

Mackay Hospital Expansion Project: **Assessment of Options for Interim** **Helicopter Landing Site**



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Mackay Hospital Expansion Project Assessment of Interim HLS Options

Overview

The Mackay Base Hospital (MBH) Expansion Project announces the delivery of an additional 128 much needed hospital beds for the Mackay Community. The site for the expansion of clinical services, referred to as the P-Block site, is adjacent to the existing ground level Helicopter Landing Site (HLS) that currently serves MBH.

The need exists to provide an interim HLS as the construction activities for the MBH expansion will be incompatible with the safe and efficient conduct of helicopter flights and patient transfers using the existing HLS. The detailed planning for the project indicates construction will be a three-year period and that the existing HLS will need to be decommissioned before the end of February 2024.

This report has been prepared to record the assessment of options identified as potential sites for the interim HLS, noting that the applicable standards for the planning, design and operation of an interim HLS are no different to those applicable to a facility with a longer-term design life.

The scope of works for the MBH Expansion includes the provision of a rooftop HLS which will provide a direct vertical linkage with the hospital's Emergency Department. It is acknowledged that none of the interim HLS options are able to provide the level of safety, efficiency and patient welfare that the rooftop HLS will provide and that a degree of compromise is required when reviewing each of the identified potential options against the key performance criteria.

The information includes details in **Part 1** of the design helicopter, the relevant design and operational standards for the assessment of options and the assessment criteria applied to each identified option. **Part 2** of the report presents the details of each option considered and the consultation undertaken with the relevant aeronautical, medical and community stakeholders whilst **Part 3** presents an assessment of each of the identified interim HLS options with a preferred option nominated.

Part 1: Analysis Framework

Design Helicopter

The helicopter types currently engaged in the provision of Helicopter Air Ambulance (HAA) services for MBH are the Bell 412 operated by the Mackay-based CQ Rescue Service and the Leonardo AW139 operated by QG Air from their Townsville base and Capricorn Rescue operating from their Rockhampton Base whilst noting that CQ Rescue will transition to the AW139 during 2024.

The interim HLS facilities need to be suitable for use by both the Bell 412EP and the AW139 in the short term with the AW 139 becoming the dominant type once CQ Rescue transition to the AW139 in 2024.

The Bell 412EP has a D-value (the largest overall dimension with rotors turning) of 17.1 metres and a maximum mass of 5.4 tonnes. The AW139 has a D-value of 16.7 metres and a maximum mass of 7 tonnes.

Given that the projected design life of the interim HLS is only three years, consideration of a longer-term supplementary design helicopter is not necessary and the AW139 is the primary design helicopter type for the interim HLS.

Relevant Standards and Recommended Practices.

Helicopter Air Ambulance flights are classified as Medical Transport flights and are required to operate within the performance criteria standards prescribed in Part 133 of the Civil Aviation Safety Regulations. These criteria include the ability to operate with safety through all phases of flight in the event that one engine is inoperative (OEI).

The CASR Part 133 regulatory criteria require the provision of an HLS that is sized to meet the OEI landing area requirements as specified in the relevant supplements to the Rotorcraft Flight Manual. The physical characteristics of an HLS and the associated operational airspace are developed by the International Civil Aviation Organisation (ICAO) and published in Volume II of Annex 14 to the Chicago Convention.

Queensland Health have published a guideline document for Helicopter Landing Sites (Reference QH-GDL-447:2021) which outlines mandatory requirements and recommendations regarding best practice for the planning, implementation and management of Helicopter Landing Sites (HLS) owned and/or operated by Hospital and Health Services (HHS) throughout their life cycle. The guidelines have been prepared as a consolidation of information in reference and regulatory documents published by the Australian Civil Aviation Safety Authority (CASA) and ICAO which were current when the QH document was in preparation.

