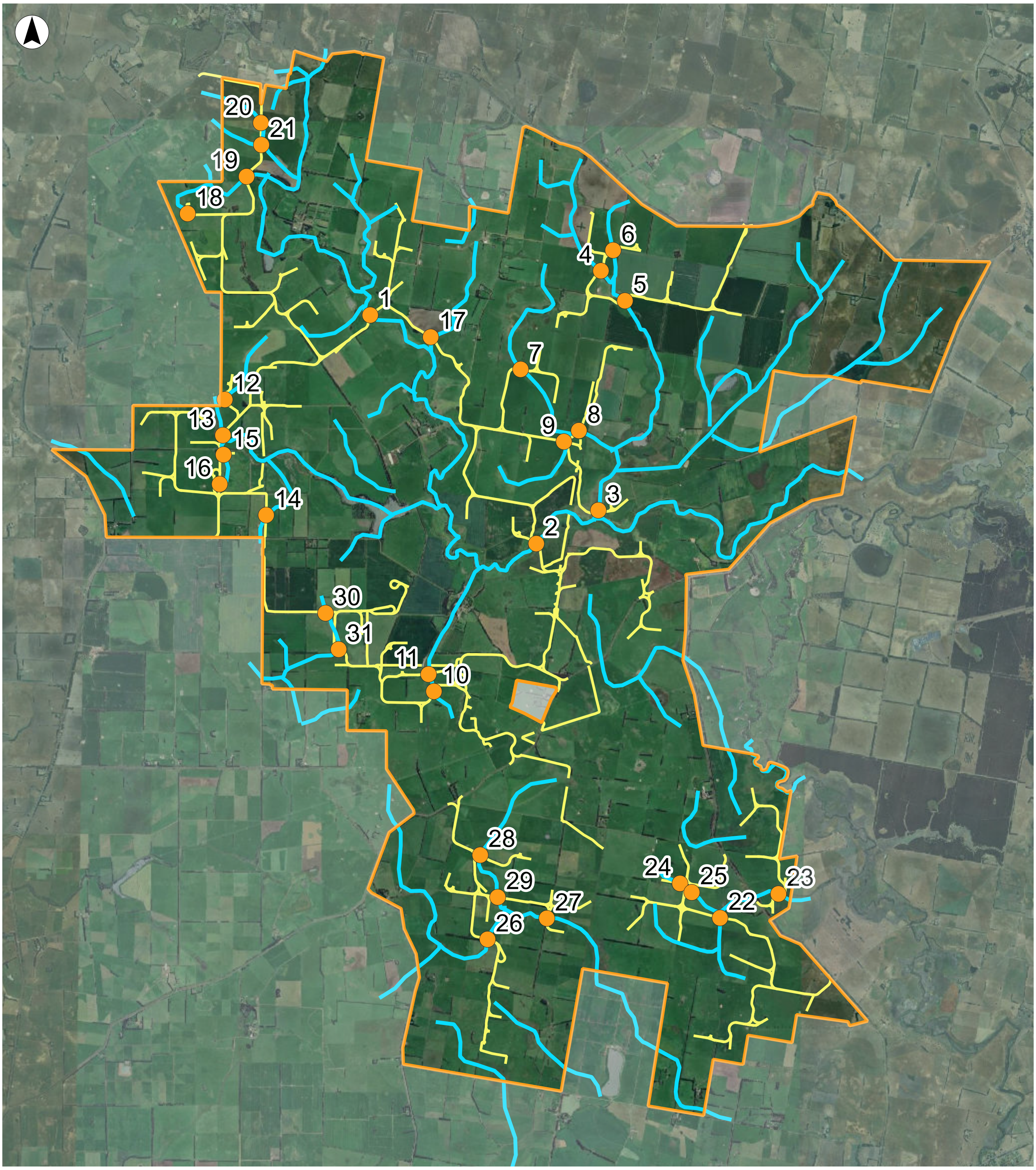


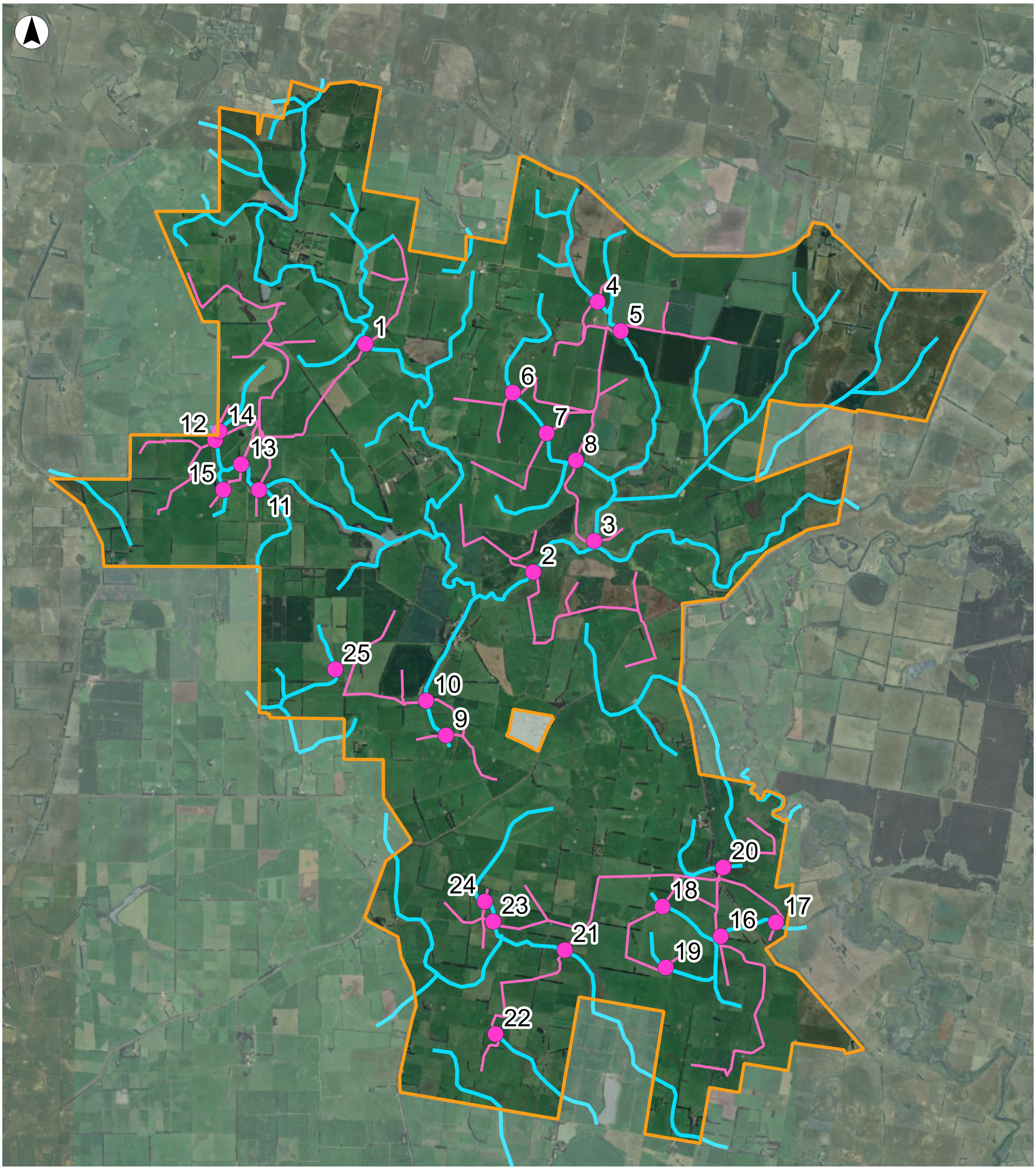
Legend

- Site Boundary
- Designated waterways
- Access tracks
- Designated waterway crossings

Scale
0 1 2 3 4 km

Data: State of Victoria (DECCA/Land Use Victoria), Commonwealth of Australia, Wind Prospect, and specialist studies/reports. Data is indicative only; accuracy and completeness are not guaranteed.
© State of Victoria and other data providers

Figure 12.16 Access track crossings of designated waterways



Legend

- Site Boundary
- Underground cables
- Designated waterways
- Designated waterway cable crossing

Scale
0 1 2 3 4 km

Data: State of Victoria (DECCA/Land Use Victoria), Commonwealth of Australia, Wind Prospect, and specialist studies/reports. Data is indicative only; accuracy and completeness are not guaranteed.

Figure 12.17 Cable crossings of designated waterways

Avoidance of environmentally sensitive locations

Wetlands

The DEECA Victorian Wetland Inventory was used as the primary data source for wetland mapping. A 100-metre buffer was placed around all mapped wetlands to exclude all project infrastructure, with the exception of access track and cable crossings. This area was selected as a means of:

- avoiding physical disturbance to wetlands and their fringes
- limiting surface water runoff, and entrained sediment loads reaching these ephemeral wetlands from construction works zones
- reducing disturbance to fauna from construction activities (for example noise, movement and light from construction)
- limiting the potential for birds and bat collisions within turbines while foraging in these ephemeral wetlands.

Turbine-free buffers were also applied for Brolga breeding wetlands, which comprised of the Brolga breeding home range, an additional disturbance buffer of 300-metres and a turbine blade length buffer of 95-metres. A detailed explanation of the buffering methodology and rationale can be found in Chapter 10 – ***Brolga***. While designed to avoid potential impacts to Brolga, these buffers also further reduce potential impacts to these ephemeral wetland areas.

