6 Construction

6.1 Introduction

This chapter provides an overview of the construction framework for the proposed airport. The framework includes an indicative construction schedule, methods and activities that may be adopted for construction of the Stage 1 development.

The construction framework described here forms the basis of the assessment of environmental impacts throughout the EIS. The actual construction plan, which will include the schedule, methods and activities for construction of the Stage 1 development, would be finalised prior to the start of construction. Timing of construction would be dependent on a range of planning and preparation activities that would need to be completed prior to commencement, including the determination of the Airport Plan, vacant possession of the airport site and tenders for construction contractors.

Construction of the Stage 1 development represents a major greenfield development with complex delivery using multiple contractors working across a range of specialist services. The area that would be directly impacted by construction (the construction impact zone) covers approximately 1,150 hectares.

Construction activities for the Stage 1 development are anticipated to occur in three major phases as outlined below with some Preparatory Activities expected to occur prior to or simultaneous with the major phases.

- Site preparation activities including the clearing and earthworks elements of the Main Construction Works. The earthworks would include relocation of around 1.9 million cubic metres of topsoil and 22 million cubic metres of subsoil and rock to create a level site.
- Aviation infrastructure activities such as construction of the runway, taxiways, apron areas, internal road network, the terminal complex, air traffic control tower, freight, cargo and maintenance facilities and a fuel farm.
- Site commissioning activities at the completion of the aviation infrastructure activities, involving testing and commissioning of all facilities in readiness for the operation of the proposed airport.

A range of existing infrastructure located on the airport site is incompatible with the proposed airport and would need to be removed and/or relocated. These assets include The Northern Road, a TransGrid 330 kilovolt (kV) transmission line, telecommunication and electricity distribution lines and water mains. Although considered in this EIS, these assets are the responsibility of the relevant private or State owners and their removal to offsite locations would be subject to separate assessment processes.

For the purpose of this assessment, it is assumed that construction would largely proceed from the north-east to the south-west of the airport site to allow relocation of existing infrastructure such as The Northern Road and the TransGrid 330 kV transmission line. The removal and/or relocation of existing utilities infrastructure will likely be required to occur concurrently with other activities.

Main Construction Works would occur within the construction impact zone shown in Figure 6–1. The construction impact zone includes the area of bulk earthworks in the northern half of the airport site, which would facilitate the development of the runway, terminal and aviation support facilities, as well as areas of disturbance outside the bulk earthworks area that would be used for ancillary infrastructure such as drainage swales and detention ponds as part of the site's proposed water management system. The southern sector of the airport site would remain largely undisturbed and zoned for future aviation use, business development or environment protection in accordance with the Airport Plan. Subsequent development such as the second runway, ancillary developments, or business park developments outside the construction impact zone are not covered by Part 3 of the Airport Plan and would therefore be subject to separate approvals under the *Airports Act 1996*.

The final construction methodology, including the proposed construction program, would be subject to refinement during detailed design and tendering of the works. This construction framework has been developed, based on contemporary construction methodologies for similar scale projects, to provide a reasonable indication of the likely construction activities and the potential sequencing, methodology and equipment that may be used in the proposed development of the airport site.

6.2 Construction logistics

6.2.1 Indicative construction schedule

For the purpose of this assessment, it is assumed that construction of the Stage 1 development would progress generally from the north-east to the south-west of the airport site, allowing for the relocation of The Northern Road and a TransGrid transmission line. The site preparation activities phase would commence following relevant tenders and design work. Site preparation activities and aviation infrastructure activities are assumed to be completed on a sector or zone basis across the airport site. The indicative construction schedule presented in Table 6–1 reflects a progressive transition and completion of site preparation activities in each of the zones shown in Figure 6–1.

Table 6–1 Indicative construction schedule for the Main Construction Works

Construction zone	Activity	Indicative construction period	
		Start	Finish
Site preparation activities – General	Site facilities	Year 1 Q1	Year 2 Q1
	Detention ponds and preliminary controls	Year 1 Q1	Year 1 Q4
	Perimeter road	Year 1 Q3	Year 3 Q1
Site preparation activities – East	Clear and grub	Year 1 Q2	Year 2 Q2
	Bulk earthworks	Year 1 Q4	Year 3 Q1
	Rehabilitation	Year 2 Q1	Year 3 Q4
Site preparation activities – North-west and south-west	Clear and grub	Year 3 Q4	Year 4 Q2
	Bulk earthworks	Year 4 Q2	Year 5 Q1
	Rehabilitation	Year 4 Q4	Year 5 Q2

Construction zone	Activity	Indicative construction period	
	Runway completion and bulk earthworks balance	Year 5 Q2	Year 7 Q3
Aviation infrastructure activities – East	Preliminaries and establishment	Year 3 Q4	Year 6 Q4
	Services	Year 3 Q4	Year 6 Q2
	Buildings	Year 4 Q1	Year 8 Q3
	Runways	Year 4 Q2	Year 6 Q3
	Taxiways	Year 5 Q2	Year 6 Q3
	Aprons and stands	Year 5 Q4	Year 6 Q4
	Main access road	Year 6 Q1	Year 6 Q2
	Internal roads and carparks	Year 6 Q1	Year 6 Q3
Aviation infrastructure – North-west	Preliminaries and establishment	Year 6 Q2	Year 6 Q2
	Runways	Year 6 Q2	Year 7 Q2
	Taxiways	Year 7 Q1	Year 8 Q2
Aviation infrastructure – South-west	Preliminaries and establishment	Year 7 Q3	Year 8 Q4
	Aircraft maintenance and cargo facilities aprons and stands	Year 7 Q4	Year 8 Q3
	Internal access roads from The Northern Road	Year 8 Q1	Year 8 Q4
Commissioning	Testing and commissioning and operational readiness	Year 8 Q2	mid-2020s

The time periods provided in this construction schedule are indicative only and have been developed specifically for the purpose of assessing environmental impacts. The actual construction schedule would be finalised prior to commencement of Main Construction Works.

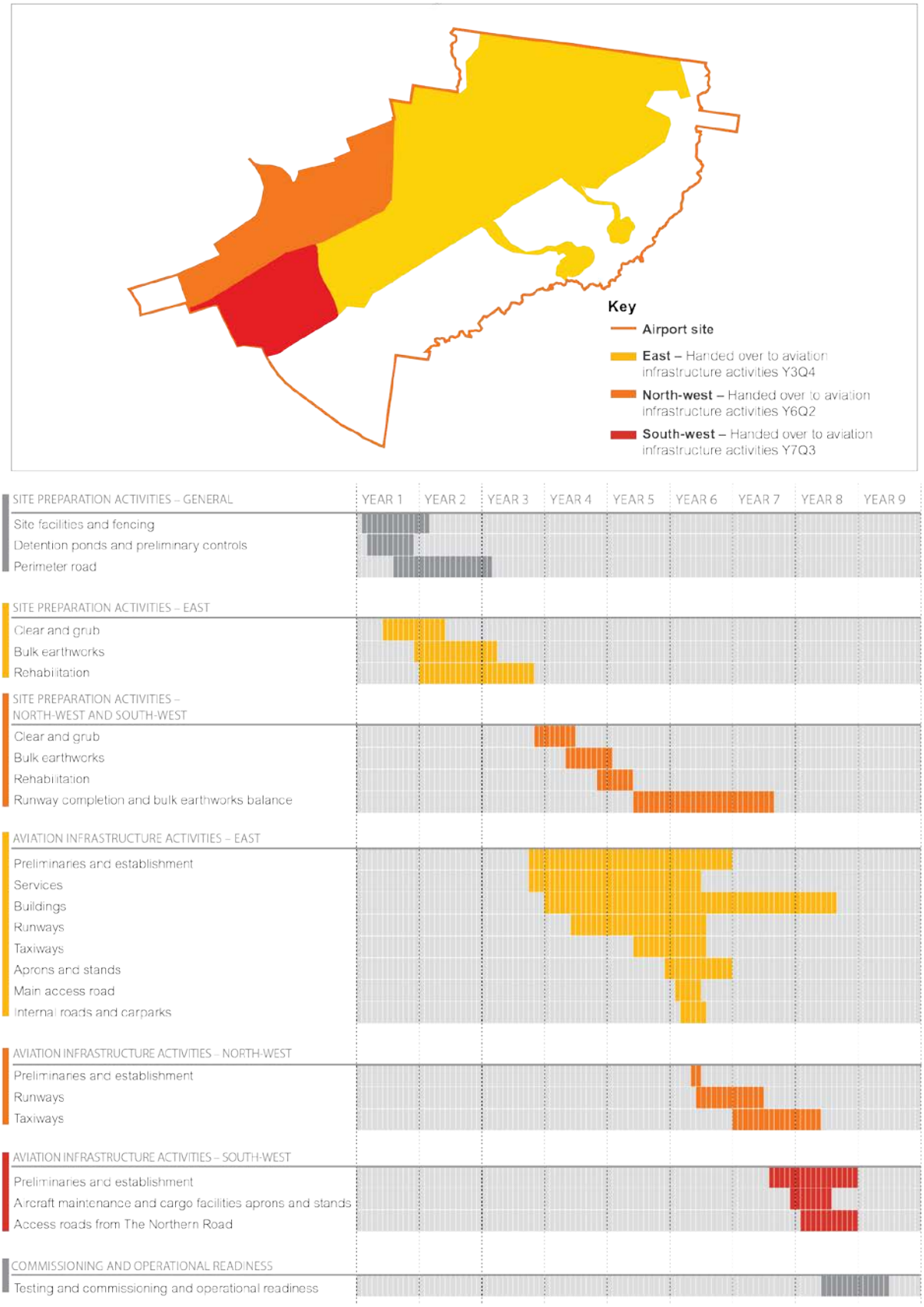


Figure 6–1 Stage 1 construction impact zone and indicative construction schedule

6.2.2 Workforce

Construction of the proposed airport would create direct employment opportunities for construction workers and support staff, particularly in and around Western Sydney. Based on the indicative construction schedule a relatively modest workforce would be required at the commencement of the Main Construction Work, increasing to around 230 personnel during the peak period of bulk earthworks activity. The aviation infrastructure workforce would start with approximately 130 personnel and increase to more than 650.