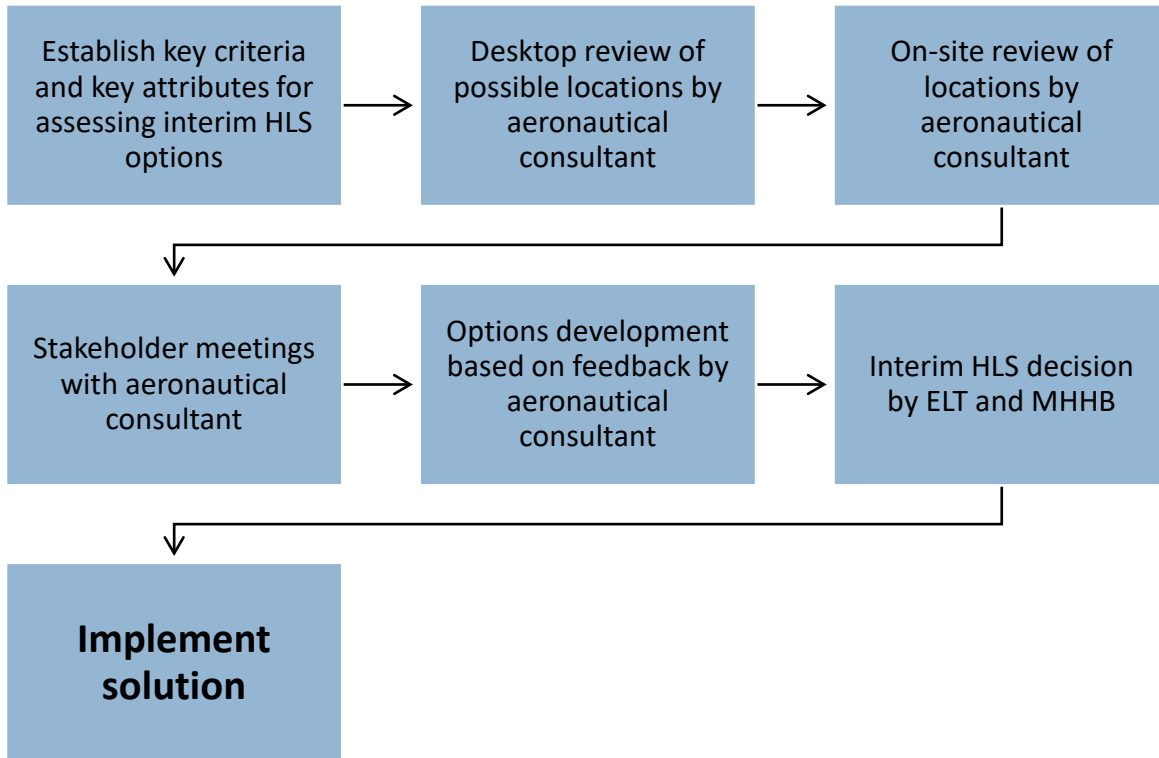
The primary reference documents for the 2021 QH guidelines have more recently been updated with the fifth edition of ICAO's Annex 14 -Volume II in 2020 and the ICAO Heliport Manual in 2021. CASA has subsequently incorporated the ICAO SARPS into their Advisory Circular AC 139.R-01 v1.0 *Guidelines for heliports - design and operation* which was published in June 2022 and updated as Version 2.0 in December 2023.

Each of the MBH interim HLS options has been assessed against the heliport SARPS presented in AC139.R-01 v2.0.

Analysis Process for the interim HLS options

The steps undertaken in the analysis of the identified interim HLS options is presented in *Figure 1*.

Figure 1: Analysis Process Steps



Primary HLS Physical and Operational Characteristics

The primary physical and operational characteristics of an HLS as listed below have been utilised in the assessment of each interim HLS option.

Accessibility

Accessibility refers to the ease with which the helicopter, support personnel and support vehicles can access the HLS.

This consideration includes

- ensuring the site is unoccupied ahead of the helicopter landing;
- obstacle free airspace remains unobstructed;
- obstructions including objects, people and dogs are clear of the HLS area; and
- ground access through gates and/or fences is available.

Accessibility extends to the availability of lighting for the TLOF and FATO areas as well as external lighting to assist the loading and unloading activities at night.

Accessibility also extends to the staffing and inspection requirements before and after each helicopter arrival or departure and for locations that do not have restricted access, the security of the helicopter and associated facilities whilst the helicopter is stationary on the HLS.

Existing site conditions

The potential for development of each interim HLS site option is acknowledged as a variable factor and has been assessed initially through a desk-top study followed by a physical site visit and feedback during stakeholder consultations.

