GREATER GIPPSLAND OFFSHORE WIND PROJECT

Preliminary Hydrology Constraints Assessment

FINAL

November 2022

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Prepared by

Umwelt (Australia) Pty Limited

on behalf of

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umwelt

Environmental & Social Consultants

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

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	Name	Date	Name	Date
Final	Caroline Funnell	11 November 2022	David Knight	11 November 2022

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Abbreviations

Abbreviation	Description
AEP	Annual Exceedance Probability
BFE & EE	BlueFloat Energy and Energy Estate
BPESC	Best Practice Erosion and Sediment
CASS	Coastal acid sulfate soils
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authorities
DELWP	Department of Environment, Land, Water and Planning
DEM	Digital Elevation Model
GDEs	Groundwater Dependent Ecosystems
GW	Gigawatts
ha	Hectares
IECA	International Erosion Control Association's
IFD	Intensity-Frequency-Duration
km	Kilometres
kV	Kilovolt
LGA	Local Government Area
OWP	Offshore wind project
RFFE	Regional Flood Frequency Estimation
VCASS	Victorian Coastal Acid Sulfate Soil
WSPA	Water Supply Protection Area
WGCMA	West Gippsland Catchment Management Authority

1.0 Introduction

1.1 Project Description

The Greater Gippsland Offshore Wind Project (the Project) is located in the Gippsland region of Victoria, to the south west of Sale. **Figure 1.1** shows the Project Area which contains the offshore and onshore components of the Project, including the transmission line route options, associated with its construction, operation and decommissioning.

The wind turbines and offshore substations are located approximately 10–43 kilometres (km) from the Gippsland coastline between Woodside Beach and Seaspray, in an area of approximately 700 km^2. Within this area, the Project involves 139 'bottom-fixed' turbines[1], two to four offshore substations and associated infrastructure with the capacity to generate up to 2.085 gigawatts (GW) of electricity. The turbines would have a capacity between 15 MW and 20 MW, hub heights between 165 m and 190 m and rotor diameters of between 250 m to 275 m.

Route options currently proposed for the transmission line incorporate 330 kV subsea cables between the offshore substations and McLoughlins Beach – Seaspray Coastal Reserve, with an onshore landing either northeast or west of the Ninety Mile Beach Marine National Park. An underground cable will run approximately 8–16 km from the coast to a new substation. An overhead transmission line will then run approximately 79 km to the Hazelwood Terminal Station (transmission route option 1a and 1b) or 65 km to the Loy Yang Power Station (transmission route option 2). The transmission line will be located within an easement approximately 80m wide.

It is noted that the transmission line options proposed as part of the Project were identified prior to release of the Victorian State Governments Offshore Wind Implementation Statement 1 (October 2022) and accordingly the location of the grid connection may be subject to further review and consideration.

The wind farm component of the Project is located in the Territorial Sea[2] and the Exclusive Economic Zone[3]. The onshore transmission line is located in the Wellington Local Government Area (LGA) with the grid connection point at the Hazelwood Terminal Station or Loy Yang Power Station in the Latrobe LGA.

1.1.1 Study Area

As shown in **Figure 1.1,** the Study Area extends beyond the Project Area. The purpose of the Study Area is to provide additional context to the existing site conditions and for identification of potential impacts. It provides flexibility in siting and design as a response to the outcomes of preliminary and subsequent assessments.

The Study Area includes:

- A 5 km buffer around the offshore wind farm components (wind turbines and offshore substations) and subsea export cable routes up to the shoreline.

[1] A bottom-fixed turbine is mounted on a structure fixed into the seabed.
[2] The Territorial Sea is the belt of water extending up to 12 nautical miles from the low water mark of the coastline
[3] The Economic Exclusive Zone is the area beyond the Territorial Sea extending up to 200 nautical miles from the low water mark of the coastline

- A 1 km buffer around the onshore overhead (or underground where needed) transmission line and the onshore substation (referred to as the transmission line corridor) except where alternatives are considered.

The following definitions apply within the Study Area:

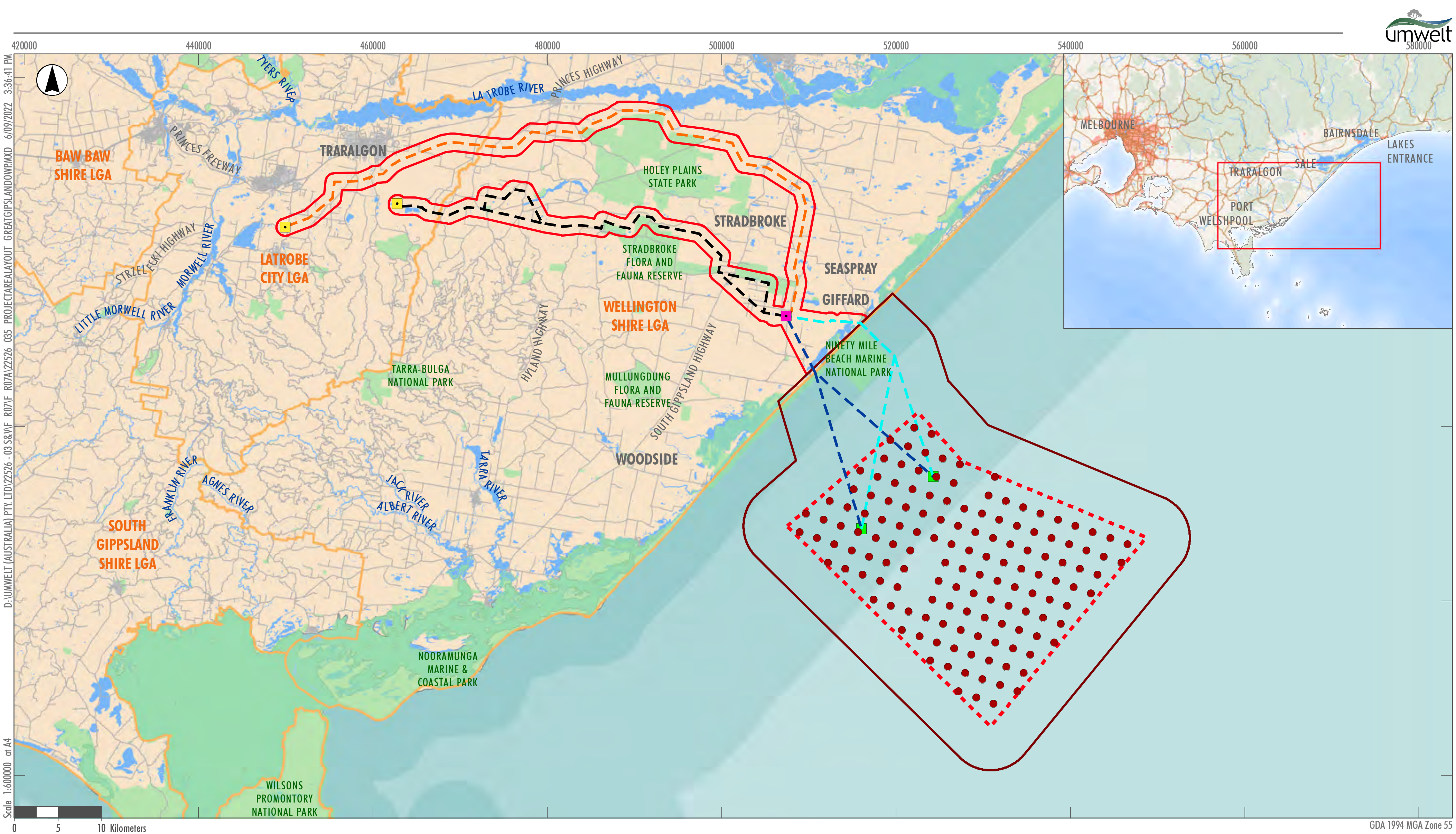
- Offshore refers to all areas from the low water line along the coast out to sea. For the purpose of the Project, the Study Area and Project Area lie in Commonwealth and State Waters (see definitions below).
- Onshore refers to all land-based areas above the low water line.
- State Waters refers to the area from the low water line along the coast up to 3 nautical miles seaward.
- Territorial Waters and Contiguous Zone (Commonwealth Waters) refers to land from the State Water boundary up to 12 and 24 nautical miles respectively, from the low water line along to the coast.
- Exclusive Economic Zone extends from the Territorial Waters and Contiguous Zone up to 200 nautical miles from the low water line along to the coast.