The estimated workforce numbers for direct onsite jobs to implement the indicative construction schedule are provided in Table 6–2 and shown on Figure 6–2.

The peak onsite workforce is anticipated to exceed 750 personnel at the time when site preparation activities and aviation infrastructure construction activities are expected to be running concurrently. The peak workforce is important for quantifying employment opportunities generated by the construction programme and for consideration of indirect impacts on the surrounding community generated by the workforce, such as increased traffic.

Table 6–2 Peak workforce (site preparation and aviation infrastructure activities)

	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Site preparation workforce																																
Labour (Civil)	31	47	62	67	161	140	129	132	145	142	111	16	15	15	15	15	15	15	19	55	64	64	58	59	55	51	8	–	–	–	–	–
Supervisory and management	10	10	10	31	37	40	59	59	71	81	79	80	81	81	80	80	81	81	73	59	59	45	37	35	11	11	5	–	–	–	–	–
Contract administration	3	3	3	9	10	11	17	17	20	23	22	23	23	23	23	23	23	23	21	17	17	13	10	10	3	3	1	–	–	–	–	–
Aviation infrastructure workforce																																
Labour (Building)	–	–	–	–	–	–	–	–	–	–	–	–	–	80	120	96	61	160	177	98	128	226	337	334	365	324	95	85	120	129	79	–
Labour (Civil)	–	–	–	–	–	–	–	–	–	–	–	107	176	147	164	147	169	122	125	97	101	164	102	88	87	68	85	57	101	86	130	100
Supervisory and management	–	–	–	–	–	–	–	–	–	–	–	15	21	45	73	81	116	116	152	156	159	159	154	156	159	156	156	121	115	90	73	57
Contract administration	–	–	–	–	–	–	–	–	–	–	–	11	15	33	53	58	84	84	109	113	114	114	111	113	114	113	113	87	83	65	53	41
Total	44	60	75	107	208	191	205	208	236	246	212	252	331	424	528	500	549	601	676	595	642	785	809	795	794	726	463	350	419	370	335	198

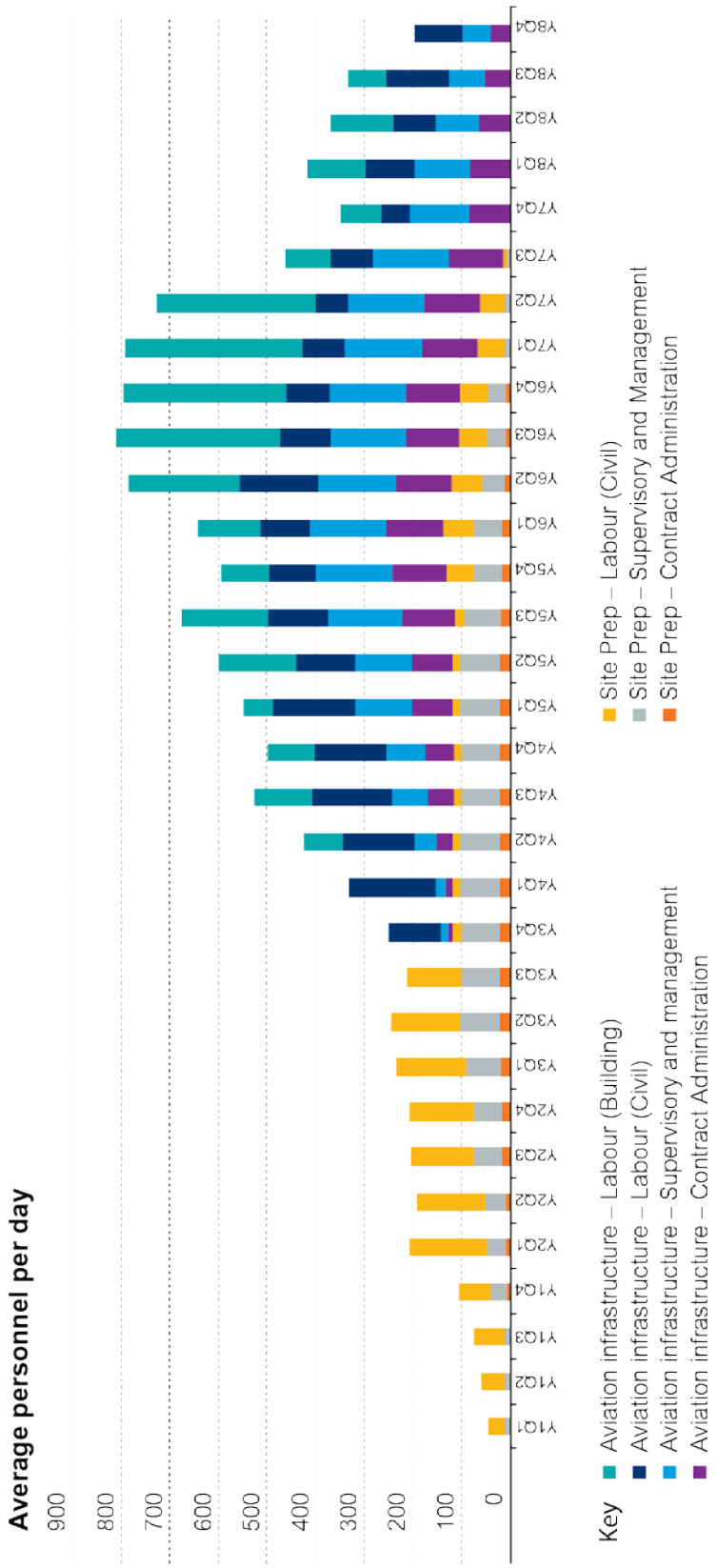


Figure 6–2 Construction workforce

6.2.3 Construction hours

The hours of construction would generally be between 6.00 am and 6.00 pm, Monday to Saturday. However, during the site preparation activities, heavy and light vehicle movements to and from site are likely to occur outside these work hours. During the aviation infrastructure activities some construction materials, such as paving materials, are expected to be delivered to the site 24 hours per day.

Other activities that may be undertaken outside of these hours include:

- works to existing services (if shutdowns are required);
- deliveries of oversized loads;
- catch-up works if works are delayed by unforeseen circumstances;
- responsive activities to protect people, property and the environment in the event of an emergency such as a fire or structural failure; and
- other activities undertaken in accordance with relevant noise guidelines, or which have no material noise or other impacts on residences.

It is noted that the proposed construction hours fall outside the standard hours for construction recommended in the NSW Environmental Protection Authority (EPA) *Interim Construction Noise Guideline* (DECC 2009a) of 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm on Saturday. The guidelines state that the recommended hours are not mandatory, and identify a number of categories of works that might be undertaken outside the recommended hours, including:

- deliveries of oversized plant or structures;
- public infrastructure works that shorten the length of the project and are supported by the affected community; and
- works where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours.

The proposed airport site covers a broad area. As such, a range of management measures, such as the placement of temporary noise barriers or exclusion buffers within the airport site, would be adopted to mitigate disturbance to nearby receivers for construction activity outside of standard construction hours.

6.2.4 Site access

Construction of the proposed airport would generate additional traffic on the regional and local road network. However, the construction of the airport is not expected to significantly impact on the surrounding transport system with the exception of potential oversize vehicle movements when mobilising equipment for the initial stages of earthworks (see Chapter 15 (Volume 2a)). Construction traffic would use the nearby road network, with most traffic expected to access the site using Elizabeth Drive, as well as potentially other routes, which will be finalised through consultation with NSW authorities. The nearby M7 has good connectivity to southern NSW via the M31, Sydney City via the M5 and M4 and northern NSW via the M2. Figure 6–3 shows the major access routes that are expected to be used by construction vehicles to access the airport site.

