strata. I have also reviewed the technical information provided in the EIS, independent scientific advice obtained as part of the EIS process, DESI EIS review comments, submissions received on the EIS and review comments from other Government agencies, including OGIA, DRDMW, DAF and Resources. Based on the information available to me, I have formed a view that any injection of sCO₂ into the PSA at the proposed location on EPQ10 would not result in the waste being contained entirely within impermeable strata, that is, the PSA is not completely self-contained and

hence the proposal must be refused under the provisions of s. 41(2)(a) of the EP Regulation.

8.4 Deterioration of environmental values from release of waste

In addition to the effect of s. 41(2)(a) of the EP Regulation above, the effect of s. 41(2)(c) of the EP Regulation is to ensure any waste that is released directly to groundwater does not result in a deterioration in the EVs of the receiving groundwater. The effect of this provision was so that the release of a waste or any contamination caused by the release of waste does not cause deterioration to the EVs of that groundwater, including (but not limited to) impacting on its suitability to be used for a particular purpose such as drinking water or agricultural purposes.

Similarly, the provision protects the availability of the groundwater to be used, meaning the potential impact on groundwater availability, such as a reduction in bore yield would also trigger this provision. The PSA with EPQ10 has scheduled EVs under s. 6(1) – (2) of the EPP (Water and Wetland Biodiversity), specifically Schedule 1 Environmental values and water quality objectives, column 1, page 28 (specifically listed as the Queensland Murray-Darling Basin and Bulloo groundwaters of basins 011, 416, 417, 422, 423, 424). The EPP (Water and Wetland Biodiversity) identifies the EVs to be enhanced or protected, and for this location the EVs for Basal GAB Zones Eastern Central Area are listed in the [Queensland Murray-Darling and Bulloo River basins Groundwater Environmental Values and Water Quality Objectives](#) as:

- aquatic ecosystems
- irrigation
- farm supply/use
- stock water
- drinking water
- industrial use, and
- cultural, spiritual and ceremonial values.

I note that the proponent did not adequately assess scheduled EVs in the PSA within the GHG plume and EPQ10 during the EIS. I do not consider the proponent has put forward a scientifically-based robust justification for not adequately addressing scheduled EVs as part of the EIS.

It is important at this point to add that I have deferred to the Macquarie Dictionary definition of deterioration in this case, therefore any adverse effect (even a negligible one) to the EVs, I consider falls within the meaning of deterioration in s. 41(2)(c) of the EP Regulation.

The EIS presents explanations regarding the GHG stream causing significant acidification of aquifer waters upon contact, and that further complex chemical reactions with the surrounding geological formation would increase the water phase concentrations of metals and metalloids (and other contaminants associated with the geological formations). I consider the EIS presents clear scientific evidence using laboratory experiments with relevant geological samples and mock-up GHG stream impacted groundwater that a deterioration of groundwater in the PSA would result from the injection of sCO₂.

The EIS also presents evidence that CO₂ injection, interacting with the site-specific geologies in the PSA at WM-1 injection well, would cause an increased concentration or levels of chloride, sulphate, iron, various metals and metalloids (including lead and arsenic) and total dissolved solids. I do, however, note that uncertainty remains regarding the extent to which this deterioration zone would travel in perpetuity.

Initially, the EIS failed to account for the scheduled nature of the EVs in the groundwater aquifer and did not provide a suitable impact assessment. During the EIS public notification period, I note that EVs were highlighted in numerous submissions, including my department's submission, to which the proponent responded and acknowledged in the EIS that the scheduled EVs did apply to groundwater in the PSA.

In the EIS, the proponent states that ss. 35 – 36 of the EP Regulation and specifically s. 36 of the EP Regulation should require consideration of an attenuation zone, as being relevant to the project when considering mitigation and management conditioning. I have formed the view that regardless of the proponent's contention that s. 36 of the EP Regulation applies, s. 41(2) still requires that the proposal must be refused given the mandatory terms in which it is put.