This hydrology constraints assessment has considered only the onshore component of the Study Area.

1.2 Scope

The scope of work involved in this preliminary hydrology constraints assessment included the following:

- Review Project catchments, topography and drainage.
- Review of watercourse mapping.
- Identify potentially impacted catchments and associated water sharing plans (surface water and groundwater).
- Identify sensitive areas including groundwater dependent ecosystems that could be impacted by the Project.
- Identify and review Project Area soils.
- Develop a preliminary 1% Annual Exceedance Probability (AEP) flood extent based on flood modelling.



Legend

- Offshore Study Area boundary
- Onshore Study Area boundary

Greater Gippsland Offshore Wind Project Area consists of:

- Greater Gippsland Offshore Wind Project Area
- Overhead Transmission Route Option 1a and 1b
- Overhead Transmission Route Option 2
- Subsea Cabling Option 1
- Subsea Cabling Option 2

- Potential Turbine Layout
- Offshore Substation
- Existing Onshore Substation
- Indicative Onshore Substation

- Local Government Boundary
- State Forest, National Parks, Reserves
- Road
- Drainage Line

- VIC Coastal and Internal Waters
- Territorial Sea
- Exclusive Economic Zone (Amended by Perth Treaty 1997)

FIGURE 1.1

Project Area and Study Area

Data source: Vic Data (2022)

2.0 Existing Environment

2.1 Surface Water Catchments and Hydrological Regimes

Most of transmission route option 2, and the eastern end of transmission route option 1 is within the catchment system for Merriman Creek and drains towards the east, discharging into McLoughlins Beach (Refer to **Figure 2.1**). This catchment system is part of the larger Seaspray catchment system.

The majority of transmission route option 1 is located within tributaries of the Latrobe River, e.g. Bennetts Creek, Traralgon Creek, Flynns Creek, etc. (Refer to **Table 2.1** for list of watercourses). This catchment is part of the larger Central Gippsland catchment system. Transmission route option 2 commences on the Gippsland coastline near McLoughlins Beach, Victoria and runs through to Loy Yang Terminal Station, largely in parallel to the existing Basslink transmission route. The west end of the transmission route option 2 is in the catchment system for Flynns Creek, which is a tributary of the Latrobe River.

There are several lakes and intertidal wetland systems within the Study Area just inland from the coastal waters, including Lake Denison as well as the Gippsland Lakes Ramsar wetland. Ramsar wetlands are wetland sites that have been designated as being representative, rare or unique wetlands, or important for serving biological diversity. Gippsland Lakes Ramsar wetlands and DELWP Mapped Wetlands near the Study Area are shown in **Figure 2.1**.

The proposed transmission route option 1 intercepts 13 main watercourses, including Traralgon Creek, Flynns Creek and Merriman Creek, as well as minor unnamed watercourses (refer to **Table 2.1**). The proposed transmission route option 2 intercepts five main watercourses - Flynns Creek, Merriman Creek, Bayliss Gully, Monkey Creek and Little Monkey Creek, as well as minor unnamed watercourses (refer to **Table 2.2**).

The identified watercourse alignments within the Project Area were classified for their Strahler Stream Order. Strahler Stream Order is used to describe the hierarchy of stream from the top to the bottom of a catchment. A first order stream has no other streams flowing into it and when two streams of the same order join, the resulting stream has the next highest order (NSW Government, 2018). Traralgon Creek, Flynns Creek, Merriman Creek and Monkey Creek were classified as fifth order watercourses, and Bennetts Creek, Waterhole Creek, Crooke Creek Bayliss Gully and Little Monkey Creek are fourth order watercourses. Unnamed watercourses in proximity to the proposed transmission line options vary between first, second and third order watercourses. **Table 2.1** and **Table 2.2** identify the Strahler Order of the watercourses that the proposed transmission routes will cross.