Figure 6–3 Major access routes to the airport site

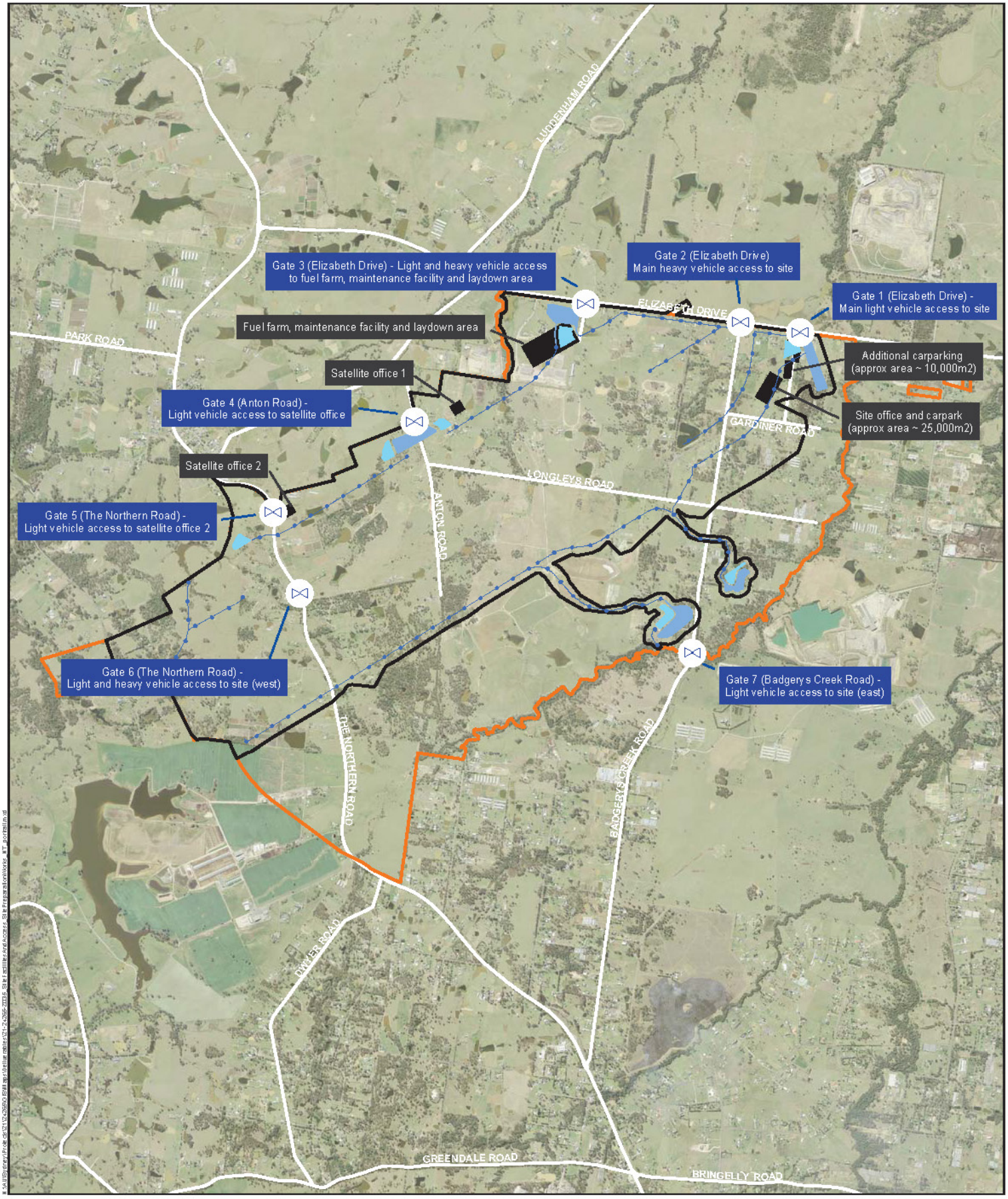
For the purpose of this assessment, seven site access gates have been assumed, as detailed in Table 6–3 and shown on Figure 6–4. Provision would be made for access by heavy and light vehicles (see Section 6.2.5).

Table 6–3 Access gates to the airport site

Gate Number	Road	Access to	Vehicles
1	Elizabeth Drive	Site office	Light only
2	Elizabeth Drive	Airport site (east)	Heavy only
3	Elizabeth Drive	Temporary fuel farm, maintenance facility and laydown area	Light and heavy
4	Anton Road	Satellite Office 1	Light only
5	The Northern Road	Satellite Office 2	Light only
6	The Northern Road	Airport site (west)	Light and heavy
7	Badgerys Creek Road	Airport site (east)	Light only

Upgrades to Elizabeth Drive and The Northern Road at the access points would require the inclusion of deceleration and acceleration lanes and right turn lanes as required to accommodate heavy vehicle movements associated with the construction programme. Other roads in the vicinity may also require upgrades and traffic control measures to accommodate additional vehicle movements. The access points would have lockable temporary gates in the permanent boundary fence. As the site develops and the earthworks progress, new site access roads would be constructed within the construction impact zone using imported gravels and maintained by graders and water carts, as required. Access to the proposed detention ponds in the southern half of the site is available via the existing public road network and formed farm access roads.

Traffic management and access to the airport site would be accounted for as part of the overall Construction Environmental Management Framework as described in Section 6.5. The Traffic and Access Construction Environmental Management Plan (CEMP) would provide specific requirements for all light and heavy vehicle movements accessing the site during construction, and any road network improvements required to accommodate the vehicles.



Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

- Badgerys Creek Site Boundary
- Construction impact zone
- Site facilites
- Detention Basin
- Bio Retention Basin
- Drainage channels
- Site access - gates

Figure 6-4 - Site preparation activities - facilities and access

0 250 500 1,000
Metres

6.2.5 Construction vehicles

Light vehicles

Light vehicles are generally defined as cars, utility vehicles and some commercial vehicles with a gross vehicle mass of less than 4.5 tonnes.

Daily light vehicle trips would be carried out primarily by the construction workforce. The number of light vehicles entering and leaving the airport site is estimated to increase steadily from around 30 during the early stages of to a peak of around 440 during the Main Construction Works. Expected daily light vehicle numbers over the indicative construction schedule are shown in Figure 6–5.

Heavy vehicles

Heavy vehicles are defined under the *Heavy Vehicle National Law 2013* (NSW) as large vehicles with a gross vehicle mass or aggregate trailer mass of more than 4.5 tonnes.

Heavy vehicles including trucks and semi-trailers would be required for the delivery of equipment and construction materials. Pavement materials for the runway, taxiways, aprons, roads and carparks are expected to be imported predominantly from outside the airport site.

Substantial volumes of gravel would be required for the base and sub-base material, while large volumes of asphalt and concrete materials would be used for surfacing. Concrete would also be a major construction material for structures (buildings).

The total quantity of gravel (or other suitable materials such as sandstone) used during construction would be approximately three million tonnes (or about 3,500 tonnes per day over around 33 months of the indicative construction schedule).

Gravel would be imported onto the airport site from excavations at other major Sydney infrastructure projects and from established quarries in the Southern Tablelands of NSW (for example, Gunlake Marulan Quarry, Holcim Lynwood Quarry and/or Boral Peppertree Quarry).

An asphalt batch plant would be established on site and would operate for around 550 days over 48 months (approximately three days per week) throughout the indicative construction schedule. The asphalt plant would require raw materials including aggregate, sand, crusher dust, lime filler and bitumen.

Aggregate would be imported to the airport site from the same quarries supplying the gravel. Sand is likely to be imported from Kurnell or Wollongong.

A concrete batch plant would also be established on site to supply concrete for an estimated 54 months, with a daily average production of 424 cubic metres. Raw materials delivered to the concrete batch plant would consist of cement, fly ash, aggregate, sand and admixture.

General building materials such as structural steel, roofing materials, flooring materials and furniture would be supplied from various sources within Greater Sydney.

The number of heavy vehicles entering and leaving the airport site during the peak construction period would range from about 100 to 200 each day, as shown on Figure 6–6. Expected daily heavy vehicle numbers over the indicative construction schedule are shown in Figure 6–6.