Watercourses and riparian zones

Watercourses and riparian zones are known to be important habitats for biodiversity, both aquatic and terrestrial. Watercourses and drains were defined using the VicMap Hydro data, which contains line features delineating hydrological features including channels, rivers and streams.

Except for required watercourse crossings for access tracks and cable crossings, watercourses were buffered by 100-metres to:

- prevent unnecessary disturbance to the watercourses or their banks
- limit potential downstream effects from construction activities such as sedimentation of waterways.

Except for required watercourse crossings, ephemeral drainages were buffered by 30-metres to:

- limit physical disturbance to the drainages
- limit surface water runoff, and entrained sediment loads reaching these ephemeral drainages from construction works zones.

12.7.3 Environmental management measures

To further minimise potential impacts to surface water features, management measures will be implemented for the construction, operation and decommissioning of the project. These management controls are outlined in Table 12.11.

Table 12.11 Surface water management control measures

Surface water impact	Project phase	Management measures	Number
Alternation of existing drainage lines and flow paths	Construction	**Detailed drainage design** 1. Prior to the commencement of construction, develop the detailed drainage design in consultation with Glenelg Hopkins Catchment Management Authority to minimise impacts to surface waters and supported ecosystems, considering best practice design guidelines. 2. Design measures will include, but not be limited to: a. permanent surface structures designed to maintain existing overland flow paths and not cause increased upstream flood levels b. culverts installed parallel to the alignment of the banks of the waterway c. the use of a reduced-width construction right of way at watercourse crossings and aim to avoid any standing water d. micro-siting crossings of Mustons Creek to avoid deeper pools where practicable to prevent potential effects on Growling Grass Frog e. integrating culverts into access track design to allow for the diversion of flow paths below the roads.	SW01
	Construction	**Works on a Waterway licence** 1. Works within a designated watercourse requiring a Works on a Waterway licence from Glenelg Hopkins Catchment Management Authority. Works would be undertaken in accordance with the requirements of the Catchment Management Authority licence.	SW02

Surface water impact	Project phase	Management measures	Number
	Construction	**Construction Environmental Management Plan – Creek crossings** 1. Where essential wind farm infrastructure (e.g., access tracks and electrical cables) crosses a creek, measures for avoiding and minimising impacts will be documented in the Construction Environmental Management Plan (EMM01) prior to the commencement of construction, including: a. preferentially scheduling works during drier months of the year and lowest flow of the waterway where watercourse trenching is required b. Avoiding undertaking of works when high rainfall events are expected c. Maintaining adequate flow rates and water levels in waterway to be crossed (as determined in consultation with the relevant authorities) to minimise impacts on aquatic ecosystem and environmental values d. Restoration of temporarily disturbed waterways and vegetation (removing any obstructions to waterway flow) as soon as practicable following the open cut trenching works to at least its pre-construction condition e. Design measures to minimise future erosion in areas where trenching occurred (e.g., use of riprap made of stones to stabilise the waterway, geofabric to prevent erosion and scour until establishment of vegetation).	SW03

Surface water impact	Project phase	Management measures	Number
Erosion and sedimentation (surface water runoff, destabilisation of waterway banks)	Construction	**Sediment, Erosion and Water Quality Management** 1. Prior to the commencement of construction, develop and implement a Sediment, Erosion and Water Quality Management Plan as a sub-plan to the Construction Environmental Management Plan (EMM01) in consultation with Glenelg Hopkins Catchment Management Authority in accordance with EPA Publication 1834.2: Civil construction, building and demolition guide. 2. Erosion and sediment control measures within the construction site will adopt a treatment train approach and include: a. monitoring surface water quality upstream and downstream of the works area during detailed planning, construction and operation phases to confirm control effectiveness and protection of environmental values b. phasing ground-disturbing works to periods of lower rainfall, where possible c. minimising vegetation clearance, particularly along drainage lines, waterways and steep slopes d. reinstating vegetation in accordance EMM LS02 e. maintaining watercourse and wetland buffers (except at watercourse crossings) and implementing management controls for works near waterways in accordance with EPA Publication 1894: Managing soil disturbance f. installing primary, secondary and tertiary sediment control measures based on site-specific hazards, consistent with Publication 1893: Erosion, sediment and dust: treatment train g. designating areas for stockpiles prior to construction, ensuring stockpiles and batters have slopes no greater than 2:1 (horizontal/vertical) h. implementing stockpile management controls consistent with EPA Publication 1895: Managing stockpiles and establishing vegetation or grass on stockpiles to be left for longer periods i. stabilising exposed soils and applying soil disturbance controls in accordance with EPA Publication 1894: Managing soil disturbance j. installing sediment fencing to protect riparian zones where works occur within 30 metres of waterways k. installing sediment treatment controls (including around stockpiles) to adequately capture sediment loads l. restricting vehicle movements to designated roads and access areas m. directing stormwater through constructed lined channels or sediment basins to reduce runoff velocity n. developing contingency measures for works within waterways or floodplains, including controls to be implemented when storm events are forecast.	SW04