Table 2.1 Watercourse Strahler Order – Transmission Route Option 1

Watercourse Name	Strahler Order
Bennetts Creek	4^{th}
Waterhole Creek	4^{th}
Plough Creek	4^{th}
Boyds Creek	3^{rd}
Traralgon Creek	5^{th}

Watercourse Name	Strahler Order
Sheepwash Creek	3rd
Flynns Creek	5th
Blind Joe Creek	3rd
Crooke Creek	4th
Deep Creek	3rd
Carr Creek	2nd
Merriman Creek	5th
Monkey Creek	5th
Unnamed watercourses	1st, 2nd and 3rd

Table 2.2 Watercourse Strahler Order – Transmission Route Option 2

Watercourse Name	Strahler Order
Flynns Creek	5th
Merriman Creek	5th
Bayliss Gully	4th
Monkey Creek	5th
Little Monkey Creek	4th
Unnamed watercourses	1st, 2nd and 3rd

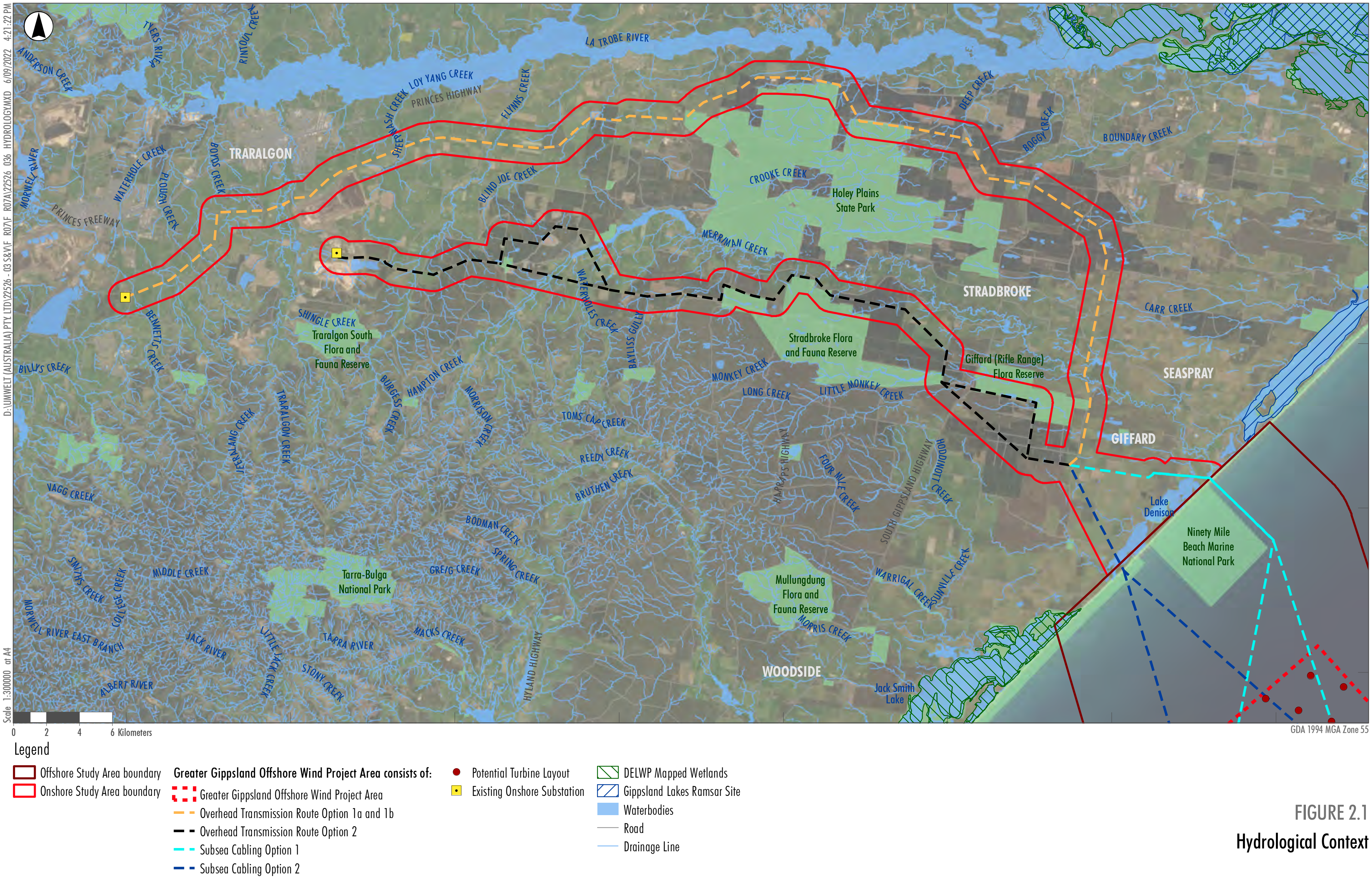


FIGURE 2.1

Hydrological Context

Image Source: ESRI Basemap (2022) Data source: VIC Data (2022); DELWP (2022)

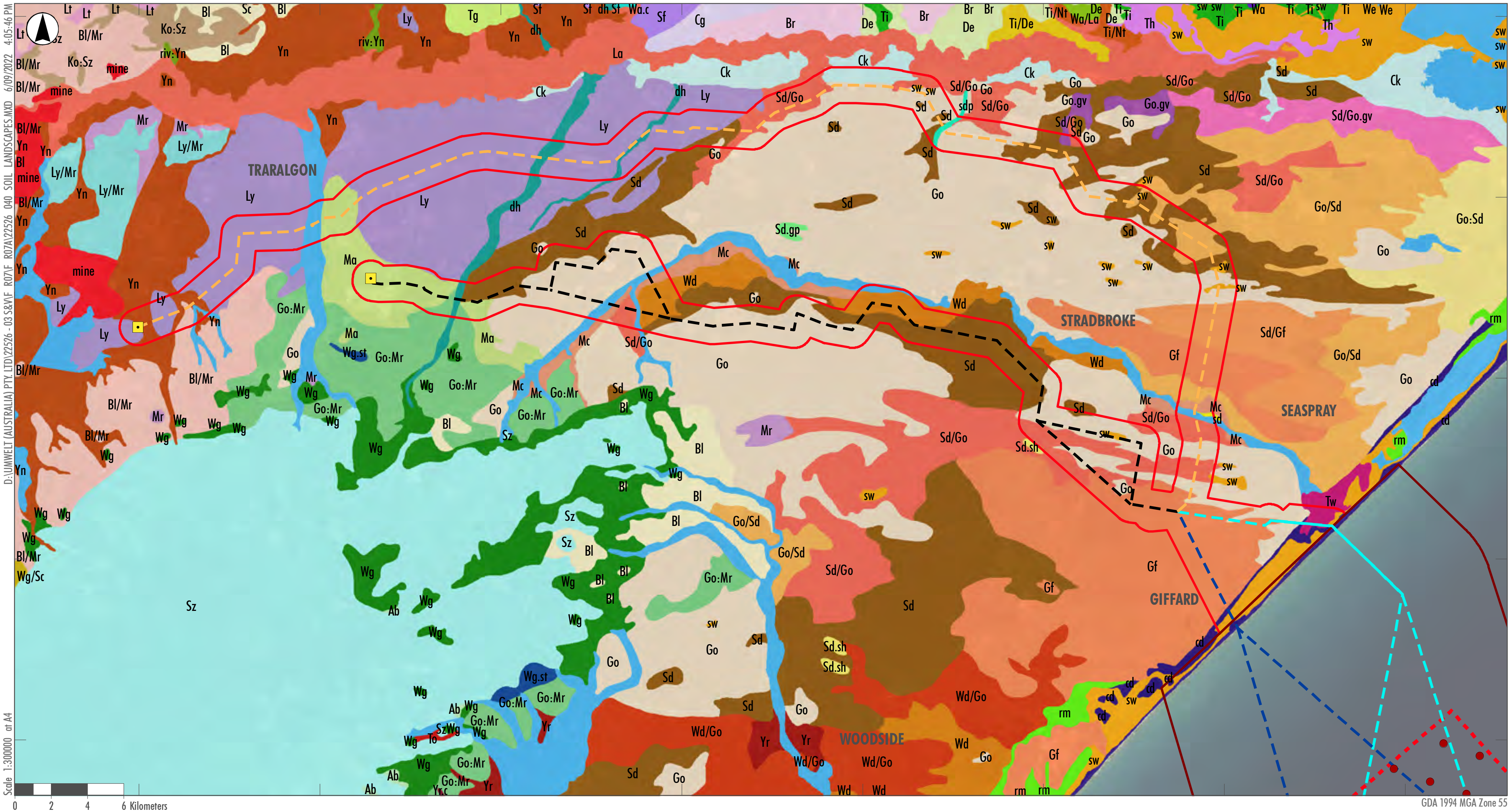
2.2 Soil Landscape and Acid Sulfate Soils