8.5 Conclusion

The EIS process has afforded the opportunity for the proponent to present detailed scientific information to support the project proposal and to suitably address the requirements of the EP Regulation and the EPP (Water and Wetland Biodiversity) regarding the project's potential impacts on groundwater resources in the PSA. Based on the information presented in the EIS, I have formed the view that the PSA is not completely self-contained entirely within impermeable strata; and the injection of supercritical CO₂ into this aquifer would likely cause a deterioration in the EVs of the receiving groundwater within the targeted injection area and resulting plume extent. Therefore, I consider that the project as proposed in the EIS must be refused under s. 41 of the EP Regulation and is **not suitable to proceed**.

8.6 Implications for future CCS

It is important to highlight that s. 41 of the EP Regulation does not automatically trigger refusal for all conceivable CCS applications under the EP Act and associated GHG Storage Act, and that my determination is related only to the project, proposed within EPQ10.

9 Completion of the EIS process

In accordance with s. 60(1) of the EP Act, the giving of this assessment report to the proponent completes the EIS process for the project.

This assessment report is given to the proponent by the following delegate of the chief executive:

ORIGINAL SIGNED

Signature

Christopher Loveday
Director, Technical and Assessment Services
Department of Environment and Science
Delegate of the chief executive
Environmental Protection Act 1994

24 May 2024

Date

Enquiries: EIS Coordinator
13QGOV (13 74 68)
Email: eis@des.qld.gov.au

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Appendix A—Human Rights Act assessment

Introduction

Carbon Transport and Storage Corporation (CTSCo) Pty Limited is proposing to develop the Surat Basin Carbon Capture and Storage (SBCCS) Project (the project) on Greenhouse Gas Exploration Permit EPQ10 and is seeking to progress to the next stage of feasibility assessment by conducting greenhouse gas (GHG) stream (predominately carbon dioxide (CO₂)) injection testing of up to 110,000 tonnes per year for three years.

CTSCo is the project proponent. CTSCo is a wholly owned subsidiary in Australia of Glencore Holdings Pty Limited, itself being a wholly owned subsidiary of Glencore plc.

CTSCo has completed an Environmental Impact Statement (EIS) for the project that describes the project and provides an assessment of the proposed and potential environmental, economic, and social impacts of the project, both positive and negative. The EIS also describes monitoring, management and mitigation measures proposed to avoid or minimise any negative impacts. The EIS also considers feasible alternatives to the project whilst providing enough information for the administering authority to determine if the project is suitable to proceed or not. The EIS process provided opportunities for state government agencies as well as members of the public to make comments and submissions on the project.

This assessment report details how human rights have been considered as part of my recommendation that the project is **not** suitable to proceed. It is important to note that whilst my action impacts CTSCo, only individuals in QLD have human rights and not corporations, therefore this assessment focuses entirely on the impact of my action on individuals' human rights.

Legislative basis

The *Human Rights Act 2019* (the HR Act) makes it unlawful for a public entity, in its decision making, to fail to give proper consideration to a human right relevant to a decision or action.

It is a law that applies to anyone working for the Queensland Government, including the decision maker for an Environmental Impact Statement assessment report (EIS assessment report) under the *Environmental Protection Act 1994* (EP Act).

When deciding if the project is suitable to proceed, I am required to:

- give proper consideration to human rights relevant to my action; and
- make actions that are compatible with human rights.

