Chapter 27

Cumulative impacts

January 2020

27 Cumulative impacts

This chapter provides an overview of the potential cumulative impacts associated with the construction and operation of the project and identifies mitigation measures to minimise these impacts.

The Secretary's environmental assessment requirements as they relate to cumulative impacts and where in the environmental impact statement these have been addressed in Table 27-1.

The proposed environmental management measures relevant to cumulative impacts are discussed in Section 27.5.

Table 27-1 Secretary's environmental assessment requirements checklist – Cumulative impacts

Secretary's requirement	Where addressed in EIS
Environmental Impact Statement	
1. The EIS must include, but not necessarily be limited to, the following: o. an assessment of the cumulative impacts of the project taking into account other projects that have been approved but where construction has not commenced, projects that have commenced q. a chapter that synthesises the environmental impact assessment and provides: - the reasons justifying carrying out the project as proposed, having regard to the biophysical, economic and social considerations, including ecologically sustainable development and cumulative impacts; and	Projects that have been assessed and may have potential cumulative impacts are identified in **Section 27.2**. Potential cumulative impacts are described in **Section 27.3** and **Section 27.4**.
Assessment of key issues	
2. For each key issue the Proponent must: c. identify, describe and quantify (if possible) the impacts associated with the issue, including the likelihood and consequence of the impact (comprehensive risk assessment), and the cumulative impacts of: a) concurrent project construction activities; and b) proposed and approved projects (where information is available at the time of writing)	Potential cumulative impacts during construction and operation for the key issues discussed in **Chapters 8** to **26** are described in **Section 27.3** and **Section 27.4**.

Secretary's requirement	Where addressed in EIS
Consultation	
4. The Proponent must assess the potential for complaint fatigue to occur during construction of the project and describe how mitigation measures, complaint handling procedures and community consultation mechanisms will mitigate complaint fatigue. The assessment must consider the cumulative impacts from the project and other major projects in the local area.	The potential for complaint fatigue to occur and proposed mitigation measures and complaint handling procedures are described in **Chapter 7** (Stakeholder and community engagement). Potential impacts of construction and complaint fatigue are described in **Section 27.3.5**.

27.1 Assessment methodology

Cumulative impacts can occur when impacts from the project interact or overlap with impacts from other projects and potentially result in a larger overall effect on the environment, businesses or local communities. Cumulative impacts may also occur when projects are constructed consecutively with construction activities occurring over extended periods of time with little to no break in between, resulting in construction fatigue for local receivers. Construction fatigue incorporates the potential for complaint fatigue, which may impact communication of community concerns during construction.

This section provides a description of how projects were initially identified for consideration of cumulative impacts with the Western Harbour Tunnel and Warringah Freeway project, the screening criteria applied to determine whether the identified projects should be assessed for cumulative impacts, and an overview of the type of assessment carried out for the relevant cumulative impacts.

The cumulative impact assessment in this environmental impact statement is based on the broad requirements set out by the Secretary's environmental assessment requirements. There are currently no NSW or Australian Government guidelines on carrying out cumulative impact assessments. The adopted methodology is shown in Figure 27-1.