A review of Victorian soil type mapping (Agriculture Victoria, 2000 and 2003) indicated that the proposed transmission line route varies between multiple soil types as shown on **Figure 2.2**. The main soil types and definitions found in the Study Area are as follows:

- Gf – Giffard Soil Type: Level plain landform with a geology of late tertiary deposits. Dominant soils are sandy loams to loamy sands and clay subsoils.
- Go - Gormandale Soil Type: Dunefield with a geology of pleistocene to recent aeolian sediments. Dominant soils are podosols/sandy rudosols and some sodosols (very deep sandy).
- La – Latrobe River Soil Type: Floodplain with a geology of recent sediments from the Latrobe River. Dominant soils are deep loams to clay loams with medium clays at depth.
- Ly – Loy Yang Soil Type: Undulating plain with geology of alluvial sediments. Dominant soils are sandy loams to sandy clay loams overlying medium to heavy clays.
- Ma – Maryvale Soil Type: Rolling low hills to undulating rises with a geology of late tertiary sediment (Pliocene). Dominant soils are fine sandy loams on a clay subsoil.
- Sd - Stockdale Soil Type: Undulating plain with a geology of tertiary sediments. Dominant soils are variable: grey and brown solodols/kurosols/chromosols (sandy).
- Sd/Gf – Stockdale with Giffard Soil Types.
- Sd/Go – Stockdale with Gormandale Soil Types.
- Wd – Woodside Soil Type: Gently undulating plain with a geology of mostly Pleistocene alluvium, some areas of recent alluvium and recent aeolian sediments. Dominant soils are sands and loams on sandy clays or medium clays.
- Yn – Yinnar Soil Type: Stagnant alluvial plain with a geology of late Pleistocene alluvial sediments. Dominant soils are fine sandy loams to silty clay loams overlying light to medium clays.

Coastal acid sulfate soils (CASS) occur naturally along many parts of Victoria's coastal zone, including Gippsland, and are largely benign if left undisturbed. However, if disturbed they can react with oxygen and produce sulfuric acid. This can be detrimental to the environment and cause acidification of water and soil, de-oxygenation of water, and poor water quality. The generation of acid through inappropriate management of acid sulfate soils can also result in damage to concrete and steel. CASS may be encountered both onshore and offshore depending on geological and historical conditions of the site.

A review of the Victorian Coastal Acid Sulfate Soil (VCASS) maps for Gippsland indicates the coastline within the onshore Study Area has potential to contain acid sulfate soils, as this area is mapped as 'prospective'. **Figure 2.3** shows the location of prospective acid sulfate soils within the Study Area.



Legend

- Offshore Study Area boundary
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Greater Gippsland Offshore Wind Project Area consists of:

- Greater Gippsland Offshore Wind Project Area
- Overhead Transmission Route Option 1a and 1b
- Overhead Transmission Route Option 2
- Subsea Cabling Option 1
- Subsea Cabling Option 2
- Potential Turbine Layout
- Existing Onshore Substation

Soil Landscapes

Ab, Bl, Bl.st, Bl/Mr, Br, Cg, Ck, De, Gf, Go, Go.gv, Go/Sd, Go:Mr, Go:Sd, Ko:Sz, La, Lt, Ly, Ly/Mr, Ma, Mc, Mr, Sc, Sd, Sd.gp, Sd.sh, Sd/Gf, Sd/Go, Sd/Go.gv, Sf, Sz, Tg, Th, Ti, Ti/De, Ti/Nt, To, Tw, Wa, Wa.c, Wa/La, Water, Wd, Wd/Go, We, Wg, Wg.st, Wg/Sc, Yn, Yr, Yr.c, cd, dh, mine, riv:Yn, rm, sd, sdp, sw

FIGURE 2.2
Soil Landscapes

Image Source: ESRI Basemap (2022) Data source: VIC Data (2022); DELWP (2018)