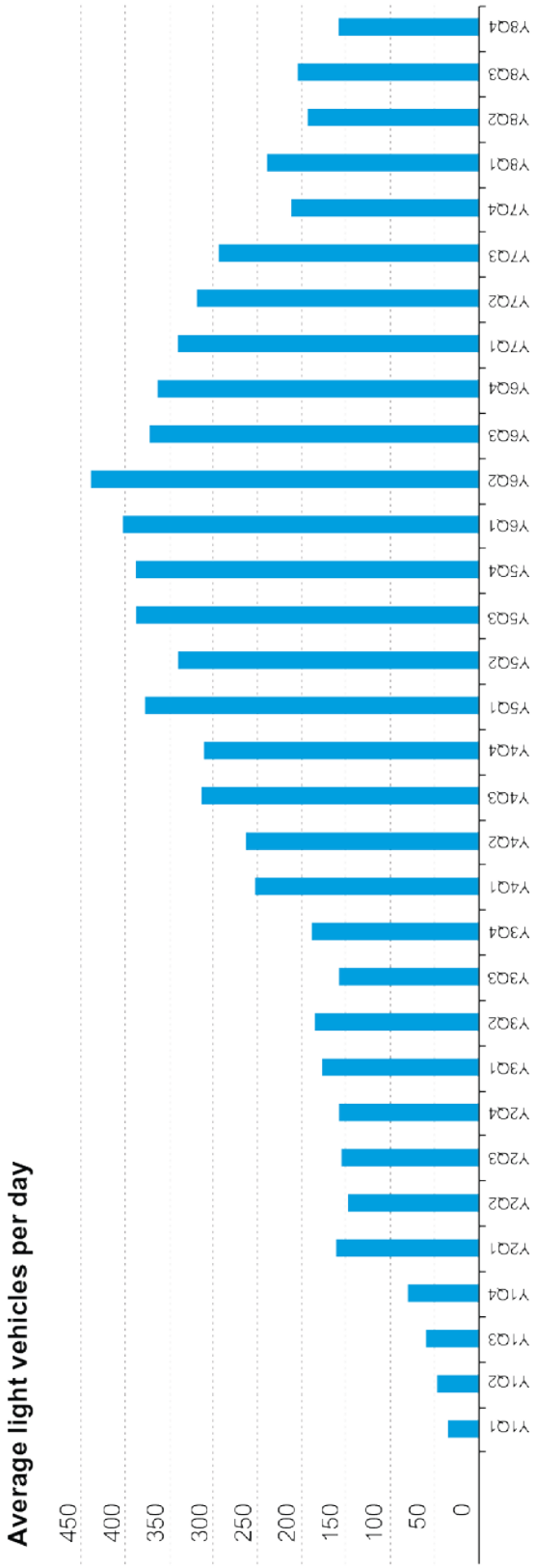


Figure 6–5 Light vehicle movements for indicative construction schedule

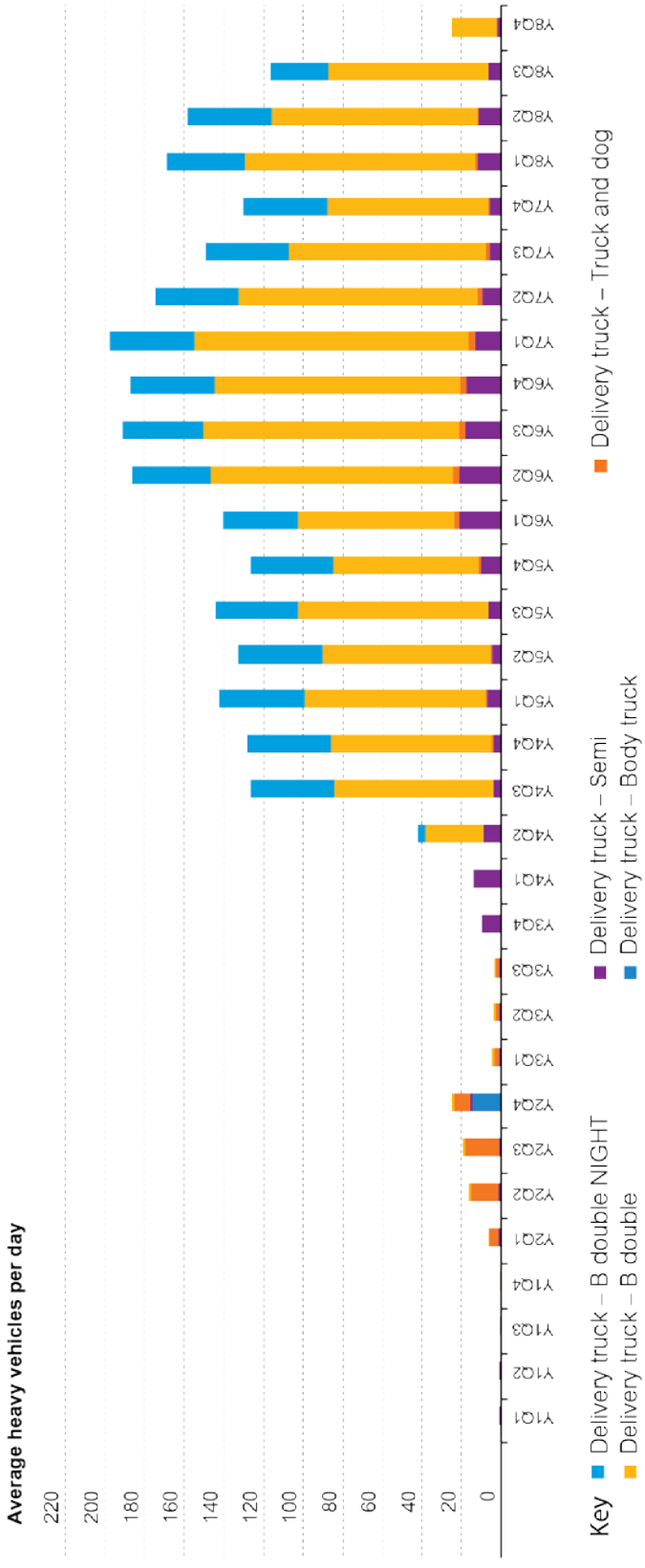


Figure 6–6 Heavy vehicle movements for indicative construction schedule

6.2.6 Construction machinery

A range of construction machinery would be used at the airport site, as listed, but not limited to that, in Table 6–4. Expected machinery use over the indicative construction schedule is presented in Figure 6–7.

Table 6–4 Expected construction machinery

Construction equipment likely to be used during the Stage 1 development (indicative only)	
Dozers (e.g. D6, D8 and D11)	Pad foot rollers
Scrapers	Loaders
Excavators (e.g. 30 tonne and 200 tonne)	Gravel pavers
Water carts (20,000 litres)	Asphalt pavers
Graders (e.g. 14 inch and 16 inch)	Elevated work platforms
Compactors	Concrete placer spreaders
Multi-tyre rollers	Concrete slip form pavers
Smooth and tandem drum rollers	Concrete texture cure machines
Dump trucks (e.g. 50 tonne)	Mobile crane
Backhoe	Piling rig

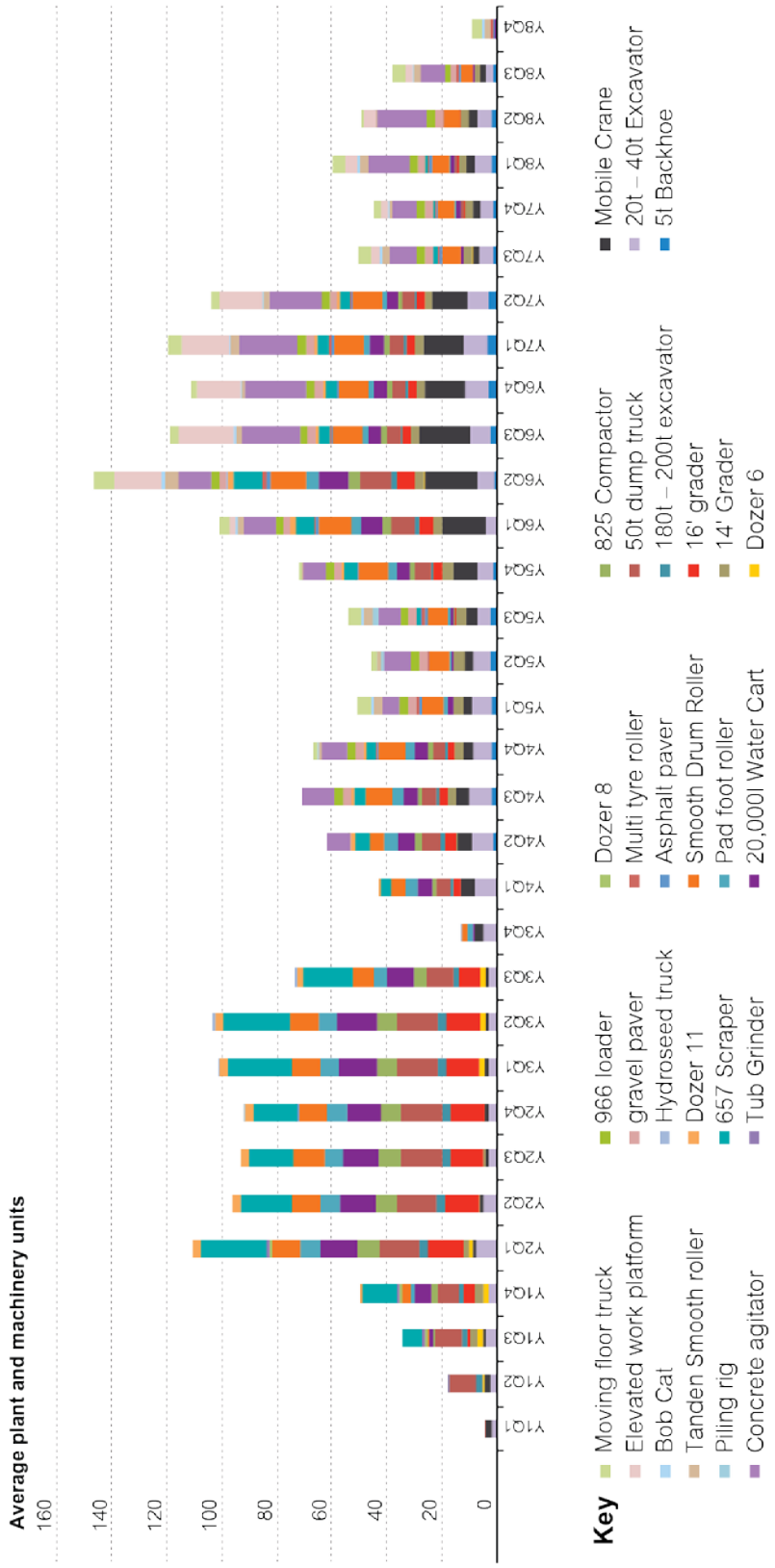


Figure 6–7 Plant and machinery for indicative construction schedule

6.3 Site preparation activities

6.3.1 Establishment of temporary construction facilities

Temporary facilities for the site preparation activities would generally be constructed within the construction impact zone as shown in Figure 6–4. The expected site facilities are outlined below. The precise facilities and their location would be refined by the construction contractor and reflected in relevant plans within the Construction Environment Management Framework.