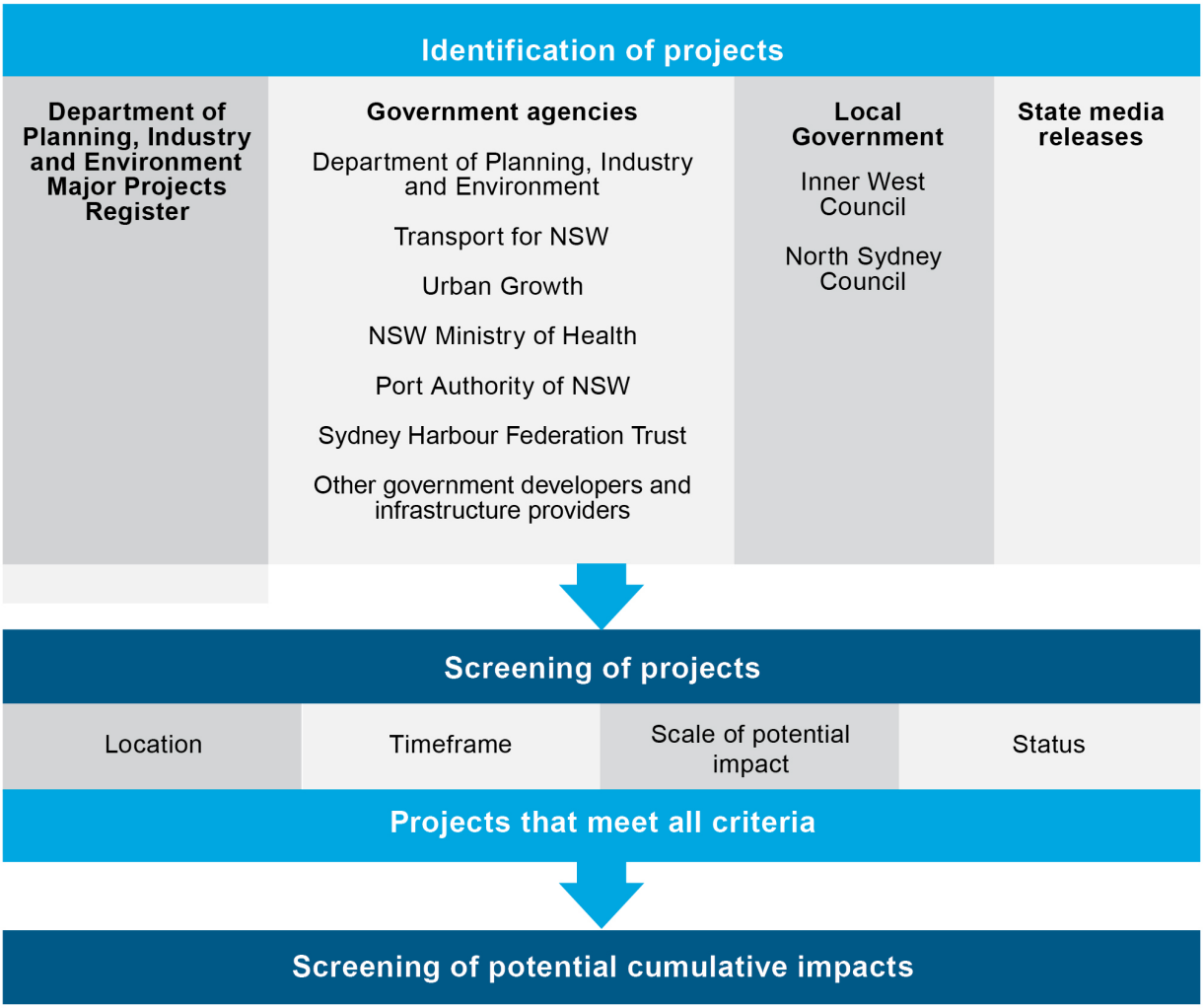

Figure 27-1 Overview of the cumulative impact assessment methodology

27.1.1 Identification of projects

An initial list of major projects for potential inclusion in the cumulative impact assessment was identified from the sources outlined in Figure 27-1.

Projects identified for inclusion in the screening assessment were those likely to meet at least one of the screening criteria described in Table 27-2. The list of projects identified can be broadly categorised as:

- **Category 1: The Western Harbour Tunnel and Beaches Link program of works**, including the Beaches Link and Gore Hill Freeway Connection project
- **Category 2: Other major transport infrastructure projects**, including related Transport for NSW projects and public transport projects
- **Category 3: Other major projects**, including urban development and other infrastructure projects.

Local strategic planning documents were also considered where they may result in future development with potential cumulative impacts with the project.

27.1.2 Screening of projects

The screening criteria shown in Table 27-2 were applied to determine whether a project or strategic plan should be included in the cumulative impact assessment. Projects and plans that satisfied all of these criteria were included and are described in Section 27.2.

Table 27-2 Screening criteria for cumulative impact assessment

Criteria	Relevance
Location A project was considered relevant where that project was within one of the following areas	Direct overlap: project footprints intersect
	In close proximity: within 500 metres of the project footprint
	In the locality: within two kilometres of the project footprint
Timeframe A project was considered relevant where that project involved one of the following timeframes	Concurrent construction programs
	Consecutive construction programs (construction fatigue considerations)
Scale of potential impact A project was considered relevant where that project involved one or more of the following impacts	Substantial temporary or permanent changes to existing traffic conditions
	Substantial temporary or permanent changes to the existing noise environment
	Impacts on numerous heritage items and/or heritage items with State, National, Commonwealth or World significance
	Substantial changes to the existing land use
	Substantial changes to the existing urban landscape
Status A project was considered relevant where that project was at one of the following stages of the statutory assessment and approval process	Approved projects (statutory approvals received), including approved projects that have not started construction, projects currently under construction, and recently completed projects
	Proposed projects (currently under statutory environmental impact assessment)
	Future strategic government projects (where commitment on construction program and methodology has been made)

27.1.3 Screening of potential cumulative impacts

The assessment of potential cumulative impacts has considered the potential for cumulative impacts at the following key locations:

- Rozelle and White Bay
- Birchgrove
- Waverton

- North Sydney and Cammeray.

Potential cumulative impacts have been considered based on likely interactions of the Western Harbour Tunnel and Warringah Freeway Upgrade project with other projects and plans listed in Table 27-3 and Table 27-4.

Where potential cumulative impacts may occur, these could relate to:

- Additional impacts due to concurrent construction periods
- Prolonged impacts due to consecutive construction periods.

The assessment of potential cumulative impacts has considered the key issues identified in Chapters 8 to 26 of this environmental impact assessment. In locations where cumulative impacts relating to a key issue has been assessed as negligible, the issue is not considered further.

The potential cumulative impacts during construction and operation are described in sections 27.1 and 27.4 respectively.

27.2 Projects assessed

Following the application of the screening criteria to identified projects, the projects included in Table 27-3 have been considered in the cumulative impact assessment. The location of these projects is shown in Figure 27-2.

Local strategic plans listed in Table 27-4 have been considered in the assessment where relevant, as they will influence development that has the potential to result in cumulative impacts with the project. The potential impacts have not been considered in detail given the uncertainty of the status and timing of associated projects, construction methodologies, and the existing coordination arrangements between Transport for NSW and Sydney Metro Authority for works in North Sydney.

Table 27-3 Projects assessed in the cumulative impact assessment

Project name, status and expected construction period	Brief project description	Relevant locations where cumulative impacts might occur[1]
Category 1: Western Harbour Tunnel and Beaches Link program of works		
Beaches Link and Gore Hill Freeway Connection project *Proposed* *2021 – 2026*	The Beaches Link and Gore Hill Freeway Connection project comprises a new tolled motorway tunnel connection from the Warringah Freeway to Balgowlah and Frenchs Forest and upgrade and integration works to connect to the Gore Hill Freeway.	• Waverton • North Sydney and Cammeray
Category 2: Transport infrastructure projects		
Sydney Metro City & Southwest (Chatswood to Sydenham) *Approved* *2017 – 2024*	The Chatswood to Sydenham component of Sydney Metro City & Southwest involves the construction and operation of a 15.5 km metro line from Chatswood, under Sydney Harbour and through Sydney's CBD out to Sydenham. Components of the project relevant to this assessment include: • Crows Nest Station • Victoria Cross Station • Blues Point temporary construction site • Barangaroo Station • White Bay truck marshalling yard.	• Rozelle and White Bay • Birchgrove • Waverton • North Sydney and Cammeray
M4-M5 Link *Approved and proposed modification pending determination* *2018 – 2023*	The M4-M5 Link project is being delivered in two stages: • M4-M5 Link tunnels – construction of the mainline tunnels between the New M4 at Haberfield and the New M5 at St Peters. This will also include stub tunnels for the Rozelle Interchange • M4-M5 Link Rozelle Interchange – construction of a mostly underground interchange at the Rozelle Rail Yards providing surface connectivity between the New M5 and M4 corridors to Victoria Road, The Crescent, City West Link, Anzac Bridge and the future Western Harbour Tunnel.	• Rozelle and White Bay