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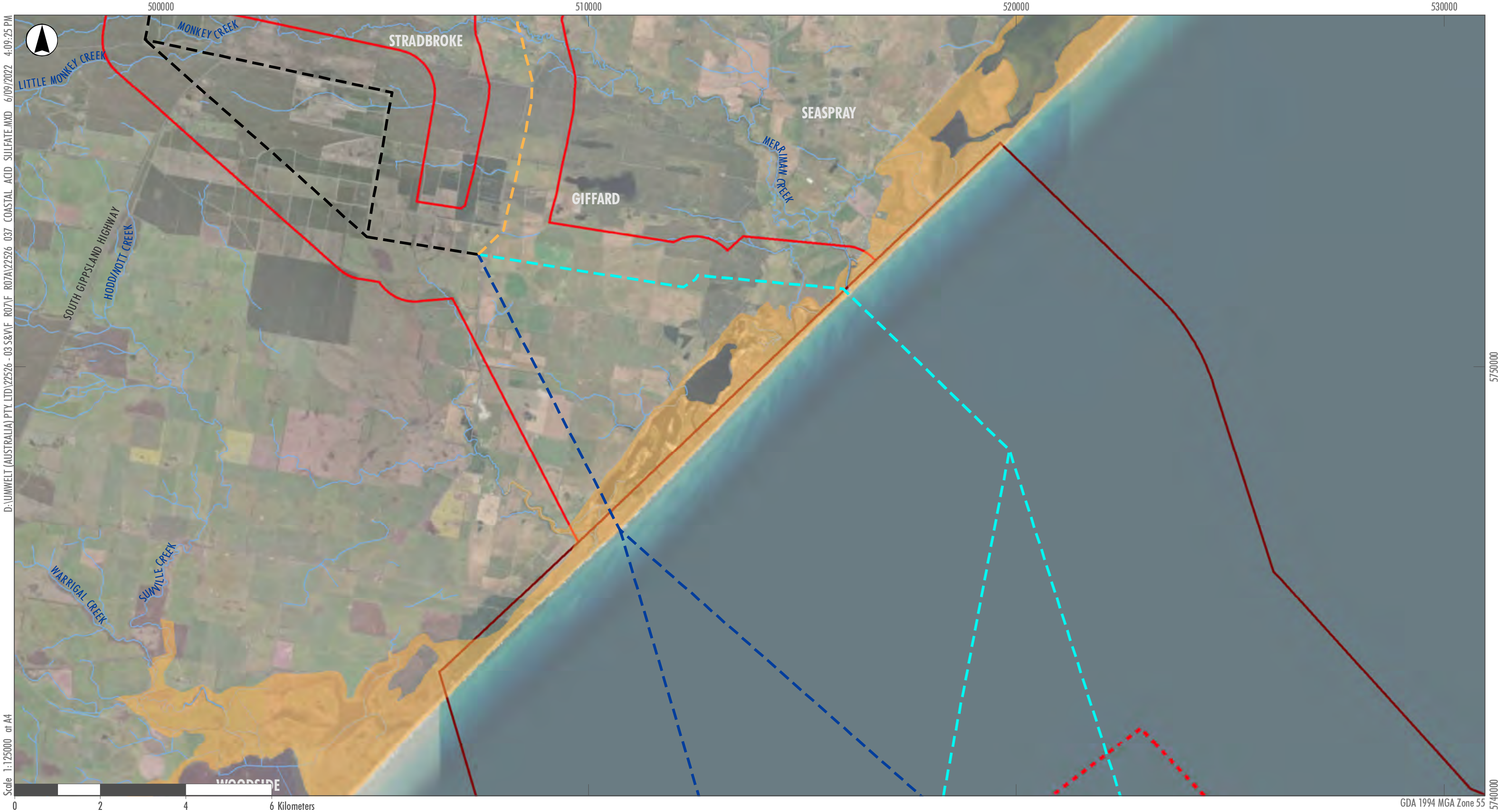

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- Offshore Study Area boundary
- Onshore Study Area boundary

Greater Gippsland Offshore Wind Project Area consists of:

- Greater Gippsland Offshore Wind Project Boundary
- Overhead Transmission Route Option 1a and 1b
- Overhead Transmission Route Option 2
- Subsea Cabling Option 1
- Subsea Cabling Option 2

- Prospective Coastal Acid Sulfate Soils
- Road
- Drainage Line

FIGURE 2.3

Acid Sulfate Soils

Image Source: ESRI Basemap (2022) Data source: VIC Data (2022); DELWP (2022)

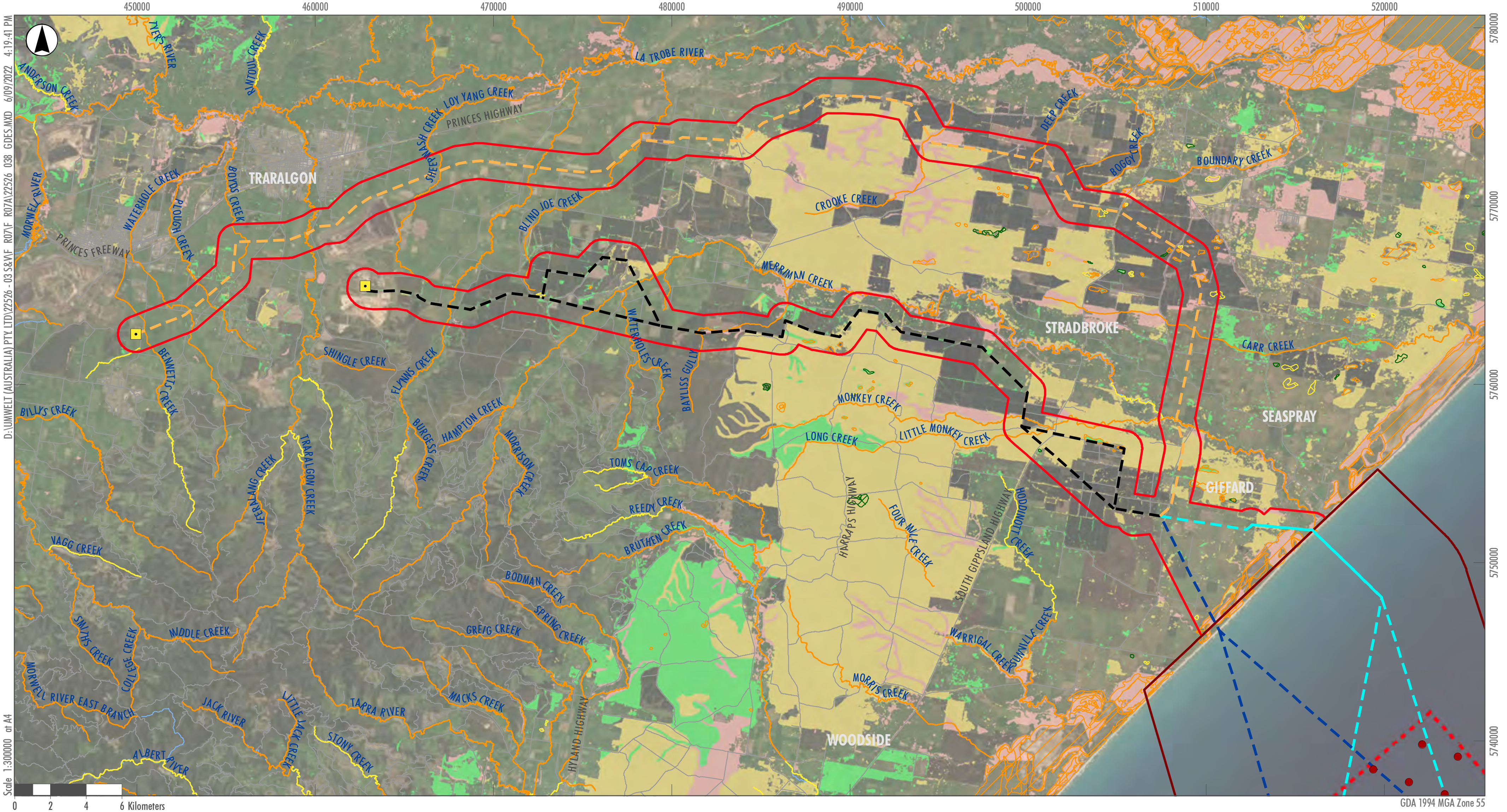
2.3 Groundwater Dependent Ecosystems (GDEs)