- **Security**. Access to the site would be restricted by the early installation of a site perimeter fence around the construction impact zone. This would include both sides of The Northern Road until the road is relocated.
- **Site office and car park.** A site office would be constructed in the north-east section of the airport site. The site office would be accessed via a sealed, temporary road from Elizabeth Drive. The site office would accommodate a staff of about 90 people. The site office would include an office, first aid and training rooms, lunch room and male and female toilets. A temporary carpark would be provided adjacent to the office, outside of the Stage 1 construction impact zone. The carpark would have about 280 car spaces (for light vehicles only), providing parking for both office and site based construction personnel.
- **Satellite offices.** Two satellite offices would be provided within the airport site. Each satellite office would include an office, first aid and training rooms, lunch room and male and female toilets. Each office would have separate parking for light and heavy vehicles.
- **Fuel farm.** A fully bunded and fenced temporary fuel farm would be established in the north of the airport site, adjacent to Elizabeth Drive. Infield machinery would be refuelled by fuel truck, which would fill at the fuel farm. The fuel farm would have capacity for three days' supply or about 165,000 litres. This fuel farm would be temporary and replaced with a permanent fuel farm to support the operation of the proposed airport.
- **Laydown area.** A laydown area would be provided adjacent to the fuel farm and accessed via Elizabeth Drive. The laydown area would be fully fenced and surfaced with suitable material to provide all-weather access. The laydown area would be used to store precast concrete products and other items that could be safely stored outside.
- **Maintenance facility.** A maintenance facility would likely be established adjacent to the laydown area and the temporary fuel farm. The facility would be capable of servicing and repairing plant and would consist of a covered work area. There would be bunded storage for lubricants, oils and other materials, container storage for spare parts and spare tyre storage. The maintenance facility would also include an office, crib facilities, toilets and a washdown area for trucks.
- **Services.** Services would be provided from existing utilities at the airport site where available and supplemented by temporary utilities, subject to agreements with the relevant operators.
    - The approximate 300 kilovolt-ampere (kVA) demand during construction is expected to be provided through electricity assets operated by Endeavour Energy. Current forecasts indicate there would be sufficient feeder capacity to provide the energy requirements (Endeavour Energy 2014). Any temporary reticulation would be constructed in accordance with Endeavour Energy standards.

- Up to 1.36 megalitres of water would be required per day for site preparation activities. Of this, about 8,600 litres (0.0086 megalitres) is expected to be required as potable drinking water for site workers. Water would be sourced through existing utilities accessible from the airport site, where possible, and supplemented by stormwater runoff captured in sediment dams or farm dams. Any temporary water supply works would be carried out in accordance with Australian Standards and other standards set by the Water Services Association of Australia.
- Up to 8,200 litres of domestic wastewater and sewage estimated to be generated each day during site preparation activities would be stored in tanks at the airport site for collection by disposal trucks to appropriate licenced facilities.
- Telecommunications would be facilitated through underground optical fibre cable and customer multiplex cabinets. Any temporary telecommunications poles and wires or underground cables would be constructed in accordance with relevant standards.
- Provision of services to the site boundary would be undertaken by the relevant service provider.

6.3.2 Vegetation and site clearing

The airport site has been largely cleared through previous rural and urban development, but retains pockets of vegetation that would need to be cleared at the start of construction. Large scale clearance of vegetation for the Stage 1 development would be restricted to the construction impact zone, and remnant vegetation in the southern portion of the site would remain largely intact (see Chapter 16 (Volume 2a)).

A Biodiversity CEMP would be developed as part of the overall Construction Environmental Management Framework as described in Section 6.5. This plan would outline the key management measures and performance indicators to guide management of biodiversity matters during these activities. The following measures are generally considered standard practice and the full set of measures would be confirmed through approval of the plan.

Before clearing, a fauna spotter would undertake an assessment to identify potential habitat trees. These trees would be clearly identified with spray paint. A dozer would then clear the undergrowth and trees not identified as potential habitat trees. An excavator would follow several days behind the dozer. The excavator would drop trees in a manner designed to maximise the likelihood of survival of any fauna present, and a qualified fauna spotter would be on hand to relocate any fauna found during the clearing activities.

Consistent with the indicative construction schedule, it is expected that the clearing and grubbing (removal of tree stumps and roots) would generally commence in the north-east of the airport site and proceed to the south-west. This would encourage fauna to move towards the south of the airport site and towards Badgerys Creek. If a fence is in place around the construction impact zone at the time the clearing occurs, provision will be made to allow fauna to relocate out of that area.

The cleared vegetation would be sheared and mulched before being stockpiled for use in erosion and sedimentation control measures. The ground would then be grubbed to remove any roots to a depth of approximately 300 millimetres.

It is expected that most existing services and fencing would need to be removed from the construction impact zone before earthworks. Materials would be salvaged for recycling where possible, or disposed off-site. Existing septic systems would either be left in place and grout filled (if under areas of fill) or excavated and removed from the airport site.

Existing farm dams located on site would be progressively emptied over a number of days. Smaller dams would be emptied by direct pumping into water carts and larger dams would have a standpipe installed. The recovered water would be used primarily for dust suppression during construction.

6.3.3 Removal of existing roads and utilities

A range of existing infrastructure located at the airport site may be incompatible with the proposed airport and would need to be removed and/or relocated. These assets include The Northern Road, a TransGrid 330 kV transmission line, telecommunication lines, electricity distribution and supply lines and water mains. Their removal may be prior to or concurrent with the Main Construction Activities. Although considered in this EIS, these assets are the responsibility of the relevant private or State owners and any relocation would be subject to separate assessment and/or approval processes.

Existing utilities including roads, electricity, water and telecommunications on the airport site would be used where practical to do so; otherwise they would be removed progressively where they are not required for construction or by other customers. Utilities that service customers outside the airport site would be relocated to provide continuity of these services. The various service providers have documented processes for removal and replacement of assets, and this activity would be undertaken in consultation with the Department of Infrastructure and Regional Development and/or the ALC.

The Northern Road would be diverted around the airport site by NSW Roads and Maritime Services as part of The Northern Road Upgrade Stage 4 under the Western Sydney Infrastructure Plan.

Arrangements for the internal road network and connections with the local road network outside of the airport site including existing roads and new roads to be constructed as part of the Stage 1 development would be finalised as part of settling the airport site layout.

Existing roads within the construction impact zone would be closed and pavement materials removed. Any temporary or permanent road closures would be managed in consultation with NSW Roads and Maritime Services and Liverpool City Council. Minor internal roads within the airport site are already being closed when they are no longer required. Any change to road accessibility during the Main Construction Works would be subject to the provisions of a traffic and access management plan that would be prepared as part of the Construction Environment Management Framework (see Section 6.5 of this chapter and Chapter 28 (Volume 2b)).

The removal of electricity assets at the airport site, including distribution and supply lines, would be arranged by the network operator.

TransGrid is the network operator of the 330 kV overhead transmission line that crosses the site and is incompatible with airport operations. The affected transmission line will require relocation to an alternative alignment, potentially underground within the boundary of the airport site within the construction impact zone. This relocation has not been specifically assessed for the purposes of this EIS and would be subject to further consideration if it proceeds.

Once a new transmission cable alignment has been confirmed, construction completed and the line commissioned, the conductors, towers and foundations from the original aboveground transmission line will be removed. This work is completed in sections between tension structures and the sequencing is dependent on ensuring that no individual structure is over-loaded to the point of failure when conductors are detached during the de-stringing process. Dismantling of the steel lattice towers can then occur followed by demolishing of the concrete foundations, including the removal of any contaminated soil from around each tower site. All waste is to be removed from the site for re-use or recycling.

Endeavour Energy is the network operator of the smaller 11 kV and 33 kV overhead distribution and supply lines. The 11 kV overhead line along The Northern Road is expected to be relocated underground within the The Northern Road realignment. The 11 kV overhead line at Badgerys Creek Road is expected to be relocated along existing roads to the east of the airport site. The 11 kV and 33 kV overhead lines along Elizabeth Drive would be relocated underground where there are airspace constraints. In each case, the location for relocations would be determined by the relevant utility provider in consultation with the Commonwealth and/or ALC where a relocation is to occur on the airport site.

Removal of potable water infrastructure at the airport site would be subject to applications to the relevant water utility provider (Sydney Water). Reconfiguration of the water supply network would be carried out prior to removal of underground piping from the airport site, in order to maintain continuity of service to customers outside the airport site.

The overhead telecommunications cable along The Northern Road is expected to be replaced by an underground line within The Northern Road realignment. The underground telecommunications cable that runs along Badgerys Creek Road from Elizabeth Drive to Bringelly Exchange could be relocated subject to Badgerys Creek Road remaining open south of Pitt Street. In such a case, a link could be retained by using Lawson Road and Pitt Street to connect to the existing optic fibre cable, thereby having no impact on customers north of Elizabeth Drive and east of Badgerys Creek currently reliant on the Bringelly exchange. In the event that Badgerys Creek Road is closed entirely and the existing cable removed, customers north of Elizabeth Drive and east of Badgerys Creek serviced by Bringelly Exchange would instead be expected to be by serviced by Luddenham Exchange via underground optical fibre cable along Elizabeth Drive. Regardless of the option, this process would be managed and co-ordinated by Telstra.

6.3.4 Earthworks

Topsoil stripping and stockpiling

Topsoil over the bulk earthworks footprint would be stripped by scrapers to a depth of approximately 150 millimetres. The total volume to be stripped is approximately 1.9 million cubic metres.

About 200,000 cubic metres of topsoil would be used to rehabilitate disturbed areas outside the construction impact zone. Rehabilitation of the disturbed areas would be associated with the demolition and removal of vacant buildings and other structures, which the Department of Infrastructure and Regional Development is undertaking as part of the day-to-day management of the airport site. The remaining topsoil would be stockpiled within the construction impact zone. The size of the stockpiles will be limited to a height of two metres to prevent deterioration of the material to be used as topsoil and appropriate erosion control devices will be installed around the stockpiles.

Based on the indicative construction schedule, topsoil stripping would commence in the north-east of the airport site and progress to the south-west. Erosion and sedimentation controls would be installed before the start of topsoil stripping in each area of work.