Assessment details	
	Date: 24/05/24
<p>Decision/action: This human rights assessment relates to the requirement under section 57 of the EP Act (current as at 8 March 2022) for the SBCCS Project EIS proposed by CTSCo (the Proponent).</p> <p>That being: The chief executive must give the proponent a report (an EIS assessment report) about the submitted EIS within 30 business days after:</p> <p style="margin-left: 40px;">(a) if, at the end of the submission period, the chief executive has accepted any submissions—the day the notice mentioned in subsection (1) was given; or</p> <p style="margin-left: 40px;">(b) otherwise—the end of the submission period.</p> <p>Related to the requirement under section 57:</p> <p>The EP Act requires that under section 58 in preparing an EIS assessment report, the chief executive must consider the following:</p> <p style="margin-left: 40px;">(a) the final terms of reference for the EIS;</p> <p style="margin-left: 40px;">(b) the submitted EIS;</p> <p style="margin-left: 40px;">(c) all properly made submissions and any other submissions accepted by the chief executive;</p> <p style="margin-left: 40px;">(d) the standard criteria;</p>	

- (e) another matter prescribed under a regulation.

Additionally, section 59 of the EP Act lists the required content of an assessment report required by section 57, an EIS assessment report must:

- (a) address the adequacy of the EIS in addressing the final terms of reference; and
- (b) address the adequacy of any environmental management plan for the project; and
- (c) make recommendations about the suitability of the project; and
- (d) recommend any conditions on which any approval required for the project may be given; and
- (e) contain another matter prescribed under a regulation.

Human rights engaged

The following Human Rights were identified as potentially engaged by my action:

1. Section 16 - The right to life - Every person has the right to life and has the right not to be arbitrarily deprived of life.
2. Section 24(2) - Property rights - A person must not be arbitrarily deprived of the person's property.
3. Section 26(2) - Protection of families and children - Every child has the right, without discrimination, to the protection that is needed by the child, and is in the child's best interests, because of being a child.
4. Section 28 - Cultural rights—Aboriginal peoples and Torres Strait Islander peoples –
 - 1) Aboriginal peoples and Torres Strait Islander peoples hold distinct cultural rights.
 - 2) Aboriginal peoples and Torres Strait Islander peoples must not be denied the right, with other members of their community—
 - a) to enjoy, maintain, control, protect and develop their identity and cultural heritage, including their traditional knowledge, distinctive spiritual practices, observances, beliefs and teachings; and
 - b) to enjoy, maintain, control, protect, develop and use their language, including traditional cultural expressions; and
 - c) to enjoy, maintain, control, protect and develop their kinship ties; and
 - d) to maintain and strengthen their distinctive spiritual, material and economic relationship with the land, territories, waters, coastal seas and other resources with which they have a connection under Aboriginal tradition or Island custom; and
 - e) to conserve and protect the environment and productive capacity of their land, territories, waters, coastal seas and other resources.

I have not listed all 23 Human Rights protected under the HR Act above, instead I have only listed those rights I believe to be engaged by an action about the suitability of the project.

I did not undertake any additional consultation to determine if the above rights were engaged. Instead, I have relied on the EIS process and on the public notification process undertaken as part of the EIS process to fulfill the requirements (where appropriate) to consult with potentially affected individuals, whose human rights may be engaged by the action.

Limitations

In considering if the rights below are limited by the project, I have considered the impact of a determination that the project is not suitable to proceed following the completion of the EIS process. Whilst such a determination does not preclude the proponent from being able to make an application for an Environmental Authority, I can only consider my recommendation as part of this assessment.

For those rights potentially engaged by the action, my assessment is set out below:

1. **Section 16 - The right to life - Every person has the right to life and has the right not to be arbitrarily deprived of life.**

Potential impacts

The project, as proposed, involves activities (the injecting of a greenhouse gas stream made up of predominately supercritical CO₂ into the Precipice Sandstone aquifer within EPQ10) that could lead to the deterioration of the water

quality for use and could generate direct impacts on the environment in the vicinity of the project area. The project, as proposed could also cause direct impacts on people who live and work in the vicinity of the project and who use the environment in that area for work, recreation, and personal purposes in the future. Currently, the location of the proposed injection into the Precipice Sandstone aquifer is not utilised for drinking water as there are no bores that extract water for those purposes located within at least 10 kilometres, however, elsewhere, water extracted from the Precipice Sandstone aquifer is used for drinking water purposes.