The Study Area was assessed to determine whether any sensitive areas were located within the vicinity of the Project. Groundwater Dependent Ecosystems (GDEs) that could be impacted by the Project were identified and are shown on **Figure 2.4**.

The proposed transmission route options 1 and 2 interact with low, moderate, and high potential GDEs from the coast to approximately 30 km along the proposed overhead transmission route, and low to moderate GDEs further west (BOM, 2017).

2.4 Water Usage and Source

The Study Area is located within the West Gippsland Catchment Management Authority and is subject to the objectives of the West Gippsland Regional Catchment Strategy (WGCMA, 2012). The Study Area is also within the Latrobe Group Aquifer - Yarram Water Supply Protection Area (WSPA).



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- Greater Gippsland Offshore Wind Project Area
- Overhead Transmission Route Option 1a and 1b
- Overhead Transmission Route Option 2
- Subsea Cabling Option 1
- Subsea Cabling Option 2

- Potential Turbine Layout
- Existing Onshore Substation
- Road
- Drainage Line

Aquatic GDEs

- High potential for GW interaction
- Moderate potential for GW interaction
- Low potential for GW interaction

Terrestrial GDEs

- High potential for GW interaction
- Moderate potential for GW interaction
- Low potential for GW interaction

FIGURE 2.4

Groundwater Dependent Ecosystems

Image Source: ESRI Basemap (2022) Data source: VIC Data (2022); DELWP (2022); Bureau of Meteorology (2017)

2.5 Flooding

2.5.1 Modelling Approach

A high level TUFLOW 2-dimensional (2D) hydraulic model was developed to estimate the indicative 1% Annual Exceedance Probability (AEP) flood extents to assist in consideration of site design and configuration. AEP refers to the likelihood of the occurrence of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. A flood with a 1% AEP has a one in a hundred chance of being exceeded in any year.

TUFLOW software is one of the most widely used hydraulic modelling software packages in Australia. The software is considered an appropriate modelling tool for modelling riverine and local overland flooding. TUFLOW allows the simulation of runoff generated from local rainfall on a grid that is representative of the site topography, known as “direct rainfall” modelling. The model provides estimates of flood levels, depths, and velocities.

The setup and configuration of the TUFLOW model is outlined as follows:

- 30 m resolution terrain grid based on 10 m resolution Vicmap Digital Elevation Model (DEM) (State Government of Victoria, 2021). This DEM has a representative horizontal and vertical accuracy of 12.5 m and 5 m or better.
- No hydraulic structures were included in the model.
- Direct rainfall was applied to the model using a simplified approach consisting of Intensity-Frequency-Duration (IFD) design rainfall derived using the 2016 ARR IFD analysis available from the Bureau of Meteorology (http://www.bom.gov.au/water/designRainfalls/revised-ifd/).
- Design storm rainfall losses were estimated using the ARR2019 datahub. For the 1% AEP design event the initial loss was 20.0 mm. The continuing loss was 3.3 mm/hr.
- A uniform Manning ‘n’ value of 0.06 was adopted.
- Latrobe River inflows were applied to model based on the maximum flows recorded at nearby Latrobe River gauges (Gauge ID 226227).

2.5.2 Flood Modelling Results and Discussion

The indicative 1% AEP design flood inundation extents and flood depth distribution across the modelled catchment is shown in **Figure 2.5**. The catchment-wide mapping shows the accumulation of floodwater along the major channels of Bennetts Creek, Traralgon Creek, Blind Joe Creek, Carr Creek, Flynns Creek, Merriman Creek and Monkey Creek as floodwater is conveyed through the Study Area.

The transmission route option 1 generally traverses the waterways and associated floodplains of Merriman Creek and its local tributaries. The transmission route option 2 generally traverses the waterways and associated floodplains of the southern tributaries of the Latrobe River in the Study Area.

The flood inundation extents, depth and velocities are variable depending on the local flooding conditions at each waterway crossing, driven by the local topography and hydrology of the contributing catchments.

Further detailed mapping of the mainstream flooding condition on the Latrobe River has been completed as part of the Latrobe River Flood Study (Cardno, 2015).

2.5.3 Recommendations

With respect to the limited scope of this high-level assessment and preliminary flood modelling, the following refinements may be undertaken in subsequent project phases to provide a comprehensive flood risk assessment for proposed development once further design development is complete and to support the planning submission:

- Update of developed model to incorporate the full suite of ARR2019 ensemble temporal patterns to establish critical design flood conditions across the catchment.
- Update model with LiDAR survey data of the area.
- In lieu of model calibration (it is noted that historical flooding information in the Study Area is unlikely to exist), modelled design flows are validated against alternative methods (e.g. Regional Flood Frequency Estimation (RFFE)).
- Full suite of mapping including flood depth, velocity and hazard distributions across the Study Area for a range of design flood magnitudes to assess risk to infrastructure and potential impacts of proposed works.