Bulk earthworks

The airport site is characterised by rolling landscapes typical of the Bringelly Shale with a prominent ridge in the west of the site, reaching an elevation of about 120 metres Australian Height Datum (AHD), and smaller ridge lines in the vicinity with elevations of about 100 metres AHD. The topography of the airport site generally slopes away from the ridges in the west, with elevations between 40 metres and 90 metres AHD, with the lower elevations toward Badgerys Creek.

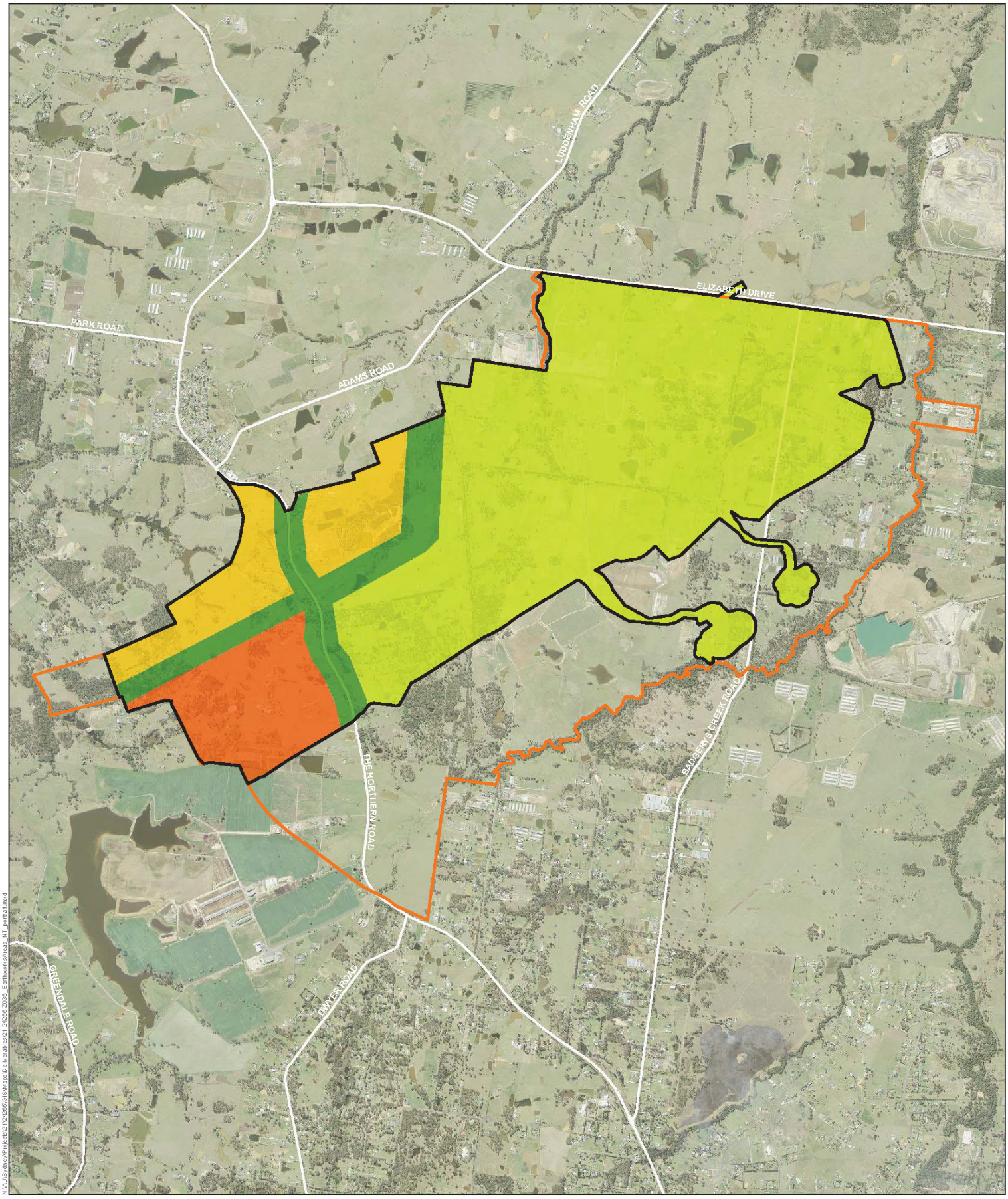
Major earthworks are required in order to achieve a level surface suitable for construction of the airport runway. The approximate elevation for the airport runway is 93 metres AHD on the northern end and 73 metres AHD on the southern end. The approximate elevation was selected in order to balance the cut and fill across the site and thereby avoid the need for any off-site disposal of surplus material. However, at the completion of bulk earthworks the landform would be left higher. This is in order to prevent degradation of the subgrade, which could be exposed to the elements for up to two years.

Bulk earthworks would involve excavation (or cut) of approximately 22 million cubic metres of earth, and a similar amount of embankment construction (or fill). The majority of the bulk earthworks is expected to be undertaken by load and haul crews (either scrapers or excavator and trucks) and placement crews (compactors, rollers, graders and water carts). The use of controlled blasting may be required to excavate isolated areas of hard rock throughout the construction impact zone. Further detail about controlled rock blasting has been provided in Chapter 11 (Volume 2b) of this EIS.

The indicative construction schedule assumes that the bulk earthworks would occur in two phases:

- Phase 1 earthworks (east, north-east and south-west) would be undertaken prior to decommissioning the TransGrid power line and relocating The Northern Road; and
- Phase 2 earthworks (earthworks balance) would entail the remainder of earthworks following decommissioning of the TransGrid power line and relocation of The Northern Road.

Indicative earthworks volumes for each area (east, north-west, south-west and balance areas) are shown on Figure 6–8 and summarised in Table 6–5. The excess material from the south-west area and the earthworks balance area would be transported and placed in the north-west area.



Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

- Airport site
- Construction impact zone

Construction areas

- Earthworks balance
- East
- North-west
- South-west

0 250 500 1,000
Metres

N

Figure 6-8 - Construction areas

Table 6–5 Indicative earthworks quantities by area

Phase	Area	Approximate cut (million cubic metres)	Approximate fill (million cubic metres)	Cut/fill balance (million cubic metres)[1]
Phase 1	East	13.0	16.6	3.6
	North-west	1.2	2.5	1.3
	South-west	3.4	.0.7	-2.7
Phase 2	Earthworks balance	4.5	1.2	-3.4
Total		22.0	20.9	-1.1

[1] Positive number is excess cut

Construction water

Up to 1.36 megalitres of water would be required per day for site preparation activities. Of this, about 8,600 litres (0.0086 megalitres) is expected to be required as potable water for the construction workforce. Water would be sourced through access to existing water supply pipelines and from stormwater runoff captured in sediment dams or farm dams at the airport site or procured from alternate sources. Water demand for moisture conditioning of bulk earthworks (to allow compaction) would be in the order of 650,000 cubic metres (650 megalitres) over the construction programme. The earthworks crews would move approximately 37,000 cubic metres of material per day, requiring a daily demand of around 1.1 megalitres of water daily for soil conditioning and approximately 0.25 megalitres for dust suppression.

Existing surface water (farm dams and sediment basins) would be used to capture run off for water before resorting to the use of potable water. There are two potable water supply pipes located adjacent to the airport site along Elizabeth Drive and The Northern Road. Offtakes would be installed on the pipes to allow for 24 hour access to water. Temporary storage dams would be constructed adjacent to the offtakes to provide two days' storage, and standpipes would be fitted to allow filling of water carts.

6.3.5 Installation of drainage

Stormwater management at the airport site would involve a series of grassed swales to convey runoff from the developed areas within the airport site, and a series of bio-retention and flood detention basins to manage flow quality and quantity prior to discharge to the receiving waters. It is expected that six detention basins with capacities of between 39,000 and 125,000 kilolitres would be established on the periphery of the airport site as part of the Stage 1 development. Each basin will incorporate a smaller forebay area for the provision of a bio-retention system for the treatment of low flows prior to discharge to the environment. The locations of the basins have been selected to allow discharge points consistent with existing drainage linesand would be sized to manage post-development flows to maintain predevelopment levels. A smaller bio-retention basin with no allowance for flood storage is also anticipated in the north-western corner of the site draining to Duncans Creek. The precise location and dimensions of the basins would be confirmed as part of detailed design of the earthworks and drainage solution.

The basins and their associated drains would be constructed, early in the indicative construction schedule to direct runoff for treatment before discharge from the airport site. The basin forebay would include provision for Alum (aluminium sulphate) dosing to assist with settling of dispersive sediments, improving water quality before discharge to receiving waters. Depending on final earthworks levels, some amendment to the inlet structures may be required to divert runoff into the ponds at the completion of the earthworks. Installation of pipe and/or box culverts would occur progressively as the earthworks are completed.

Due to the requirement for the drainage to fit in with earthworks progression, it may be necessary for the drainage crew to demobilise and remobilise to the airport site at various times during the bulk earthworks.

Materials such as precast concrete products (for example, pipes, box culverts and headwalls) as well as bedding sand and any select backfill would be delivered to the airport site progressively, as required. Where possible, the materials would be delivered directly to their final position. If this is not possible, they would be delivered to the laydown area and then moved at an appropriate time to their final position using onsite cranes and heavy vehicles.

Open drains would be constructed progressively as earthworks are completed. The drain construction would commence at the downstream end of the drain and work upstream to prevent excessive standing water in the drains after rain. Lining or grassing of open drains would be completed as soon as practicable after excavation. Material from the excavation of drains would be used as general fill in the construction activities. Depending on the size of the open drains, they may be constructed by excavator and truck. If drains are of sufficient size, the earthworks scrapers would excavate as part of the bulk earthworks.