The factors considered in the development potential assessment include

- the technical criteria for an HLS and associated airspace,
- access to the location for vehicles and personnel;
- current ownership of the location;
- the presence of existing vegetation, fencing and access control measures;
- the availability of utilities such as water sewer and electrical connections;
- the current usage of the location; and
- proximity to existing residential areas.

Proximity to Mackay Base Hospital Emergency Department

Each patient transfer between the helicopter and the hospital requires the patient to be moved from either the helicopter or the hospital ED to a generally alternative stretcher or equipment for the travel element of the transfer process.

The length of the travel element can be measured in metres or time with the time factor being the critical characteristic. Consultation with user groups has identified a limit of 200 metres is applicable for ground movement of patients without mechanical assistance from a motorised gurney or separate vehicle such as the electric stretched carriers seen at football games.

The physical proximity to the MBH ED can be identified for each interim HLS option but that characteristic needs to be assessed in terms of time for the physical movement to be completed. A sub-characteristic of the transfer travel time is the level of clinical support available for the patient throughout the duration of the travel element.

The development of an interim HLS requires consideration of regulatory approval processes including land use zonings and permitted uses, the submission and approval of development applications and the associated timings for elements of an approval process such as the public consultation period for a proposed development.

Safety, security and privacy considerations

The development and operation of an HLS needs to consider and provide for the safety of the helicopter and the patient as well as for the attendant personnel and observers.

The security of the HLS needs to be considered in terms of protecting the helicopter whilst it has landed; the security of any equipment stored on site between helicopter flights or of any permanent infrastructure or support equipment provided at the site.

The privacy of patients needs to be respected and protected at the HLS during the loading or unloading of a patient which may be observed by onlookers and on occasions, the media.

Community impact of helicopter flights using the interim facility

The existing HLS is largely remote to residential areas but retains the potential to interact with community as users of the riverside cycle and walking path as well as people outside the existing birthing centre observing the helicopter when using the existing HLS.

The use of an interim HLS may affect the broader community which are not currently exposed to helicopter noise and rotorwash effects or may be impacted indirectly by aspects of the interim HLS development such as the decommissioning of carpark places at the hospital or the removal of access to community sites.

Design life of infrastructure

The interim HLS by definition has a relatively short design life, nominally three years.

The longer-term utility of infrastructure provided in support of an interim HLS for MBH as well as the capital costs involved in the provision, operation and maintenance of the infrastructure is a factor to be considered for each identified option.

Communication and coordination systems

The safety and efficiency of patient transfers by helicopter is very much reliant on effective communications and coordination between the numerous parties involved.

The involved parties may include most if not all of the following:

- the helicopter flight crew;
- the helicopter medical crew;
- the hospital Emergency Department;
- Queensland Ambulance Service;
- Retrieval Services Queensland;
- the ground crew at the HLS; and
- possibly Police or SES personnel to prepare a public area site ahead of a helicopter arrival.

Whilst existing communication protocols are in use for the patient transfers at the hospital HLS and at Mackay Airport for fixed wing and rotary wing aircraft, stakeholder consultation identified the potential exists to improve the efficiency of patient transfer activities through enhancements and reviews of the existing protocols and practices.

Mackay weather considerations

The Mackay climate presents with hot and humid conditions for a large part of the year.

The Bureau of Meteorology climate statistics for Mackay indicate rainfall in excess of 1 millimetre is recorded on 25% of the year with 10% greater than 10 millimetres and 5% in excess of 25 millimetres per day. In addition, temperatures in excess of 30°C are recorded on 60% of days during the summer months. The facilities associated with the interim HLS need to support the Occupational Health and Safety considerations for patients and attendant personnel.

Part 2: Siting options considered and stakeholder consultation

Desktop review of possible options:

Initial planning for this project included the identification of potential sites for an interim HLS with reference to local knowledge as well as vertical imagery from the Google Earth and Nearmap.com resources.

The preparatory discussions identified that the existing ground level HLS will not be available once the adjacent P-Block construction works commence. The discussions also acknowledged that Mackay Airport is currently used for patient transfers when fixed wing air ambulance aircraft are required and also as an alternate site for rotary wing helicopters when the hospital HLS is not available or not suitable.