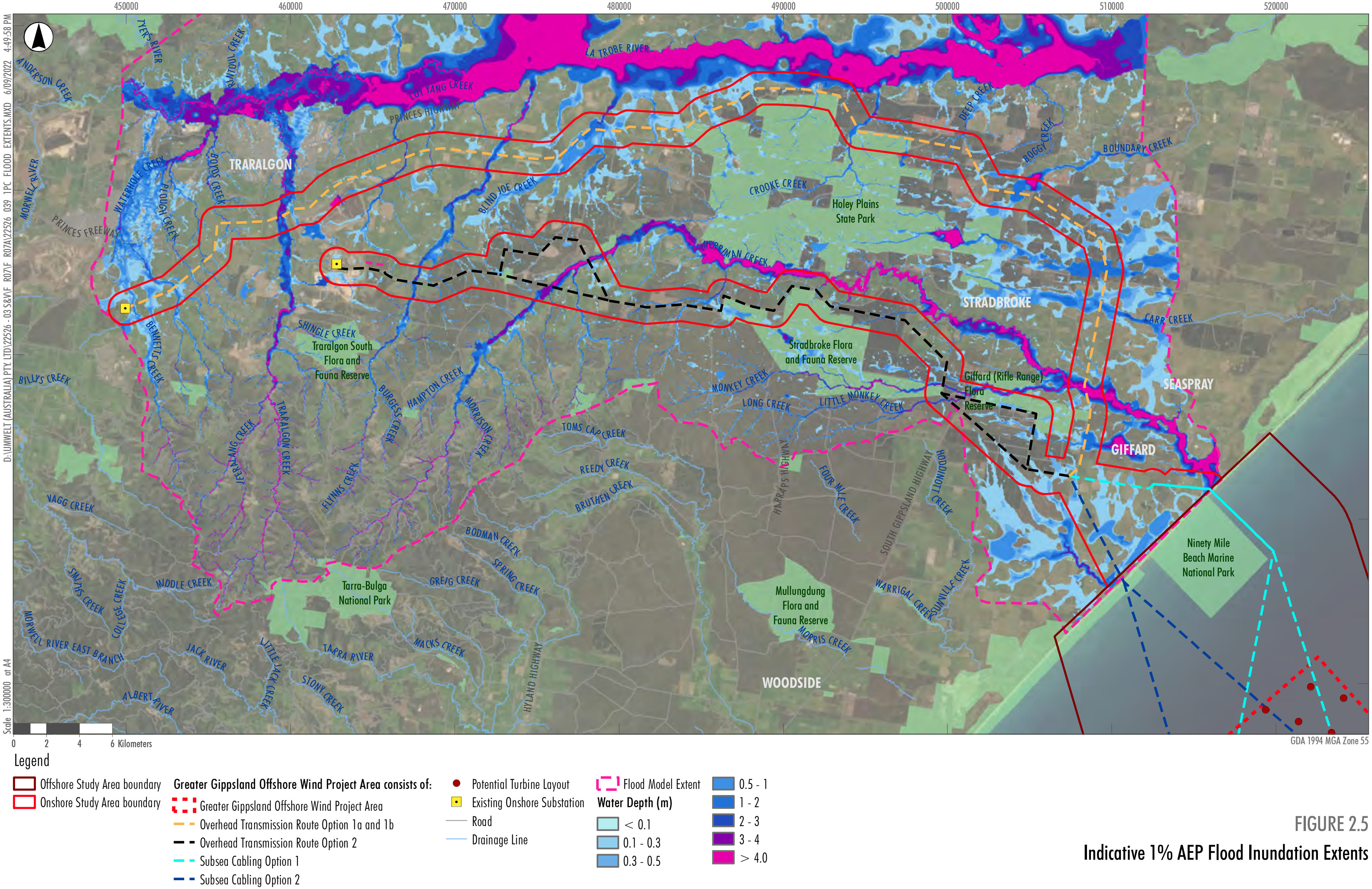

FIGURE 2.5

Indicative 1% AEP Flood Inundation Extents

Image Source: ESRI Basemap (2022) Data source: VIC Data (2022); DELWP (2022)

3.0 Potential Impacts to Surface Water

Following definition of the existing environmental context of the Study Area and surrounds, potential surface water and hydrology impacts have been identified with consideration of the Project design, construction, operation, and decommissioning activities in the context of the existing conditions. An overview of these potential impacts is provided in **Table 3.1**.

The principal impacts related to water resources are expected during the construction and decommissioning phases of the Project and are associated with surface water quality risks, mainly at the intersection of the construction works with watercourses and a general risk of erosion as a result of disturbed or exposed soils. These potential impacts are primarily a result of potential trenching through waterways if required by the Project. Trenching may be restricted by flooding impacts as well as riparian zone offset requirements. These risks may be most significant along Traralgon Creek, Flynns Creek, Merriman Creek and Monkey Creek, which are fifth order streams.

Table 3.1 Potential Surface Water and Hydrology Impacts

Environment Aspect	Description of Potential Impact
Surface Water Quality – Erosion and Sedimentation	Construction and decommissioning activities such as vegetation removal, earthworks (including disturbance of acid sulfate soils) and movement of heavy vehicles have the potential to impact the surface water quality of watercourses and sensitive waterbodies (i.e. wetlands) within the Study Area and result in soil erosion and sedimentation in downstream waterways. Discharge of sediments (both air and water borne) from exposed ground during construction may result in adverse impacts on receiving environment surface water quality.
Surface Water Quality - Trenching	Trenching of ephemeral watercourses (which may occur as a result of burying the onshore cable from the coastal landing to the onshore substation) and movement of heavy vehicles have the potential to impact the surface water quality of watercourses and sensitive waterbodies (i.e. wetlands) within the Study Area and result in soil erosion and sedimentation in downstream waterways.
Surface Water Quality – Spills, Leaks and Litter	Fuel or chemical spills, or inappropriate material storage, resulting in contamination of groundwater and/or nearby waterways and sensitive waterbodies (i.e. wetlands), resulting in environmental degradation and implications under the Environmental Protection Act 2018.
Groundwater	Impacts to groundwater resources including Groundwater Dependent Ecosystems (GDEs).
Surface Water Quality	Fuel or chemical spills, fire management systems or inappropriate material storage, resulting in contamination of groundwater and/or nearby waterways and sensitive waterbodies (i.e. wetlands), resulting in environmental degradation and fines under the EP Act.
Surface Water Quality	Discharge of stormwater from the Study Area during operation resulting in adverse impacts on receiving environment surface and groundwater water quality.
Surface Water Geomorphology	Discharge of stormwater from the Study Area during operational phase resulting in adverse impacts on receiving environment surface water geomorphology (e.g. stream bank erosion and scouring) or hydroecology.

4.0 Recommendations

Based on the outcomes of the impact assessment undertaken to identify potential impacts of hydrology, relevant design constraints that have the potential to affect the Project site have been identified. A summary of the identified mitigation recommendations is provided in **Table 4.1**.