6.3.6 Rehabilitation

Topsoil that was previously stripped from the site would be spread to areas nominated for landscaping and/or grassing. The topsoil would be transported by scrapers and spread by dozers to the nominated depth. Seeding and/or planting would occur after the spreading of topsoil.

Topsoiling and seeding would be undertaken as soon as practicable after completion of the bulk earthworks, to assist with erosion and sedimentation control.

6.4 Aviation infrastructure activities

6.4.1 Establishment of site facilities

The indicative construction schedule shows that aviation infrastructure activities would be staged for progressive commencement, in line with the completion of components of the site preparation activities. Construction site facilities expected to be required are included below. The precise facilities and their location would be refined by the construction contractor and reflected in relevant plans within the Construction Environment Management Framework.

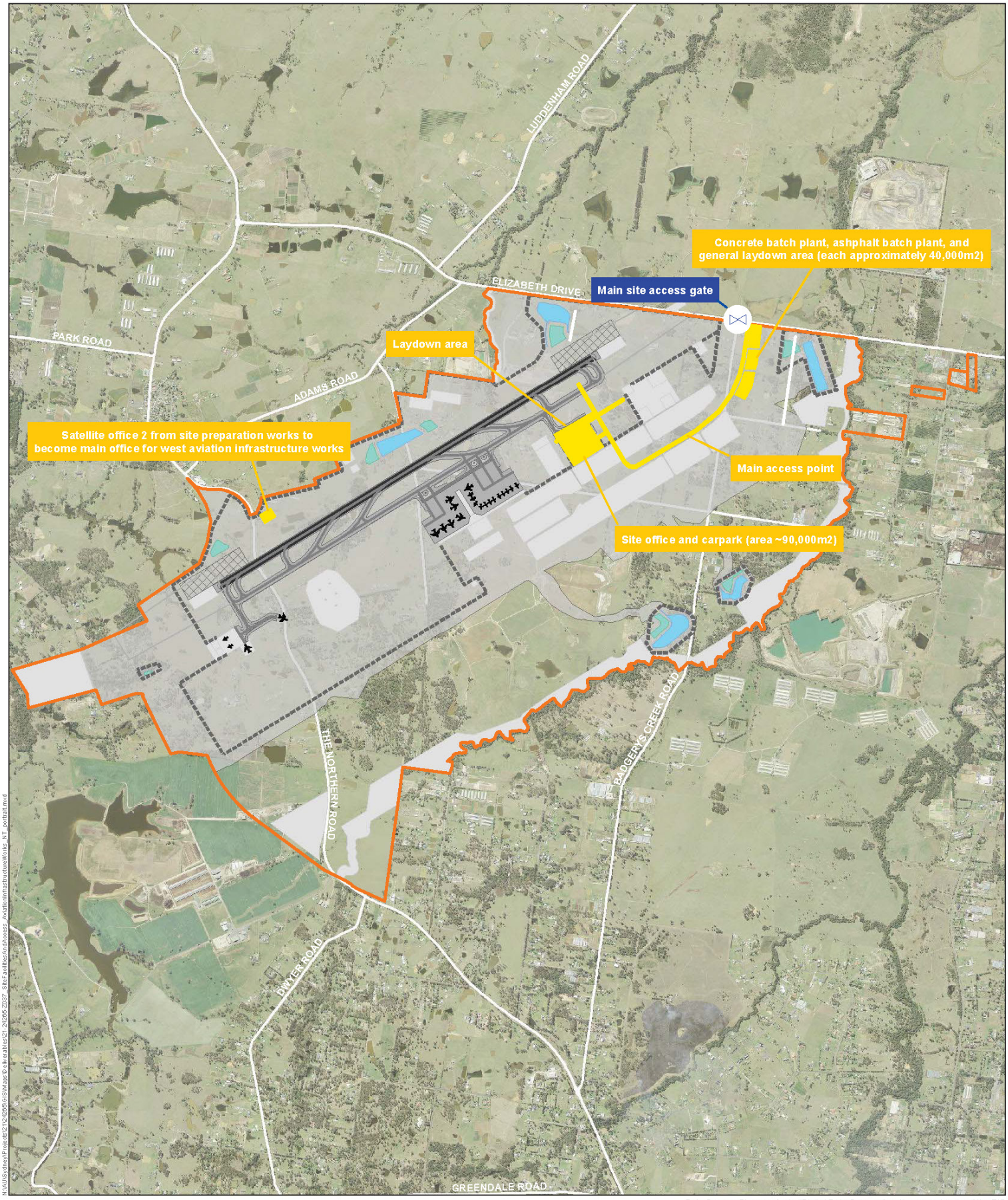
- **Site office and carpark.** A site office would be constructed in the north-east of the site with an indicative location as shown on Figure 6–9. The site office would accommodate around 240 people and the carpark to be provided adjacent to the office would have around 600 car spaces (for light vehicles only), providing parking for both office and site based construction personnel. The site office would include an office, first aid and training rooms, lunch room and

male and female toilets. Services (except sewerage) to the site office would be provided from the existing services on Elizabeth Drive. Sewage holding tanks would be provided and emptied regularly and carted offsite.

- **Asphalt batch plant.** Due to the large quantity of asphalt required for the pavement construction, an asphalt batch plant would be established on site. The asphalt batch plant would be located in the north-east of the airport site. The total asphalt required would be approximately 712,000 tonnes over a total period of 48 months. The plant would operate for approximately 550 days over this period, producing a daily average of about 1,300 tonnes.
- **Concrete batch plant.** In order to ensure reliable and continuous supply of concrete, a concrete batch plant would be established on site. It would be located in the same vicinity as the asphalt batch plant. The concrete required would be approximately 224,000 cubic metres for pavements and 234,100 cubic metres for buildings, a total of about 458,100 cubic metres. The concrete would be required over a period of approximately 54 months with a daily average of about 424 cubic metres.
- **Laydown areas.** Two laydown areas would be provided. The first would be adjacent to the asphalt and concrete batch plants. The second laydown area would be provided to the north of the site office and car park. The laydown areas would be used for the storage of materials on site before integration into the aviation infrastructure works.

6.4.2 Establishment of main access point

The main access point to the airport site would be from Elizabeth Drive with some access also to occur from The Northern Road and Badgerys Creek Road, as shown on Figure 6–9. The main access point would be surfaced with gravel pavement and a two-coat seal. Other internal site access roads would be gravel pavement maintained by grader and water cart.



Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

- Airport site boundary
- Site facilites
- Site access - gates

Notes:
1. Major site access roads to be sealed. Other access roads to be unsealed and maintained by grader and watercart.
2. Batch plants are located close to site boundary to minimise travel distance onsite for delivery vehicles

0 200 400 800
Metres

N

Figure 6-9 - Aviation infrastructure activities - facilities and access

6.4.3 Construction of paved areas

Construction of paved areas (including the northern runway, taxiways, aprons, internal roads and carparks) could involve the following.

- **Pavement box out.** Areas of pavement would be left high at the completion of the bulk earthworks (to prevent degradation of the subgrade, which could be exposed to the elements for up to two years). When the pavement preparation activities are under way, the earthworks would be completed to subgrade level (that is, the underside of pavement). The earthworks would be undertaken by load and haul crews (either scrapers or excavator and trucks) and placement crews (compactors, rollers, graders and water carts). Water infrastructure used in the site preparation activities would be retained to supply water for these activities. The general earthworks profile for the pavement box out is shown on Figure 6–10.