The initial analysis identified that the options for an interim HLS can be assigned to three groupings:

- in the vicinity of MBH within relatively short walking distance of the hospital ED (noting that further than 200 metres requires mechanical assistance);
- on airport locations with road ambulance transfers to the ED or
- at general community locations with road ambulance transfers to the ED.

None of the identified sites were rejected during the initial phase of analysis with the decision taken by the project team to review each after a physical site visit and consultation with stakeholders.

The relative location of each siting option relative to the MBH ED and the associated travel routes are shown in Figure 2 with enlarged images of areas in Figures 3, 4 and 5.

Figure 2: Location of Nominated Sites Relative to MBH ED



Options in the vicinity of Mackay Base Hospital

The following options were identified within the group of options in the vicinity MBH with the potential for patient transfer to occur without the use of a supplementary road ambulance.

It is noted that all of the options other than #6 and #7 involve distances greater than 200 metres and will need to incorporate mechanical assistance for the patient transfer.

Figure 3 shows the relative location of each potential interim HLS siting option in the vicinity of the hospital site.

Option 1 is the open area east of the Glenella Connection Road and south of the Pioneer River. This location is the closest to the hospital campus but being undeveloped and relatively remote does not appear to have any convenient connections to services. Preliminary investigations indicate that whilst it is likely an HLS could be established at an elevation similar to Glenella Road, the adjacent areas are within the identified flood zones for the Pioneer River.

Option 1A connects to the hospital via Bridge Road using the existing cycling and walking path, a distance of 950 metres.

This travel distance exceeds 200 metres and will require mechanical assistance for the patient transfer. In addition, this route lies within the flood zone for the adjacent creek which prompts the question of how and where to make transfers in the event the creek is flooded.

Option 1B connects to the hospital over a distance of 350 metres with the air of a purpose-built bridge link crossing the creek on the western side of the hospital at an elevation above the predicted flood levels. As the travel distance exceeds 200 metres, mechanical assistance for the patient transfer would be required.

Option 1C requires a road ambulance to connect with the hospital over a travel distance of 1.5 kilometres on the roads network. This option would require the introduction of procedures to enter and leave the traffic flow on Glenella Drive which can be subject to heavy traffic volumes in peak times.

Option 2 is an elevated HLS built on a support structure located outside of the hospital site boundary with a rampway connection to the hospital over a total travel distance of 350 metres.

Option 3 is a ground level HLS built on the carpark at 476 Bridge Road with an attendant assisted transfer distance of 400 metres to the MBH ED.

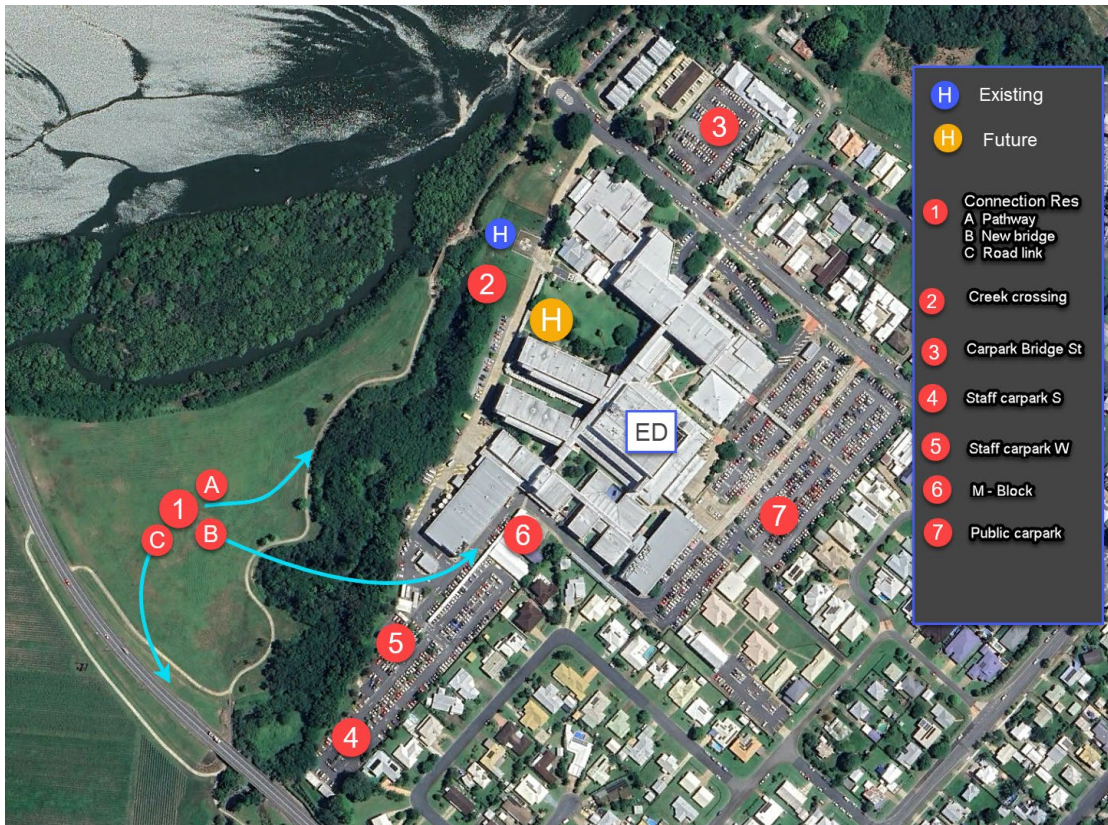
Option 4 is a ground level HLS on the western end of the staff carpark and a travel distance for the patient transfer of 400 metres.