Project name, status and expected construction period	Brief project description	Relevant locations where cumulative impacts might occur[1]
Sydney Metro West *Proposed* *Construction starting 2020*	The Sydney Metro West will service the key precincts of Greater Parramatta, Sydney Olympic Park, The Bays Precinct and the Sydney CBD. The project is proposed to include: • A new Metro Station in The Bays precinct • A new metro station under an existing suburban station on the T1 Northern Line east of Sydney Olympic Park • At least one Sydney Metro West station under the Sydney CBD, delivering an easy interchange between suburban rail, new light rail and the new metro stations currently under construction.	• Rozelle and White Bay
Category 3: Other projects and strategic developments		
Wenona School New Education Building *Approved* *Construction commenced (construction overlap assumed)*	This project involves the demolition of existing structures and construction of a six-storey school building at 255-265 Miller Street, North Sydney.	• Waverton • North Sydney and Cammeray
Shore School Physical Education Centre *Approved* *Proposed completion in 2020*	This project involves the demolition of existing buildings at 4-5 Hunter Crescent and 16 William Street, North Sydney and construction works comprising an aquatic centre, new sports facilities, additional learning and staff spaces, car parking and landscaping.	• Birchgrove • Waverton • North Sydney and Cammeray
Commercial and hotel development on Berry and Walker Streets at North Sydney *Approved* *No timeframe information*	This project involves the construction of two new buildings, one for commercial and the other for hotel use. The commercial building will be positioned on Berry Street and the hotel building on Walker Street. The commercial building will be 35–40 storeys high and the hotel building will be 28–30 storeys high.	• Waverton • North Sydney and Cammeray

Project name, status and expected construction period	Brief project description	Relevant locations where cumulative impacts might occur[1]
(construction overlap assumed)		
St Aloysius' College Redevelopment *Approved* *No timeframe information (construction overlap assumed)*	This proposal is for a staged redevelopment at St Aloysius' College. Stage 1 would include a masterplan and concept approval for the three existing campuses in Kirribilli, and detailed built form approval for two campuses. Stage 2 would include detailed built form approval for the third campus, to be sought under a future development application.	• Waverton • North Sydney and Cammeray
Loreto Kirribilli Staged Redevelopment *Approved* *No timeframe information (construction overlap assumed)*	This proposal is for a staged redevelopment at Loreto Kirribilli. Works would involve the demolition, excavation and construction of various buildings and associated landscaping works on the school site at Carabella Street, Kirribilli.	• Waverton • North Sydney and Cammeray
Glebe Island concrete batching plant (Hanson Construction Materials Pty Ltd) *Proposed (2019-2020)*	This proposal is for the construction and operation of a new aggregate handling and concrete batching facility, with the capacity to produce up to one million cubic metres of concrete per annum.	• Rozelle and White Bay
Glebe Island Multi-User Facility *Approved* *No timeframe information (construction overlap assumed)*	The project is proposed to include construction and operation of a ship off-loading, storage and despatch facility for bulk construction materials such as sand, aggregates and other dry bulk construction materials. The project site is located within land owned by the Port Authority on the eastern side of Glebe Island.	• Rozelle and White Bay

Project name, status and expected construction period	Brief project description	Relevant locations where cumulative impacts might occur[1]
The new Sydney Fish Market (Stage 1 and Stage 2) *Proposed (2020-2023)*	The new Sydney Fish Market will include wholesale facilities and auction rooms, offices and commercial space, culinary education, retail premises including food and beverage premises (potentially with liquor licenses), back-of-house facilities and car and delivery vehicle parking spaces and ancillary uses. The new facility will be set within an improved public domain including the creation of a waterfront promenade with improved access to Blackwattle Bay and linking to surrounding areas and to public transport.	• Rozelle and White Bay

[1] Relevant locations where cumulative impacts might occur include locations where surface works for the Western Harbour Tunnel and Warringah Freeway Upgrade project occur within two kilometres of a Category 1, 2 or 3 project

Table 27-4 Strategic plans considered in the cumulative impact assessment

Strategic plan	Brief description	Relevant locations where cumulative impacts might occur
The Bays Precinct Urban Transformation Plan	This 20-30 year plan provides for a mix of cultural, maritime, recreational, retail and commercial uses around eight waterfront locations including White Bay Power Station, Glebe Island, White Bay, Blackwattle Bay including Sydney Fish Market, Wentworth Park, Rozelle Bay and Bays Waterways and Rozelle Rail Yards. UrbanGrowth is currently conducting studies to inform development of the Bays Markets District (Blackwattle Bay) and White Bay Power Station, which cover locations relevant to this assessment.	• Rozelle and White Bay
Waverton Peninsula Strategic Master Plan	The Waverton Peninsula Strategic Master Plan was adopted by Council in 1999. The master plan is being progressively implemented in stages as funding permits. Future proposed works include: • Coal Loader Tunnel No. 1 restoration • Coal Loader lower terrace picnic/barbeque and stage area • Coal Loader harbourlink steps.	• Waverton
Ward Street Precinct Master Plan (North Sydney)	This master plan by North Sydney Council proposes to replace the Ward Street car park at North Sydney with a major new community facility and a public plaza connected by active, pedestrian focused laneways.	• North Sydney and Cammeray
St Leonards Park Landscape Masterplan	The St Leonards Park Landscape Masterplan is designed to guide future upgrade works with recognition of the park's recreational and heritage values. The Masterplan includes restoration works for key heritage items with the park and the provision of new and improved recreational facilities, including active transport pathways, playground and sporting equipment.	• North Sydney and Cammeray