Surface water impact	Project phase	Management measures	Number
	Construction	**Quarry Work Plan** 1. Prior to the development of an on-site quarry, the Draft Quarry Work Plan (provided in Attachment II) will be finalised and submitted to Resources Victoria (Department of Energy, Environment and Climate Action) for approval. 2. The Quarry Work Plan will include measures to: - a. manage and monitor surface water impacts b. manage noise emissions, in accordance with a Quarry Noise Management Plan (NV02) c. control emissions of dust or other particulates d. manage the carriage and deposition of dust, silt and clay by vehicles existing the work authority area e. manage erosion from topsoil and overburden stockpiles f. manage site rehabilitation. 3. Prior to blasting, the affected areas will be pre-wet to minimise dust emissions. Blasting would occur when winds are blowing away from the nearest sensitive receptors (i.e. from the north, south or west) and are consistent enough to encourage movement of dust away from the nearest receptors, but light enough to minimise emission generation and transport of dust off-site.	EMM07
Waterway contamination (from accidental spills)	Construction Operation Decommissioning	**Storage and Handling of Hazardous Materials** 1. Develop and implement measures in accordance with EPA Publication 1698: Liquid handling and storage guidelines and EPA Publication 1700: Preventing liquid leaks and spills from entering the environment to manage potential pollutants from entering the environment. These measures will be documented in the Construction Environmental Management Plan (EMM01), Operational Environmental Management Plan (EMM09), and Decommissioning Plan (EMM10), and include: a. measures for the use, storage, transfer and disposal of hydrocarbons and chemicals b. a site-specific risk assessment and spill response procedure for hazardous materials (batteries, explosives, etc.) c. requirements for the storage of liquid fuels and chemicals, including: i. containment within bunded areas or equivalent facilities ii. being located more than 50 metres from waterways iii. placement within designated areas of the project site. d. requirements for spill response kit(s) to be located at waterway crossings, at locations where machinery/plant are operating, and refuelling and fuel/chemical storage areas during construction e. incorporation of spill containment measures into the drainage design.	EMM11

Surface water impact	Project phase	Management measures	Number
	Construction Operation Decommissioning	**Retain and manage firefighting water** 1. The battery energy storage system will be designed to include a retention basin to capture firefighting water to prevent uncontrolled release of water to the environment. 2. Contaminated water captured within the retention basin will be disposed at a lawful place in accordance with the *Environment Protection Act 2017*	EMM08
Disposal of collected water	Construction	**Construction Environmental Management Plan - Discharge of collected water** 1. To minimise the risk of surface water contamination, water collected during quarry and foundation excavation dewatering activities will only be discharged to the environment in accordance with the Environment Protection Regulations 2021 and the following management measures, which would be documented in the Construction Environmental Management Plan (EMM01): a. assessing the quality of groundwater to be disposed (in accordance with GW04) b. assessing the baseline quality of waterways that have the potential to receive collected water to determine the potential impact (in accordance with SW04) c. conducting a risk assessment in accordance with EPA Publication 1287: Guidance for environmental and human health risk assessment of wastewater discharges to surface waters, identifying management controls to prevent impacts to the environmental values of the waterway so far as reasonably practicable d. applying for EPA permission, if required under the Environment Protection Regulations 2021 e. implementing sediment control devices, where required.	SW05

12.7.4 Residual impacts

Following the development of design measures and management controls, an assessment of residual effects and impacts was completed. This assessment considers the changes to the surface water environment as a result of the construction, operation and decommissioning of the project. The assessment rates the significance of these effects based on the criteria outlined in Table 12.5

The greatest likelihood of impacts to the waterways and wetlands is from construction activities associated with watercourse crossings, and to a lesser extent, from general construction activities. These activities have the potential to result in physical streambed disturbance and water quality impacts from stormwater runoff containing sediments entering waterways.

The following section assesses the likely residual effects to key surface water features, assuming design measures (outlined in Section 12.7.2) and management controls (outlined in Section 12.7.3) are implemented.

Hopkins River

Runoff entering Hopkins River

Direct impacts to Hopkins River due to physical disturbance to the waterway is not expected, as the river forms a small portion of the eastern project site boundary. However, indirect impacts to Hopkins River may occur due to the fact that most of the project site is located within the Hopkins River catchment, and its tributaries exist within the project site (including Mustons Creek). This may create indirect impacts associated with changes to water quality.

During construction, there may be a temporary increase in sedimentation (and to a lesser extent other contaminants), which may reduce water quality and cause impacts for other users of a watercourse or for aquatic and semi-aquatic flora and fauna (assessed in Chapter 8 – ***Biodiversity and habitat***).