In recommending that the project is unsuitable to proceed, I determine that my action will not limit the rights in section 16 because it will not authorise any of the proposed activities outlined in the EIS to occur on site.

2. Section 24(2) - Property rights - A person must not be arbitrarily deprived of the person's property.

Potential impacts

The project as proposed involves activities that could generate direct impacts on property and the rights of people to use and enjoy their properties within and adjacent to the project area. These impacts include (but are not limited to) groundwater quality impacts associated with the injection of supercritical CO₂ into the Precipice Sandstone aquifer, groundwater usage/extraction, land usage for vehicle movement and construction of facilities and infrastructure associated with the activity, and land sterilisation by creating areas where landowners and occupiers are no longer authorised to access.

In recommending that the project is unsuitable to proceed, I determine that my action will not limit the rights in section 24(2) because it will not authorise any of the proposed activities outlined in the EIS to occur on site.

3. Section 26(2) - Protection of families and children - Every child has the right, without discrimination, to the protection that is needed by the child, and is in the child's best interests, because of being a child

The project, as proposed, involves activities (the injection of supercritical CO₂ into the Precipice Sandstone aquifer) that could lead to the deterioration of groundwater quality in the future, therefore, potential impacts from contamination could disproportionately affect children who are living now and are born in the future as the contamination could take time to manifest in the aquifer. Children are on average more at risk because they are more vulnerable to physical impacts, including any changes to drinking water quality.

In recommending that the project is unsuitable to proceed, I determine that my action will not limit the rights in section 26 (2) because it will not authorise any of the proposed activities outlined in the EIS to occur on site.

4. Section 28 - Cultural rights—Aboriginal peoples and Torres Strait Islander peoples –

- 1) Aboriginal peoples and Torres Strait Islander peoples hold distinct cultural rights.**
- 2) Aboriginal peoples and Torres Strait Islander peoples must not be denied the right, with other members of their community—**
 - a) to enjoy, maintain, control, protect and develop their identity and cultural heritage, including their traditional knowledge, distinctive spiritual practices, observances, beliefs and teachings; and**
 - b) to enjoy, maintain, control, protect, develop and use their language, including traditional cultural expressions; and**
 - c) to enjoy, maintain, control, protect and develop their kinship ties; and**
 - d) to maintain and strengthen their distinctive spiritual, material and economic relationship with the land, territories, waters, coastal seas and other resources with which they have a connection under Aboriginal tradition or Island custom; and**
 - e) to conserve and protect the environment and productive capacity of their land, territories, waters, coastal seas and other resources.**

Potential Impacts

The project, as proposed, involves activities that generate direct impacts on land within and adjacent to the project area. These impacts could affect the intangible cultural heritage values and potential artefacts found on the project site and impact the rights of traditional owners to use the site and the surrounding land.

I am aware that the Bigambul Native Title Aboriginal Corporation (BNTAC) represent the traditional owners associated with the operational lands for the project and that a Cultural Heritage Management Plan (CHMP) has been agreed with the BNTAC and approved by the Queensland Government. The CHMP between CTSCo and BNTAC was developed in accordance with the Part 7 of the *Aboriginal Cultural Heritage Act 2003*.

In recommending that the project is unsuitable to proceed, I determine that my action will not limit the rights in section 28 because it will not authorise any of the proposed activities outlined in the EIS to occur on site.

Record of consultation

No specific consultation was undertaken in relation to my action. Broad, project-based consultation was undertaken as part of the EIS process.

Outcome

Human rights are **not limited** and the action is compatible with the HR Act because:

- I recommended that the project is unsuitable to proceed and therefore my action does not authorise any activities that may limit human rights.

ORIGINAL SIGNED

Signature

24 May 2024

Date

Christopher Loveday

Department of Environment, Science and Innovation

Delegate of the administering authority

Environmental Protection Act 1994