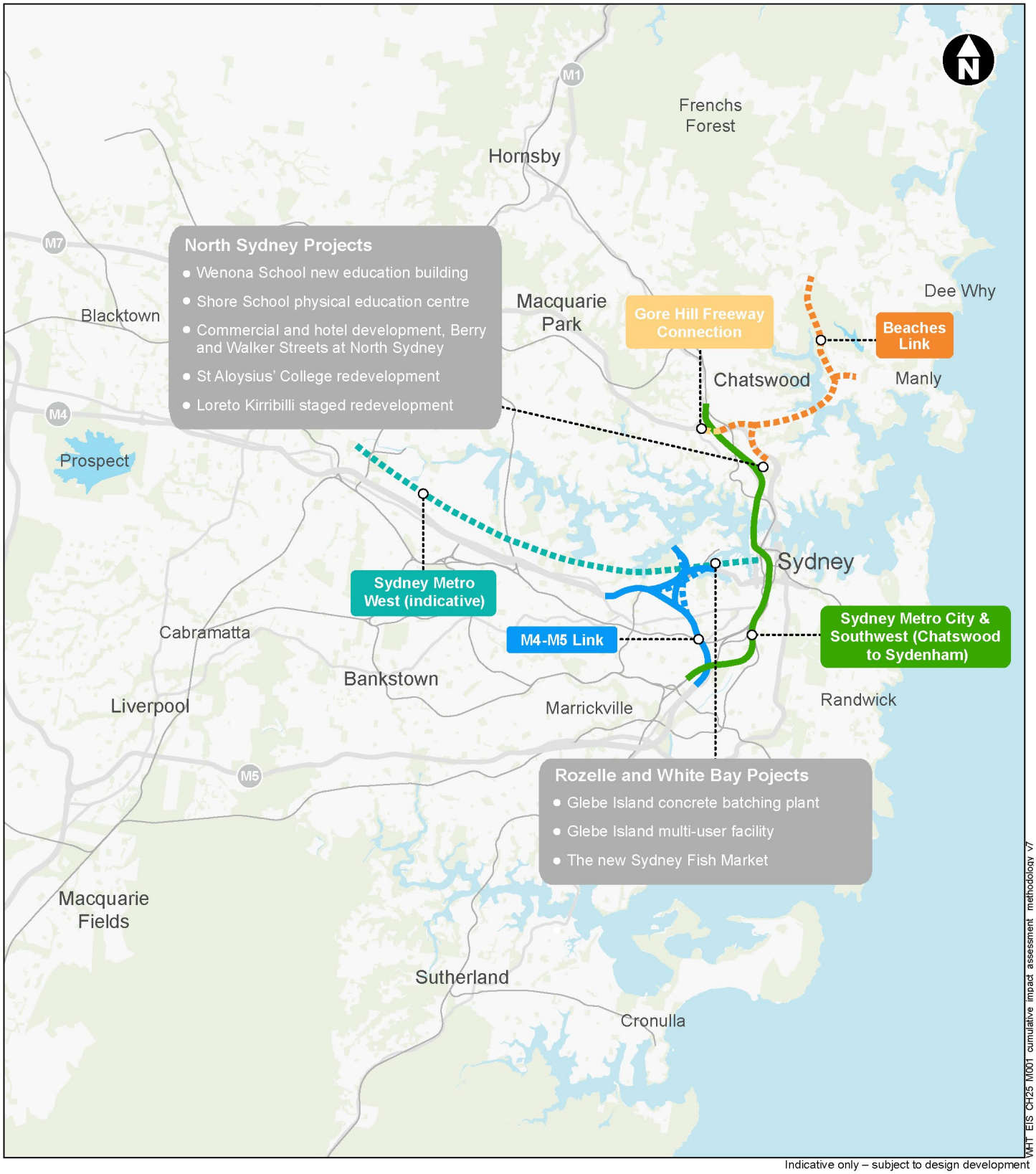

Figure 27-2 Projects assessed in the cumulative impact assessment

27.3 Assessment of potential cumulative construction impacts

The following sections describe the potential cumulative impacts during construction of the project based on likely interactions with the projects and plans listed in Table 27-3 and Table 27-4.

Impacts outlined in each section are unmitigated potential cumulative impacts. Mitigation measures are included in Section 27.5.

27.3.1 Rozelle and White Bay

Projects

Construction activities at Rozelle and White Bay would occur in close proximity to the following projects:

- M4-M5 Link
- Sydney Metro West
- Sydney Metro City & Southwest (White Bay truck marshalling yard)
- Glebe Island Concrete Batching Plant and Aggregate Handling
- Glebe Island Multi-User Facility
- The new Sydney Fish Market (Stage 1 and Stage 2).

Construction activities at Rozelle and White Bay would occur in the locality of the Sydney Metro City & Southwest project (Barangaroo Station).

Potential cumulative impacts

Potential cumulative construction impacts at Rozelle and White Bay are identified in Table 27-5.

In summary, cumulative impacts are most likely to be experienced by receivers around the Rozelle Interchange at Rozelle, Lilyfield and Annandale as a result of concurrent and consecutive construction activities for the project and the M4-M5 Link project. Potential cumulative impacts may also be experienced in the vicinity of White Bay, Blackwattle Bay and Glebe Island at Balmain as a result of concurrent and consecutive construction activities for the project, Sydney Metro City & Southwest, and major projects at Glebe Island and the upgrade of the Sydney Fish Markets.

Construction traffic generated by the projects considered has the potential to result in cumulative impacts to the road network at Rozelle and around White Bay. Roads most likely to be affected include the City West Link, The Crescent and Victoria Road at Rozelle, and James Craig Road at White Bay. There is potential for the departures from Glebe Island Berths 7 & 8 to be affected by dredge spoil barges occupying White Bay Berth 3. There would need to be cooperation between the occupants of White Bay during the arrival and departure of cargo ships, bulk carriers or cruise lines. However this level of cooperation is considered to be the status quo.

There is potential for cumulative temporary construction noise, visual amenity, and social and economic impacts may also be experienced by receivers at Rozelle, Lilyfield, Balmain and Annandale due to the number of projects under construction both concurrently and consecutively in close proximity. There is also potential for drawdown impacts to a domestic groundwater bore at Rozelle due to the number of tunnelling projects in close proximity.

The construction of projects may provide cumulative benefits for local construction workers, and to local business and services by increasing passing trade during construction periods.