Sedimentation is most likely to occur from runoff from stockpiles or cleared areas including hardstand areas, access tracks and cable trenches. This would most likely occur during periods of intense rainfall. With the application of watercourse buffers, most project infrastructure is located away from tributary drainage channels, except for a small number of watercourse crossings for access tracks and cables. To reduce any impacts, sediment control measures would be applied and watercourse crossings during high flow periods would be avoided.

Impacts to Hopkins River associated with the transport of poor water quality in drainage channels was assessed to be localised and unlikely to reach Hopkins River itself, and would occur for a short duration during periods of high rainfall and of low severity/intensity. The significance of this impact was assessed to be low.

Alteration of existing drainage patterns

The construction of access tracks and hardstand areas have the potential to alter existing drainage patterns if not accounted for during design. Hydrological flood modelling was used to inform the placement of turbine locations and other infrastructure to ensure flow pathways are not altered. There are three wind turbines proposed within the Hopkins River floodplain. Two of the proposed turbine locations would be inundated by a maximum inundation of more than 300 millimetres. The effect of these on river flow behaviour is considered low during both construction and operation.

There are 12 designated waterway crossings within the Hopkins River catchment. With the implementation of recommended measures, the magnitude of potential impacts associated with altering hydrology within the Hopkins River catchment was assessed to be very low, with any impacts likely to be localised, for a short duration and of low severity. The detailed access track and culvert designs would include updated modelling to ensure hydrological connectivity is maintained and culverts are placed at appropriate locations.

Mustons Creek, Tea Tree Creek, Lyall Creek, Drysdale Creek and other designated waterways

Creek crossings

For local creeks, the key impact pathway is physical disturbance to the creek beds and associated aquatic habitats at the access track and cable crossings. To minimise impacts, these waterway crossings will be designed to maintain appropriate flow capacity of drainage lines, and to minimise the extent of disturbance and vegetation removal within the creeks. The rehabilitation of disturbed areas following completion of works will be undertaken to the satisfaction of the Glenelg Hopkins Catchment Management Authority. Construction works would also be timed to avoid periods of high flow periods, where possible.

If a creek is flowing at the time of construction, water would be diverted through a temporary upstream coffer dam with piped flow around the construction works area. Excavation through a dry creek bed would then occur followed by installation of the culvert or cable. The creek bed would then be immediately reinstated and rehabilitated. Downstream sediment control measures, including sediment traps, would also be installed in accordance with best practice guidelines outlined in Section 12.7.3. Water pollution would be minimised by reducing land disturbance and maintaining areas of vegetation.

With the implementation of design and control measures, the potential impacts associated with physical disturbance and poor water quality runoff was assessed to be localised (mainly at crossing points), for a short duration (expected to be over several weeks) and of low severity. The significance of this impact to these creeks was assessed to be low.

Runoff entering creeks

There is potential for run-off from construction work areas (e.g., stockpiles or cleared areas) to enter creeks during construction, which may reduce water quality. This can cause impacts for other users of a watercourse or for aquatic and semi-aquatic flora and fauna (assessed in Chapter 8 – ***Biodiversity and habitat***). To limit this impact, watercourse buffers would be implemented.

Sedimentation is most likely to occur from runoff from stockpiles or cleared areas including hardstand areas, access tracks and cable trenches. This would most likely occur during periods of intense rainfall. Through the implementation of watercourse buffers, most project infrastructure are located away from tributary drainage channels, except for watercourse crossings for access tracks and cables.

To reduce impacts, sediment control measures would be applied and watercourse crossings would be avoided during high flow periods. As a result, the impacts associated with construction runoff to creeks and the transport of poor quality water in drainage channels was assessed to be localised and unlikely to reach the creeks themselves, and would occur for a short duration during periods of high rainfall, and of low severity/ intensity. Considering the degraded condition of the drainage channels within the investigation area, the significance of this impact was assessed to be low.

Alteration of existing drainage patterns

If not accounted for during design, potential impacts to the creek would result from altered drainage patterns, creating modified hydrological patterns. With the implementation of management controls outlined in Section 12.7.3, potential impacts associated with altering the hydrology of the creeks was assessed to be localised around wind turbines and along access tracks, and unlikely to alter the overall dynamics of the catchment.

During the construction and operation phases, hydrological modification is not predicted to impact the physical form of any creek. With measures in place, the significance of these impacts was assessed to be low during construction, reducing to very low during operations.

Impacts of on-site quarry

Impacts to creeks and local catchments during project construction and operation related to the on-site quarry are related to the alteration of existing drainage patterns (due to quarry bunding) and from runoff entering creeks, as discussed above.

Merri River

Runoff entering Merri River

As the Merri River is located more than 20 kilometres south of the project site, physical disturbance is not expected to cause direct impact, however its tributaries (Lyall Creek and Drysdale Creek) originate within the project site and would require access track and cable crossings. Changes to water quality or hydrological impacts to these tributaries may indirectly impact the Merri River.