Table 4.1 Recommended Mitigation Measures

Environment Aspect	Recommended Mitigation Measures
Surface Water Quality – Erosion and Sedimentation	• Works in waterways not to be undertaken in wet weather. • Consider boring techniques for laying cables at waterway crossings where possible to limit open trenching works in sensitive environments. Overhead transmission lines should not require trenching. • Works on Waterways Permits will be required and design of waterway crossings for roads and cables etc will adhere to the permit conditions and design requirements of the local CMA. • Industry best practice Construction Environmental Management Plan (CEMP) to be implemented which includes a Waste Management Plan that addresses the storage and stockpiling of raw materials, transport of materials to site, and disposal of materials. This should also include measures to manage any potential Acid Sulfate Soils found in excavated fill material, in accordance with the Acid Sulfate Soil Guidelines. • Erosion and sediment control measures to be detailed in a CEMP including establishment of appropriate drainage during construction, sediment controls such as sediment sumps and fencing, stockpile management, oil booms and/or sediment traps applied during works in waterways, and reinstatement measures such as reseeding and revegetation after construction works are complete. • A CEMP will be developed for the Project which will incorporate an Erosion and Sediment Control Plan and detail methods for minimising sediment laden runoff in accordance with the International Erosion Control Association's (IECA) Best Practice Erosion and Sediment (BPES) guidelines (IECA, 2008). • Water will be used for dust suppression in order to minimise airborne contaminants.
Surface Water Quality - Trenching	• Trenching will be avoided where possible in favour of boring techniques for waterway crossings, to be considered further as the transmission design develops. • Watercourses only to be traversed by trenching if the bed is dry. • Work is not to be undertaken in wet weather. • Vehicle access to the riverbed is to be confined to the easement. • Trenching of a watercourse bank is to start at the top of the slope and work downwards. • Temporary bunding, silt fencing, and sediment dam installation are to be constructed if required. • Watercourse walls are to be re-established to a stable slope consistent with the 'natural' slope. Shaping should remove irregularities that would interfere with flows. • Where the watercourse has a surface layer of coarse material (rocks, pebbles, gravel) care should be taken to restore this surface layer. • Rock armouring of the bed and base of wall is to be undertaken.

Environment Aspect	Recommended Mitigation Measures
Surface Water Quality – Spills, Leaks and Litter	• Industry best practice CEMP to be implemented which includes a Waste Management Plan that addresses the storage and stockpiling of raw materials, transport of materials to site, and disposal of materials. • Appropriate storage and bunding of hazardous goods and fuels to be in accordance with best practice and safety sheets as detailed in a CEMP. • Location of site sheds/storage areas and construction vehicle parking to be identified in CEMP away from sensitive areas, including a buffer distance from waterways. • Spill Management Protocol to be implemented if any spills occur in the Project Area.
Groundwater	• Groundwater table is not intercepted during construction. • A dewatering procedure is prepared and incorporated into the CEMP in the event that ephemeral or temporary groundwater is encountered during construction works. • Industry best practice CEMP to be implemented which includes a Waste Management Plan that addresses the storage and stockpiling of raw materials, transport of materials to site, and disposal of materials. • Appropriate storage and bunding of hazardous goods and fuels to be in accordance with best practice and safety sheets as detailed in a CEMP. • Spill Management Protocol to be implemented if any spills occur in the Project Area.
Surface Water Quality	• Industry best practice CEMP to be implemented that includes a Waste Management Plan that addresses the storage and stockpiling of raw materials, transport of materials to site, and disposal of materials. • Location of site shed/storage areas and vehicle parking to be identified in CEMP away from sensitive areas including a buffer distance from waterways. • Spill Management Protocol to be implemented if any spills occur in the Project Area.
Surface Water Quality	• Operation phase mitigation measures will be guided by an Operational Management Plan developed for the Project, which will detail methods for minimising sediment loss from the Study Area in accordance with best practice guidelines. • Stormwater runoff from the Project Area during the operational phase will be discharged diffusely across the Study Area via vegetated surfaces wherever practicable and will collect and direct stormwater to nearby drainage systems or watercourses.
Surface Water Geomorphology	• Project Area drainage works will aim to minimise potential impacts on the existing overland flow paths and stormwater will be discharged diffusely across the Study Area via vegetated surfaces wherever practical. Project Area drainage works will aim to minimise potential impacts on the existing overland flow paths. • Although peak flows of stormwater runoff from the Project are expected to increase slightly post-development at locations where surfaces are made impervious or less pervious, these increases are not expected to impact the downstream environment. This is because only a very small proportion of the catchment will be subject to development (largely only substation and transmission line base areas) and this runoff is expected to form a very small percentage of peak flow in each receiving watercourse. • Additional specific mitigation measures to control stormwater discharge from the Study Area are not considered necessary given the small volume discharged in the context of each receiving catchment. The proposed mitigation measures are considered to reduce any impacts to stream water quality and geomorphology.

5.0 Conclusions and Recommendations

This Preliminary Hydrology Constraints Assessment has reviewed information and data to understand the potential impacts of the Project on water resources within the Project Area. With respect to potential constraints on the proposed development, the most significant issues relate to flood risk and waterway riparian corridors.

A risk assessment of potential impacts to water resources during construction, operation and decommissioning phases of the Project identified impacts that may occur during construction of the Project (namely if trenching through waterways is required for underground cabling). These impacts are associated with surface water quality risks, mainly at the intersection of the construction works with watercourses and a general risk of erosion as a result of disturbed or exposed soils. Only a limited distance of underground cabling is proposed between the shore landing of the subsea cables and the substation near Lake Denison (<5 km). Where possible, boring techniques will be considered which would reduce if not eliminate the surface water risks identified here from trenching techniques. Trenching is therefore included as a conservative and worst-case risk of the project to the receiving environment.

The development of a preliminary flood model has enabled the mapping of estimated 1% AEP flood inundation extents across the Project area. The most significant site flooding is typically limited to along the mainstream alignments of Bennetts Creek, Traralgon Creek, Blind Joe Creek, Carr Creek, Creek, Merriman Creek and Monkey Creek.

With respect to the limited scope of this preliminary assessment, it is recommended that the following is undertaken in subsequent project phases to complete the surface water and hydrology assessment for proposed development:

- The flood modelling is updated and refined as described in **Section 2.5.3** in subsequent project phases and LiDAR data is obtained for the Study Area.
- The assessment is refined and updated when further detail is confirmed regarding the the construction methodology (e.g., underground cable construction) and locations of infrastructure (i.e. substation, overhead transmission line, access tracks, etc.).
- The West Gippsland Catchment Management Authorities (CMA) are consulted with respect to water usage approval.

6.0 References

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