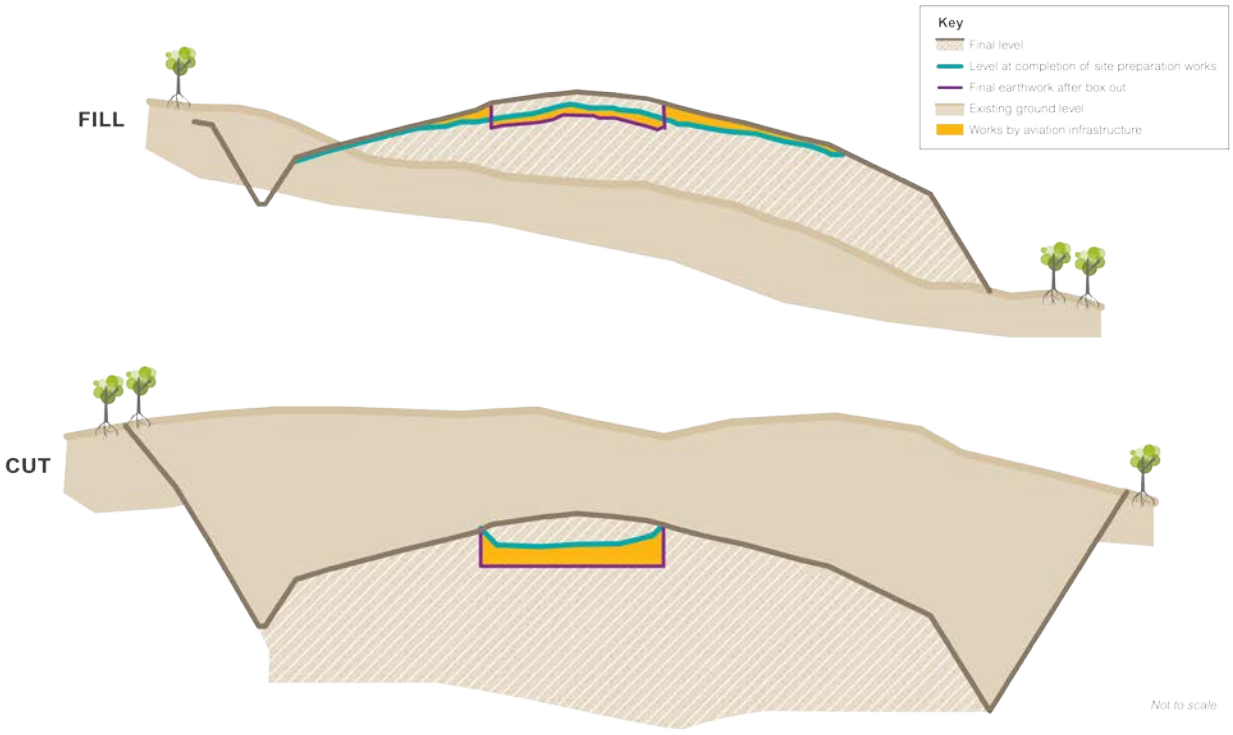


Figure 6–10 Earthworks profile

- **Subgrade preparation.** At the completion of the box out, the subgrade would be tested for conformance. If the subgrade is non-conforming, the material would be removed and replaced with suitable material. If it is conforming, it would be ripped and re-compacted. Machinery used in this operation would comprise a grader, water cart and smooth drum roller. If removal is required, the earthworks scrapers would be utilised. The unsuitable material would be disposed of on site in non-critical earthworks areas.
- **Gravel placement.** Gravel would be placed at all paved areas constructed within the airport site. The gravel would be placed by a paver and loader and compacted by a smooth drum roller.
- **Asphalt placement.** The runway, taxiways, internal roads and carparks would be surfaced with asphalt. Asphalt would be placed by an asphalt paver fed by a material transfer vehicle

from the on-site batching plant. A multi-tyre roller and smooth drum rollers would follow the paver to compact the asphalt.

- **Concrete placement.** The aprons would be surfaced with reinforced concrete.
- **Installation of lighting.** Ground lighting would be installed within the pavement surface for aircraft ground navigation.

6.4.4 Provision of services

Major services that would need to be reticulated around the airport site include electricity, telecommunications, gas, water and sewerage. Where possible, the services would be designed and installed in shared, underground trenches following the conclusion of the site preparatory activities and would be designed to service both construction and operation of the aviation infrastructure. Services would be provided subject to agreements with the relevant operators, generally as described below.

- The 700 kVA of electricity estimated to be required during construction is expected to be provided via connection to electricity assets operated by Endeavour Energy. Current forecasts indicate there would be sufficient feeder capacity to meet the energy requirements during construction (Endeavour Energy 2014). Poles, wires and buried conduits to reticulate power to and within the airport site would be constructed in accordance with Endeavour Energy standards by a designated service provider.
- The 25,500 litres of potable water estimated to be required each day during aviation infrastructure activities is expected to be provided via connection to existing assets. Temporary storage dams and associated offtakes from Sydney Water pipes would be established to support construction, whereas connection to the supply main at Elizabeth Drive would be required during operation. There is currently sufficient capacity at the anticipated connection point to supply the required potable water. Water supply works to reticulate water to and within the airport site would be carried out in accordance with the relevant standards.
- The 24,000 litres of wastewater and sewage estimated to be generated each day during aviation infrastructure activities would be stored in tanks at the airport site for collection by disposal trucks to a licenced facility.
- Telecommunications would be facilitated via connection to underground optical fibre cable and customer multiplex cabinets. It is anticipated that a connection would be made to the existing underground optical fibre cable at Elizabeth Drive. Poles and wires, or underground cables, would be constructed in accordance with relevant standards.

6.4.5 Building construction

Construction of the airport buildings (for example, the terminal complex, air traffic control tower, freight and maintenance facilities) would generally involve the following stages:

- foundations and floor slabs, structural framing and intermediate floors (if required);
- roofing;
- exterior wall systems;
- vertical circulation;

- automated systems and security systems (if required);
- internal fit out; and
- commissioning.

Detailed design of the proposed airport would be carried out in accordance with the requirements set out in the Airport Plan.

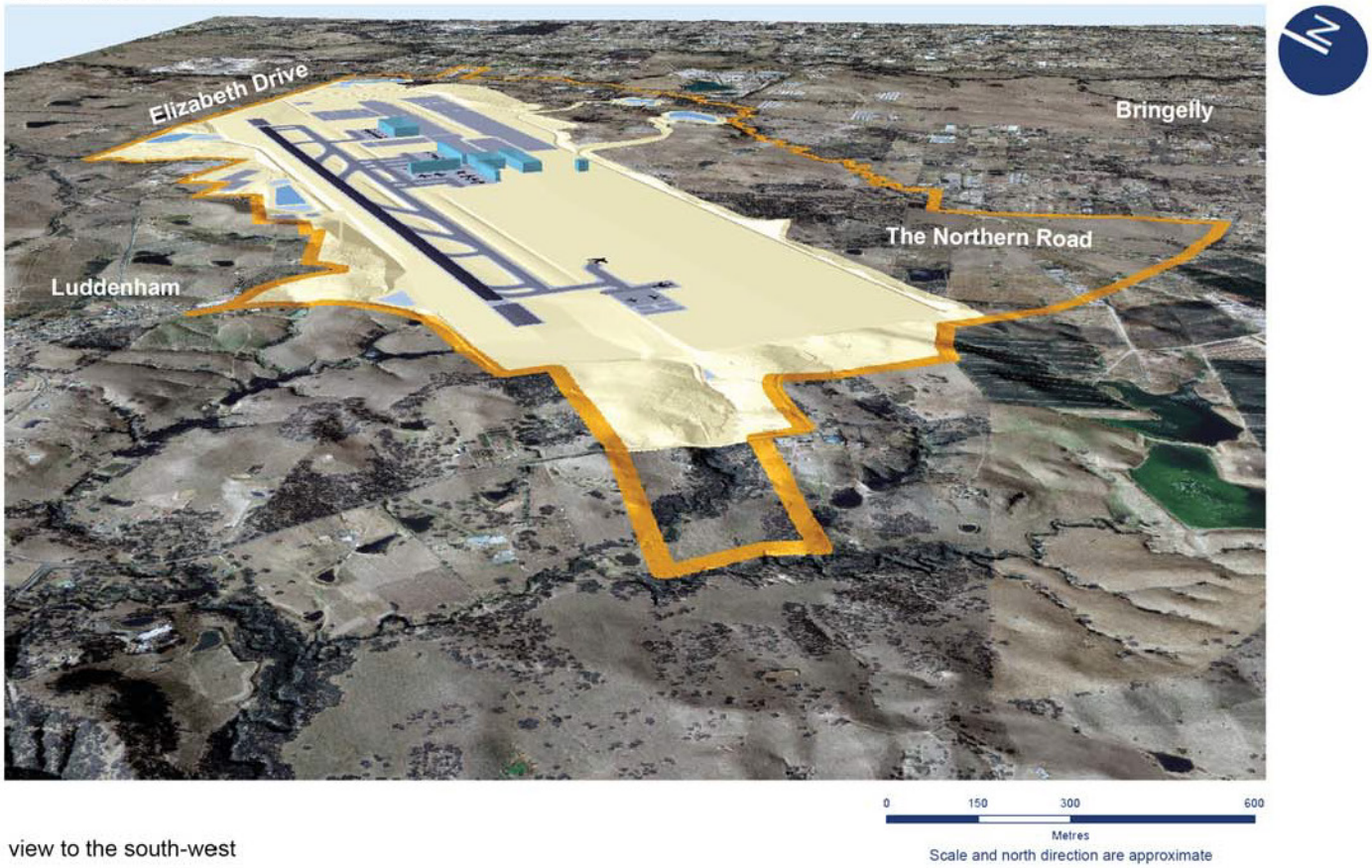
6.4.6 Construction of fuel farm

The temporary fuel farm for construction activities outlined in Section 6.3.1 would eventually be replaced with a permanent fuel farm to support the operation of the proposed airport. The fuel farm would be designed and constructed in accordance with AS 1940-2004.

6.4.7 Final landform

The final landform incorporating proposed bulk earthworks and aviation infrastructure is indicatively depicted in Figure 6–11.

view to the north-east



view to the south-west

LEGEND

- Airport site
- Terminal buildings and support facilities
- Runways
- Taxiways and aprons
- Landscape area
- Detention basin
- Bio retention basin

Figure 6-11 - Indicative Stage 1 Landform

6.5 Construction management

Construction of the Stage 1 development would be undertaken in accordance with a Construction Environmental Management Framework. The Framework would include:

- consideration of all required statutory and other obligations, including consents, licences, approvals and voluntary agreements;
- management policies, procedures and review processes to assess the implementation of environmental management practices and the environmental performance of the proposed airport against defined objectives and targets;
- requirements and guidelines for management having regard to mitigation measures specified by this EIS and the revised draft Airport Plan;
- requirements in relation to incorporating environmental protection measures and instructions in all relevant standard operating procedures and emergency response procedures;
- specific procedures, including monitoring, as identified in this EIS;
- roles and responsibilities of all personnel and contractors to be employed on site;
- ongoing engagement with the community surrounding the airport site, including procedures for complaints handling and communication methods;
- a monitoring and auditing programme;
- environmental sub-plans specified in this EIS;
- an incident response procedure; and
- a contingency plan for utility disruptions.