The potential for construction fatigue and complaint fatigue at Rozelle and White Bay is discussed in Section 27.3.5.

Additional cumulative construction impacts at Rozelle and White Bay may be generated by future projects associated with the Bays Precinct Urban Transformation Plan (refer to Table 27-4), however construction program and specific scope of these projects have not yet been released.

Cumulative impacts resulting from the construction of the projects considered are expected to be negligible for the following issues:

- Air quality
- Non-Aboriginal heritage
- Aboriginal heritage
- Hydrology and water quality
- Flooding
- Biodiversity
- Hazard and risk
- Resource use and waste management
- Sustainability
- Climate change and greenhouse gases.

As such, these issues are not considered further in Table 27-5.

Table 27-5 Potential cumulative construction impacts – Rozelle and White Bay

Environmental impact	Potential cumulative environmental impacts – category 2 projects
M4-M5 Link	
Traffic and transport	• Prolonged heavy and light vehicle traffic on City West Link, The Crescent, James Craig Road and Victoria Road[1] • Prolonged adjustments to bus stops along The Crescent, north of Johnston Street[1].
Health and safety	• Additional risk of contamination exposure around the Rozelle Interchange • Additional health effects for residential receivers around Rozelle, Lilyfield and Annandale from stress and anxiety from changes in the urban environment.
Noise and vibration	• Additional temporary minor increase in construction noise for receivers around the Rozelle Rail Yards, White Bay, Blackwattle Bay and at Rozelle, Lilyfield and Annandale • Prolonged duration and frequency of construction noise for receivers around the Rozelle Rail Yards and White Bay[2].
Urban design and visual amenity	• Additional and prolonged moderate to high landscape and visual impacts for residential and recreational receivers in the vicinity of Rozelle Rail Yards, the Glebe foreshores, and residential receivers around Annandale and Lilyfield • Additional and prolonged moderate to high landscape and visual impacts for receivers using transport corridors around the Rozelle Interchange, including The Crescent and City West Link.
Socio-economic, land use and property	• Additional and prolonged increase in passing trade for local businesses and services around Darling Street and Victoria Road at Rozelle, and around James Craig Drive, Chapman Road and Robert Street at White Bay • Additional and prolonged land use impacts at Rozelle Rail Yards and the Glebe foreshores due to consecutive construction periods • Additional and prolonged amenity impacts for residential receivers near the Rozelle Rail Yards and for industrial and commercial receivers around White Bay and Glebe Island • Additional and prolonged impacts to community perceptions of public health and safety due to increases in construction traffic for residential receivers near the Rozelle Rail Yards and for industrial and commercial receivers around White Bay and Glebe Island • Additional and prolonged increased demand for construction workers, providing benefits for local workers.

Environmental impact	Potential cumulative environmental impacts – category 2 projects
Geology, groundwater and soils	Water table drawdown impacts at one domestic groundwater bore around the Rozelle Interchange[3].
Sydney Metro City & Southwest	
Traffic and transport	White Bay truck marshalling yard: • Prolonged heavy and light vehicle traffic on James Craig Drive Barangaroo Station: • Additional marine construction traffic in Sydney Harbour in the vicinity of White Bay, Johnstons Bay and Darling Harbour.
Health and safety	Negligible
Noise and vibration	Negligible
Urban design and visual amenity	Negligible
Socio-economic, land use and property	Additional and prolonged increase in passing trade for local businesses and services around James Craig Drive at White Bay.
Geology, groundwater and soils	Negligible

[1] Quantitative cumulative assessment presented in Chapter 8 (Construction traffic and transport)
[2] Quantitative cumulative assessment presented in Chapter 10 (Construction noise and vibration)
[3] Quantitative cumulative assessment presented in Chapter 16 (Geology, soils and groundwater).

27.3.2 Birchgrove

Projects

Construction activities at Birchgrove, including within Sydney Harbour, would not be in close proximity to any projects identified in Section 27.2, but would occur in the locality of the following projects:

- Sydney Metro City & Southwest Chatswood to Sydenham (Blues Point temporary construction site).

Potential cumulative impacts

Potential cumulative construction impacts at Birchgrove are identified in Table 27-6.

In summary, potential cumulative impacts at Birchgrove would be limited to temporary minor construction noise impacts due to the proximity of construction support sites (WHT 4 and 5) to the temporary construction site for Sydney Metro City & Southwest (Chatswood to Sydenham) at Barangaroo.

The potential for construction fatigue and complaint fatigue at Birchgrove is discussed in Section 27.3.5.

Cumulative impacts resulting from the construction of the projects considered are expected to be negligible for the following issues:

- Traffic and transport
- Air quality
- Health and safety
- Non-Aboriginal heritage
- Aboriginal heritage
- Geology, groundwater and soils
- Hydrology and water quality
- Flooding
- Biodiversity
- Land use and property
- Social and economics
- Hazard and risk
- Resource use and waste management
- Sustainability
- Climate change and greenhouse gases.

As such, these issues are not considered further in Table 27-6.

Table 27-6 Potential cumulative construction impacts – Birchgrove

Environmental impact	Potential cumulative environmental impacts
	Category 2 projects
	Sydney Metro City & Southwest
Noise and vibration	• Additional temporary minor increase in noise and vibration for receivers around the Sydney Harbour south temporary construction site (WHT5) at Birchgrove[1] • Prolonged duration and frequency of construction noise and vibration for receivers around the Sydney Harbour south temporary construction site (WHT5) at Birchgrove[1].

[1] Quantitative cumulative assessment presented in Chapter 10 (Construction noise and vibration)

27.3.3 Waverton

Projects

Construction activities at Waverton, including within Sydney Harbour, would not be in close proximity to any projects identified in Section 27.2, but would occur in the locality of the following projects:

- Sydney Metro City & Southwest (Chatswood to Sydenham) (Victoria Cross Station and Blues Point temporary construction site)
- Wenona School New Education Building
- Shore School Physical Education Centre

  Commercial and hotel development on Berry and Walker Streets at North Sydney.

Potential cumulative impacts

Potential cumulative construction impacts at Waverton are identified in Table 27-7.