During construction a temporary increase in suspended sediments (and to a lesser extent other contaminants) may occur. This has the potential to reduce water quality. This is most likely to occur immediately downstream of stockpiles or cleared areas during periods of intense rainfall. To limit this potential impact, watercourse buffers will be implemented. Other measures to limit potential impacts to this waterway include the installation of cut-off or intercept drains to redirect stormwater from cleared areas, installing erosion and sediment control measures prior to construction in accordance with best practice standards, and rehabilitating disturbed areas. With these measures in place, changes to water quality in the Merri River are not predicted. Any downstream transport of sediments would likely settle in grassed swales within agricultural areas before reaching the main Merri River. Therefore, any potential impacts are predicted to be negligible.

Alteration of existing drainage patterns

During the project design, hydrological flood modelling was used to inform the placement of wind turbine locations and other infrastructure. Similarly, modelling of flood and flow velocity has been considered for the sizing of culverts to ensure flow pathways are not affected by the project. As such, permanent changes to hydrological drainage patterns within the Merri River catchment are not predicted. During construction, earthworks and stockpiles also have the potential to impede natural drainage. Measures that would be implemented include avoiding the creation of continuous rows of stockpiled materials and providing gaps to allow flow, and minimising the length that stockpiles are in place to minimise this hazard.

Considering the nature and scale of works required to construct the project, hydrological changes are not predicted to impact the Merri River, with any changes highly localised and temporary around ephemeral drainage channels within the project site. The significance of these changes was assessed to be very low.

Ephemeral wetlands

Potential impacts to ephemeral wetlands from the construction and operation of the project include the disruption of hydrology and flows reaching these areas, influencing the inundation of these areas, and runoff of poor water quality (e.g., suspended sediments), altering water quality of these ephemeral systems.

To avoid and minimise potential impacts to ephemeral wetlands, a 100-metre buffer was placed around all DEECA mapped wetlands to exclude all project infrastructure as a means of avoiding physical disturbance to wetlands and their fringes and to limit the likelihood of poor-quality surface water runoff from construction works zones reaching these areas. In addition, turbine-free buffers were proposed for Brolga breeding wetlands. These buffers comprised the Brolga breeding home range, an additional disturbance buffer of 300-metres and a turbine blade length buffer of 95 metres. A detailed justification for this buffer is described in Chapter 10 – ***Brolga***. While designed to avoid potential impacts to Brolga, these buffers also further reduce potential impacts to these ephemeral wetland areas.

During the project design, hydrological flood modelling was used to inform the placement of project infrastructure, including turbines. Similarly, modelling of flood and flow velocity has been considered for the sizing of culverts to ensure flow pathways are not affected by the project. No permanent changes to the hydrology and flow of the Hopkins River or local creek catchments within the project site, including ephemeral wetlands, is predicted. With the implementation of management controls outlined in Section 12.7.3, the potential impacts associated with poor water quality runoff was assessed to be localised, for a short duration and of low severity. The significance of this impact was assessed to be low.

12.7.5 Impact assessment summary

A summary of the surface water impact assessment is shown in Table 12.12, with the full assessment presented in Appendix B – ***Surface Water and Groundwater Impact Assessment.***

Table 12.12 Surface water impact assessment summary

Watercourse	Impact pathway	Project phase	Mitigation and management	Likely impact (considering magnitude, extent and duration)	Significance rating and justification
Hopkins River and associated tributaries (other than Mustons Creek)	Reduced water quality (e.g., turbidity, dissolved oxygen) due to culvert crossings of tributary drainages, and sedimentation due to stockpiles and earthworks for infrastructure, access tracks and hardstands	Construction	• Hydrological buffer for all infrastructure excluding crossings [EMM SW04] • Placement of flow diversion banks upstream of works areas [EMM SW04] • Bridge/culvert design based on hydrological modelling [EMM SW01] • Crossing structures would conform to relevant local Council, Glenelg Hopkins Catchment Management Authority and DEECA guidance [EMM SW01] • Implement a Sediment, Erosion and Water Quality Management Plan, in consultation with the Glenelg Management Plan, in consultation with the Glenelg Hopkins Catchment Management Authority, and in accordance with EPA Victoria guidance [EMM SW04] • Management of water collected during dewatering of excavations, including installation of sediment control devices where required [EMM SW05].	Impacts would be localised, occur for a short duration, and be of low severity in the context of the existing conditions. Temporary increase in sedimentation (and to a lesser extent other contaminants) from runoff from stockpiles or cleared areas. This would most likely occur during periods of intense rainfall which has the potential to reduce water quality.	Low Considering the moderate physical and ecological condition of this waterway within the project site and the very poor to moderate existing water quality, the significance of this impact was assessed to be low.
	Hydrological changes to surface water flows due to project infrastructure with the introduction of impermeable surfaces, and waterway crossings for access tracks and linear infrastructure.	Construction, operation	• Detailed design incorporating hydrological modelling [EMM SW01] • Modelling of flood and flow velocity to determine the size of the culverts [EMM SW01]	The magnitude of impacts is predicted to be localised, for a short duration and of low severity.	Low The magnitude of any hydrological alterations outside turbine free buffers was assessed to be of very low significance.