In summary, potential cumulative impacts at Waverton would be limited to temporary reductions in visual amenity due to the proximity of construction support sites (WHT 6 and 7) to the temporary construction site for Sydney Metro City & Southwest (Chatswood to Sydenham) at Blues Point.

The potential for construction fatigue and complaint fatigue at Waverton is discussed in Section 27.3.5.

Additional cumulative construction impacts at Waverton may be generated by future projects associated with the Waverton Peninsula Strategic Masterplan (refer to Table 27-4), however construction program and specific scope for these projects have not yet been released.

Cumulative impacts resulting from the construction of the projects considered are expected to be negligible for the following issues:

- Traffic and transport
- Air quality
- Health and safety
- Non-Aboriginal heritage
- Aboriginal heritage
- Geology, groundwater and soils

- Hydrology and water quality
- Flooding
- Biodiversity
- Land use and property
- Social and economics
- Hazard and risk
- Resource use and waste management
- Sustainability
- Climate change and greenhouse gases.

As such, these issues are not considered further in Table 27-7.

Negligible cumulative impacts are expected to result from construction activities at Waverton from the following projects:

- Wenona School New Education Building
- Shore School Physical Education Centre
- Commercial and hotel development on Berry and Walker Streets at North Sydney.

As such, these projects have not been considered further in Table 27-7.

Table 27-7 Potential cumulative construction impacts – Waverton

Environmental impact	Potential cumulative environmental impacts
	Category 2 projects
	Sydney Metro City & Southwest
Urban design and visual amenity	Additional and prolonged moderate to high landscape and visual impacts for residential receivers at McMahons Point and recreational receivers at Barangaroo Reserve.

27.3.4 North Sydney and Cammeray

Projects

Construction activities at North Sydney and Cammeray would occur in close proximity to the following projects:

- Beaches Link and Gore Hill Freeway Connection project
- Sydney Metro City & Southwest (Victoria Cross Station and Crows Nest Station)
- Wenona School New Education Building
- Shore School Physical Education Centre
- Commercial and hotel development on Berry and Walker Streets at North Sydney
- St Aloysius' College Redevelopment
- Loreto Kirribilli Staged Redevelopment.

Potential cumulative impacts

Potential cumulative construction impacts at North Sydney and Cammeray are identified in Table 27-8.

In summary, cumulative impacts may potentially be experienced by receivers around the Cammeray Golf Course, the North Sydney CBD and the Warringah Freeway corridor between Milsons Point and Cammeray.

Cumulative traffic impacts have the potential to be experienced at Cammeray due to the interaction of the project with the Beaches Link and Gore Hill Freeway Connection project. In particular, the local road network at Cammeray is likely to be affected due to the consecutive use of Cammeray Golf Course as construction support sites for the Western Harbour Tunnel and Beaches Link program of works.

Cumulative temporary construction noise, visual amenity and social and economic impacts may also be experienced by receivers at North Sydney and Cammeray due to the number and proximity of construction sites associated with the project, the Beaches Link and Gore Hill Freeway Connection project, and the Sydney Metro City & Southwest project. It is likely that these construction sites would operate both concurrently and consecutively, with prolonged impacts to residential, commercial and recreational receivers.

The consecutive use of a portion of the Cammeray Golf Course as construction support sites for the Western Harbour Tunnel and Beaches Link program of works also has the potential to result in prolonged cumulative land use and heritage impacts as well as impacts to public open space.

These projects may also provide cumulative benefits for local construction workers and to local business and services in these areas by increasing passing trade during construction periods.

The potential for construction fatigue and complaint fatigue at North Sydney and Cammeray is discussed in Section 27.3.5.

Additional cumulative construction impacts at North Sydney may be generated by future projects associated with the Draft Ward Street Precinct Masterplan and the St Leonards Park Landscape Masterplan (refer to Table 27-4), however the construction program and specific scope for these projects have not yet been released.

Cumulative impacts resulting from the construction of the projects considered are expected to be negligible for the following issues:

- Air quality
- Aboriginal heritage
- Geology, groundwater and soils
- Hydrology and water quality
- Flooding
- Biodiversity
- Hazard and risk
- Resource use and waste management
- Sustainability
- Climate change and greenhouse gases.

As such, these issues are not considered further in Table 27-8.

Negligible cumulative impacts are expected to result from construction activities at North Sydney and Cammeray from the following projects:

- Wenona School New Education Building
- Shore School Physical Education Centre
- Commercial and hotel development on Berry and Walker Streets at North Sydney
- St Aloysius' College Redevelopment
- Loreto Kirribilli Staged Re-development.

As such, these projects have not been considered further in Table 27-8.

Table 27-8 Potential cumulative construction impacts – North Sydney and Cammeray area

Environmental impact	Potential cumulative environmental impacts	
	Category 1 projects	**Category 2 projects**
	Beaches Link and Gore Hill Freeway Connection	**Sydney Metro City & Southwest**
Traffic and transport	Additional and prolonged reduction in level of service on Ernest Street, Falcon Street and Miller Street at Cammeray due to construction traffic volumes[1].	Negligible
Health and safety	Health effects for residential receivers around Cammeray from stress and anxiety from changes in the urban environment.	Negligible
Noise and vibration	Additional and prolonged temporary increase in construction noise from construction works at Cammeray Golf Course and construction sites at Cammeray Golf Course and Flat Rock Drive for the Beaches Link and Gore Hill Freeway Connection project[2].	Additional and prolonged temporary increase in construction noise from construction works at Cammeray Golf Course and construction sites at Victoria Cross and Crows Nest for the Sydney Metro City & Southwest project[2].
Urban design and visual amenity	Additional and prolonged moderate to high landscape and visual impacts for receivers around the Warringah Freeway corridor, residential receivers around Cammeray, North Cremorne and Neutral Bay, and recreational receivers at Cammeray Park.	Prolonged minor to moderate landscape and visual impacts for receivers in the North Sydney CBD, particularly around Berry Street and Miller Street.
Socio-economic, land use and property	• Additional and prolonged increase in passing trade for local businesses and services in North Sydney and Cammeray, particularly along Miller Street • Additional and prolonged land use impacts at Cammeray Golf Course due to consecutive construction periods • Additional temporary and permanent loss of open space, parks	• Additional and prolonged increase in passing trade for local businesses and services in North Sydney and Crows Nest • Additional and prolonged amenity impacts for commercial receivers in the North Sydney CBD • Additional and prolonged impacts to community