Watercourse	Impact pathway	Project phase	Mitigation and management	Likely impact (considering magnitude, extent and duration)	Significance rating and justification
Mustons Creek Tea Tree Creek Lyall Creek Drysdale Creek Other creeks / designated waterways	Reduced water quality (e.g., turbidity, dissolved oxygen) due to culvert crossings of tributary drainages, and sedimentation due to stockpiles and earthworks for infrastructure, tracks and hardstands.	Construction	• Hydrological buffer for all infrastructure excluding crossings [EMM SW04] • Crossing design based on hydrological modelling [EMM SW01] • Minimisation of crossing construction width [EMM SW01] • Placement of flow diversion banks upstream of works areas [EMM SW04] • Implement a Sediment, Erosion and Water Quality Management Plan, in consultation with the Glenelg Hopkins Catchment Management Authority and EPA Victoria [EMM SW04].	Localised physical disturbances due to watercourse crossings and resulting sedimentation and temporary water quality changes. Temporary increase in sedimentation (and to a lesser extent other contaminants), from runoff from stockpiles or cleared areas. This would most likely occur during periods of intense rainfall which has the potential to reduce water quality.	Low Sensitive due to several crossings but with manageable construction of established impact mitigation techniques.
	Hydrological changes to surface water flows due to project infrastructure with the introduction of impermeable surfaces, and waterway crossings for access tracks and linear infrastructure.	Construction, operation	• Hydrological flood modelling was used to inform the placement of turbine locations [EMM SW01] • Modelling of flood and flow velocity to determine the size of the culverts [EMM SW01].	Temporary modification of hydrological drainage (for example during watercourse crossings). No permanent impact the physical form (via hydrological modification) of these creeks predicted.	Low Impacts assessed to be low during construction, reducing to very low during operations.

Watercourse	Impact pathway	Project phase	Mitigation and management	Likely impact (considering magnitude, extent and duration)	Significance rating and justification
	Quarry development influencing downstream water quality and hydrology	Construction, operation and post closure	• 'Zero discharge' site [EMM SW03] • Surface water management using swale drains, bunding, sediment traps and sumps [EMM11] • Water retention basins to capture water run-off [EMM SW04] • Approved Quarry Work Plan [EMM07]	On-site quarry is proposed within the Mustons Creek catchment. Quarry is not affected by the 1% AEP flood event. With the implementationOn-site quarry is proposed within the Mustons Creek catchment. Quarry is not affected by the 1% AEP flood event. With the implementation of measures into the design of the quarry, no impacts from quarry construction and operation are predicted to receiving waters within the Mustons Creek catchment.	Very low Impacts to surface water are not anticipated
	Battery energy storage system development influencing downstream water quality and hydrology	Construction, operation and post closure	• 'Zero discharge' site • Surface water management using swale drains, bunding, sediment traps and sumps (SS04) • Water retention basins to capture water run-off [EMM SW04]	Battery energy storage system is located within the Mustons Creek catchment. Battery energy storage system is affected by the 1% AEP flood event, but flows can be diverted. With the implementation of measures into the design of the battery energy storage system, no impacts from its construction and operation are predicted to receiving waters within the Mustons Creek catchment.	Very low Impacts to surface water are not anticipated

Watercourse	Impact pathway	Project phase	Mitigation and management	Likely impact (considering magnitude, extent and duration)	Significance rating and justification
	Accidental spill of firefighting contaminated water reduces water quality	Construction, operation and post closure	• Retention basin to prevent uncontrolled release of firefighting water [EMM08]	Uncontrolled release of fire water at the Battery Energy Storage System has the potential to cause contamination of receiving surface water system. Uncontrolled releases are considered unlikely with the implementation of best-practice measures.	**Low** Impacts to surface water not anticipated
Merri River	No direct impact. Potential indirect impacts to water quality and hydrological changes during project construction and operation.	Construction, operation	• Watercourse buffers from works areas [EMM SW04] • Placement of flow diversion banks upstream of works areas [EMM SW04] • Management of water collected during dewatering of excavations, including installation of sediment control devices where required [EMM SW05].	Localised change to sedimentation, change to flood levels and/or change to flow regime up or downstream of the modification location.	**Very low** Any downstream transport of sediments would likely settle in grassed drainage channels within agricultural areas before reaching the Merri River approximately 20 kilometres downstream.
			• Hydrological flood modelling was used to inform the placement of turbine locations [EMM SW01] • Design and management of stockpiles [EMM SW04]	Permanent changes to hydrological drainage patterns within the Merri River catchment are not predicted. Any changes highly localised and temporary around ephemeral drainage channels within the project site.	**Very low** Any hydrological changes would be limited to tributary drainage lines.

Watercourse	Impact pathway	Project phase	Mitigation and management	Likely impact (considering magnitude, extent and duration)	Significance rating and justification
Ephemeral wetlands	Disruption of hydrology and flows	Construction	• Turbine free buffer around selected Brolga breeding wetlands [EMM SW04] • 100-metre buffer around all mapped wetlands to exclude all project infrastructure, with the exception of access tracks and cable crossings [EMM SW04] • Detailed design incorporating hydrological modelling [EMM SW01].	Permanent changes to hydrological drainage patterns are not predicted. Temporary modification of flows around project infrastructure, particularly during construction, but these would be unlikely to affect the inflows to these wetlands overall.	**Negligible** Changes to hydrological drainage patterns are not predicted.
	Potential impacts to water quality and hydrological changes during project construction and operation.	Construction, operation	• Implement a Sediment, Erosion and Water Quality Management Plan, in consultation with the Glenelg Hopkins Catchment Management Authority and EPA Victoria [EMM SW04]. • Management of water collected during dewatering of excavations, including installation of sediment control devices where required [EMM SW05] • Placement of flow diversion banks upstream of works areas [EMM SW04].	Any changes highly localised and temporary around ephemeral drainage channels within the project site.	**Negligible** Impacts to surface water are not anticipated.
All	Waterway contamination from accidental spills of hazardous waste, resulting in impacts to water quality.	Construction, operation	• Spills management and response [EMM11].	With control measures in place any spills are predicted to be localised and could be readily remediated.	**Low** Uncontrolled releases are unlikely using best-practice construction and operational management measures.

Table 12.13 Surface water cumulative impact assessment summary

Aquifer	Environmental value	Impact pathway	Combined surface water and groundwater residual impact significance
Quaternary Aquifer (QA) Water Table Aquifer (Newer Volcanic Group Basalts Aquifer (UTB) / Whalers Bluff Formation / Hanson Plain Sand (UTAM))	GDEs (including potential unmapped springs), stygofauna and groundwater bore users	Reduced groundwater recharge in locations impacted by alterations of existing drainage patterns through diversion of flow, caused by the project components	Low
	Stygofauna	Reduced groundwater recharge in locations impacted by alterations of existing drainage patterns through diversion of flow, caused by the project components	Low
	Groundwater bore users	Reduced groundwater recharge in locations impacted by alterations of existing drainage patterns through diversion of flow, caused by the project components	Low
Water Table Aquifer (Newer Volcanic Group Basalts Aquifer (UTB) / Whalers Bluff Formation / Hanson Plain Sand (UTAM))	GDEs (including potential unmapped springs), stygofauna and groundwater bore users	Groundwater contamination caused by infiltration of contaminated surface water, caused during construction	Low
Hopkins River and tributaries (other than Mustons Creek)	Water dependent ecosystems and species	Reduced waterway flows caused by groundwater extraction during construction	Low
Mustons, Tea Tree, Lyall, Drysdale and other Creeks/ designated waterways	Agriculture and irrigation (including stock watering).	Reduced waterway flows caused by groundwater extraction during construction	Low
Ephemeral wetlands	Water dependent ecosystems and species	Reduced waterway flows caused by groundwater extraction during construction	Low
Hopkins River and tributaries (other than Mustons Creek)	Water dependent ecosystems and species	Waterway contamination caused by contaminated groundwater entering waterways through e.g. springs	Low
Mustons, Tea Tree, Lyall, Drysdale and other Creeks/ designated waterways	Agriculture and irrigation (including stock watering).	Waterway contamination caused by contaminated groundwater entering waterways through e.g. springs	Low
Ephemeral wetlands	Water dependent ecosystems and species	Waterway contamination caused by contaminated groundwater entering waterways through e.g. springs and baseflow	Low

12.8 Conclusions

Construction and operation of the project has the potential to impact surface water systems and supporting environmental values through distinct impact pathways, which may result in physical disturbance of watercourses, reduced water quality and altered flows.

Flood behaviour within the project catchments was used to inform the siting of infrastructure to avoid areas of potential flooding. Other design mitigations include designing the project with buffers around all mapped wetlands, and minimisation of watercourse crossings through siting of access tracks. Detailed designs would be completed in accordance with best practice guidelines and in consultation with relevant authorities. Residual effects of watercourse crossings and to a lesser extent reduced water quality from construction works were assessed to be localised and temporary resulting in impacts ranging from very low to low. Residual effects to the hydrology and water quality of ephemeral wetland were assessed as negligible.