Environmental impact	Potential cumulative environmental impacts	
	Category 1 projects	**Category 2 projects**
	Beaches Link and Gore Hill Freeway Connection	**Sydney Metro City & Southwest**
	and recreational facilities at Cammeray Golf Course • Additional and prolonged amenity impacts for receivers around the Warringah Freeway and for residential and recreational receivers at Cammeray • Additional and prolonged impacts to community perceptions of public health and safety due to increases in construction traffic for residential and recreational receivers at Cammeray • Additional and prolonged increased demand for construction workers, providing benefits for local workers.	perceptions of public health and safety due to increases in construction traffic in the North Sydney CBD • Additional and prolonged increased demand for construction workers, providing benefits for local workers.
Non-Aboriginal heritage	• Additional and prolonged moderate impacts on Cammeray Park (including golf course) • Minor temporary impacts to additional heritage items in the vicinity of North Sydney and Cammeray.	Minor temporary impacts to additional heritage items in the vicinity of North Sydney.

[1] Quantitative cumulative assessment presented in Chapter 8 (Construction traffic and transport)
[2] Quantitative cumulative assessment presented in Chapter 10 (Construction noise and vibration)

27.3.5 Construction and complaint fatigue

Construction fatigue

There is potential for construction fatigue to be experienced by receivers in the vicinity of the project. Construction fatigue may be experienced by receivers that are in the vicinity of concurrent or consecutive project construction activities where the activities overlap or have little or no break between the activities of one project, or multiple adjacent projects.

Areas considered most likely to experience sustained impacts to receivers that may result in construction fatigue include residential receivers in the vicinity of the Rozelle Rail Yards, White Bay and Glebe Island, commercial receivers in the North Sydney CBD, residential receivers in Cammeray, and regular users of the Warringah Freeway. Construction fatigue in the above areas may occur as a result of the close proximity of multiple construction sites for the project, and from construction activities associated with the following projects:

- Rozelle and White Bay
  - M4-M5 Link
  - Sydney Metro West
  - Sydney Metro City & Southwest (White Bay truck marshalling yard)
  - Glebe Island concrete batching plant
  - Glebe Island Multi-User Facility
  - The new Sydney Fish Market
- North Sydney and Cammeray
  - Beaches Link and Gore Hill Freeway Connection
  - Sydney Metro City & Southwest (Victoria Cross Station and Crows Nest Station).

Based on the environmental impact assessments the project and for those projects listed above, potential impacts considered most likely to result in construction fatigue include construction traffic and parking, construction noise and vibration, visual and amenity impacts, and impacts to community perceptions of public health and safety.

There is also potential for construction fatigue to be experienced by residential receivers in Birchgrove, Waverton and McMahons Point as a result of works on the Sydney Metro City & Southwest project at Blues Point. Construction fatigue at these locations may be generated by temporary visual amenity and construction noise impacts from both projects.

Work would be coordinated between the various project construction sites, where feasible and reasonable to minimise construction fatigue.

Community consultation would be undertaken to gauge key impacts and issues and identify any unknown impacts from concurrent or consecutive sets of construction works. The community consultation framework presented in Chapter 7 (Stakeholder and community engagement) and Appendix E (Community consultation framework).

Complaint fatigue

Complaint fatigue may occur where community perceptions of project complaint management systems result in failure to report concerns about construction impacts. Complaint fatigue may be compounded where multiple agencies are responsible for issues in the same area where construction of multiple projects occurs.

There is potential for complaint fatigue to be generated in the vicinity of any construction site for the project (refer to Chapter 6 (Construction work)). Areas considered most likely to

generate complaint fatigue include Rozelle and White Bay, and North Sydney and Cammeray, due to the proximity of multiple construction sites for the project, as well as construction sites for the following projects:

- Rozelle and White Bay
  - M4-M5 Link
- North Sydney and Cammeray
  - Beaches Link and Gore Hill Freeway Connection
  - Sydney Metro City & Southwest (Victoria Cross Station, Crows Nest Station, Blues Point temporary construction site).

A complaints management system would be implemented for the duration of construction, which would include a number of different complaint mechanisms to cater to different needs and preferences (refer to Chapter 7 (Stakeholder and community engagement)). The complaints management system for the project is outlined in Appendix E (Community consultation framework).

The community relations team for the project would build a working relationship with the project teams for other major projects under construction at the same time as the project to identify stakeholders and community members who may be susceptible to complaint fatigue.

27.3.6 Summary

In summary, the potential cumulative impacts during construction of the project based on likely interactions with other projects and plans would be concentrated around Rozelle and White Bay areas in the south of the project footprint, generated by interactions between the project, M4-M5 Link and various major projects at White Bay.

Potential cumulative impacts around North Sydney and Cammeray in the north of the project footprint would be generated by interactions between the project, Beaches Link and Gore Hill Freeway Connection, and Sydney Metro City & Southwest sites at Victoria Cross and Crows Nest.

Limited cumulative impacts may also be experienced in the vicinity of temporary construction sites at Birchgrove and Waverton as a result of interactions with Sydney Metro City & Southwest construction activities at Blues Point.

Without mitigation, key potential cumulative impacts in the vicinity of Rozelle would likely include minor to moderate temporary increases in traffic volume, construction noise and vibration, decreased visual amenity and land use impacts. There is also potential for construction fatigue and complaint fatigue to be experienced by surrounding receivers at these locations as a result of concurrent and consecutive construction programs. Overall, the cumulative impacts in Rozelle and surrounds is moderate and manageable. The potential impacts would be mitigated by considered and tailored cumulative construction traffic planning, based on confirmed cumulative activities at the time of construction.

The design and construction methodology has been developed with consideration of these issues, and attempts to mitigate many of these issues where possible. The community consultation framework presented in Chapter 7 (Stakeholder and community engagement) and Appendix E (Community consultation framework) has also been developed with consideration of complaint fatigue and includes procedures to proactively manage this issue where possible. Potential cumulative construction impacts would be managed in accordance with the measures outlined in Section 27.5.

27.4 Assessment of potential cumulative operational impacts

A number of potential cumulative impacts during the operation of the project are included in the operational modelling. This has been used to inform the assessment of key issues, including for traffic, air quality, noise and vibration, and human health.

The operational modelling considered the following scenarios:

- Without the project ('Do minimum')
- With the project ('Do something')
- With the project and other planned proposed projects ('Do something cumulative').

The operational modelling scenarios have considered cumulative impacts associated with the Category 1 and 2 projects listed in Table 27-3. Category 3 projects were excluded as they were considered unlikely to generate cumulative operational impacts. Within the operational models:

- As part of the 'Do minimum' scenarios, the M4-M5 Link is considered as this project is approved and would be operational prior to the Western Harbour Tunnel and Warringah Freeway project
- As part of the 'Do something cumulative' scenarios, the Beaches Link and Gore Hill Freeway Connection is considered as this project is subject to planning approval.

In addition to Category 1 and 2 projects some additional projects have been considered outside the two-kilometre radius (refer to Table 27-9) as they are considered to be relevant to some operational models, which operate on a wider scale to the cumulative assessment in this chapter.

The cumulative assessments are discussed in detail in their assessment chapters and technical working papers listed below, and are therefore not considered further in this chapter:

- Traffic and transport: Chapter 9 (Operational traffic and transport) and Appendix F (Technical working paper: Traffic and transport)
- Noise and vibration: Chapter 11 (Operational noise and vibration) and Appendix G (Technical working paper: Noise and vibration)
- Air quality: Chapter 12 (Air quality) and Appendix H (Technical working paper: Air quality)
- Human health: Chapter 13 (Human health) and Appendix I (Technical working paper: Health impact assessment).

Table 27-9 Additional projects included in the operational 'Do something cumulative' modelling scenarios for the environmental impact assessment

Projects included in operational model	Traffic and transport	Noise and vibration	Air quality	Human health
WestConnex program of works	✓	✓	✓	✓
Sydney Gateway	✓	✓	✓	✓
F6 Extension (Stage 1)	✓	✓	✓	✓
F6 Extension (full project)	×	×	✓	✓

Excluding the above assessments, the potential cumulative operational impacts are expected to be limited to social, economic and visual amenity issues.

Potential cumulative social and economic impacts would be generated by Category 1 and 2 projects. The Category 3 projects identified in Table 27-3 were considered unlikely to generate cumulative operational social and economic impacts. Cumulative operational impacts would be associated with improved travel benefits for communities, business and industry, including freight, across the Sydney transport network.

Potential cumulative visual amenity impacts would be concentrated around Rozelle and Cammeray. Potential cumulative impacts at Rozelle would be generated with the M4-M5 Link project. This project has been incorporated into the baseline operational scenario for landscape character and visual amenity in Chapter 22 (Urban design and visual amenity) and is therefore not considered further in this chapter.

Potential cumulative visual impacts at Cammeray would be primarily generated with the Western Harbour Tunnel and Beaches Link program of works. Operational facilities for both projects introduce new built forms into existing open space at Cammeray Golf Course and generate cumulative landscape character and visual amenity impacts for residential receivers at Cammeray and motorists on the Warringah Freeway and Ernest Street.

There would be no cumulative impacts to geology, groundwater and soils, hydrology and water quality, flooding, hazard and risk, resource use and waste management, sustainability, Aboriginal heritage, non-Aboriginal heritage, climate change and greenhouse gases, and biodiversity during the operation of the project, as impacts to heritage items and biodiversity would be limited to the construction phase of the project.

27.5 Environmental management measures

The implementation of environmental management measures for the project would avoid, to the greatest extent possible, cumulative impacts with surrounding development. As each of the study disciplines presented in this environmental impact statement have identified site specific management measures to reduce the potential impact to acceptable levels, cumulative mitigation measures have focused on broader opportunities around inter-project coordination and communication with stakeholders.

Construction fatigue is recognised as an important issue for communities in the vicinity of large construction projects that overlap in time or space. Substantial effort to coordinate with other projects through construction would be made to further manage fatigue impacts where possible.

Further opportunities to more effectively manage construction fatigue would be considered during the design and construction of the project.

Environmental management measures relating to cumulative impacts are outlined in Table 27-10.

Table 27-10 Environmental management measures – Cumulative impacts

Ref	Phase	Impact	Environmental management measure	Location
CI1	Pre-construction	Cumulative impacts	Considered and tailored multi-party engagement and cooperation will be established prior to construction to ensure all contributors to impacts are working together to minimise adverse impacts or enhance benefits of multiple projects occurring concurrently or consecutively. Haulage routes and road occupancy will be coordinated with other major transport projects via the Sydney Coordination Office.	WHT/WFU
CI2	Pre-construction	Cumulative construction fatigue	Multi-party engagement and cooperation will be established prior to construction to coordinate with the following projects to manage fatigue impacts where possible: a) M4-M5 Link b) Beaches Link and Gore Hill Freeway Connection c) Sydney Metro City & Southwest.	WHT/WFU
CI3	Construction	Cumulative impacts	Communication strategies for the project will be managed consistently across the NSW Government transport portfolio and in accordance with the Community Consultation Framework for the project, particularly with the Beaches Link and Gore Hill Freeway Connection project.	WHT/WFU
CI4	Construction	Cumulative complaints fatigue	Cumulative complaints fatigue will be managed as outlined in Chapter 7 (Stakeholder and community engagement). Complaint management tools for the project are outlined in Appendix E (Community consultation framework).	WHT/WFU

WHT = Western Harbour Tunnel, WFU = Warringah Freeway Upgrade

RMS 19.1441
ISBN 978-1-922338-08-2