Option 5 is a ground level HLS on the north-western edge of the staff carpark with a travel distance to the ED of 300 metres.

Option 6 is an elevated HLS located on a purpose-built multi-storey frame above the M-Block buildings with a transfer distance of 190 metres and a change in levels to access the Emergency Department.

Option 7 is a ground level HLS on the public carpark area with a travel distance of 100 metres.

Figure 3: Location of sites in the vicinity of MBH



Options located on Mackay Airport

Mackay Airport is the operational base for the CQ Rescue organisation which undertakes patient transfer on the western apron adjacent to their base facilities.

Patient transfers currently occur at the eastern apron area at Mackay Airport when fixed wing air ambulance aircraft are involved in the patient transfer. The eastern apron is also used for helicopter patient transfers by QG Air operating from their base in Townsville and by the Capricorn Helicopter Rescue Service operating from their base in Rockhampton.

Figure 4 shows the location of the on-airport options which have been identified as potential sites for the interim HLS.

Each option requires the use of a road ambulance to complete the transfer between the helicopter and the hospital.

Option 8 is the area adjacent to the airport's Rescue and Fire Fighting Service (RFFS) base with access through Gate 23 and a transfer distance of 3.7 kilometres. Google Maps indicates the travel time for this route from Gate 23 as 8 to 13 minutes, depending on time of day and local traffic.

Option 9 is the eastern apron area currently used by fixed wing air ambulance flights as well as helicopter air ambulance flights operated by QG Air and CapRescue services. The travel distance to the hospital from the east apron is 6.2 km for which Google Maps nominates a travel time of 10 to 16 minutes.

Option 10 is the existing helicopter stands on the western side of Runway 14/32 with access through Gate 21 and Roy Steen Street. Google Maps indicates a travel distance to the hospital of 6.2 km and a travel time between 11 and 18 minutes.

Option 11 refers to the existing CQ Rescue base with a travel distance to the hospital of 5.4 km and a travel time between 9 and 14 minutes.

Option 12 refers to a new location on the western apron developed to serve as an alternate to the eastern apron for fixed wing and rotary wing air ambulance aircraft. The travel distance has been identified as 5.1 km with a travel time between 9 and 14 minutes.

Figure 4: Location of identified on-airport sites



Options located within the general community areas

Figure 5 indicates the relative location of identified off-airport sites within the broader West Mackay community. None of the sites in this group have existing facilities that could be re-purposed to serve as an interim HLS and each would need development of the helicopter touchdown and lift off (TLOF) area as well as the associated facilities.

Option 13 refers to a potential development on Hume Street with a travel distance of 1.4 kilometres and an estimated travel time from Google Maps of 3 minutes.

Option 14 refers to the Mackay Showground which is 2.9 kilometres from the hospital with a travel time estimated to be between 6 and 9 minutes.

Option 15 refers to the open area on Lansdowne Street west of the Glenella Connection Road which is 1.5 kilometres from the hospital with an estimated travel time of 3 minutes.

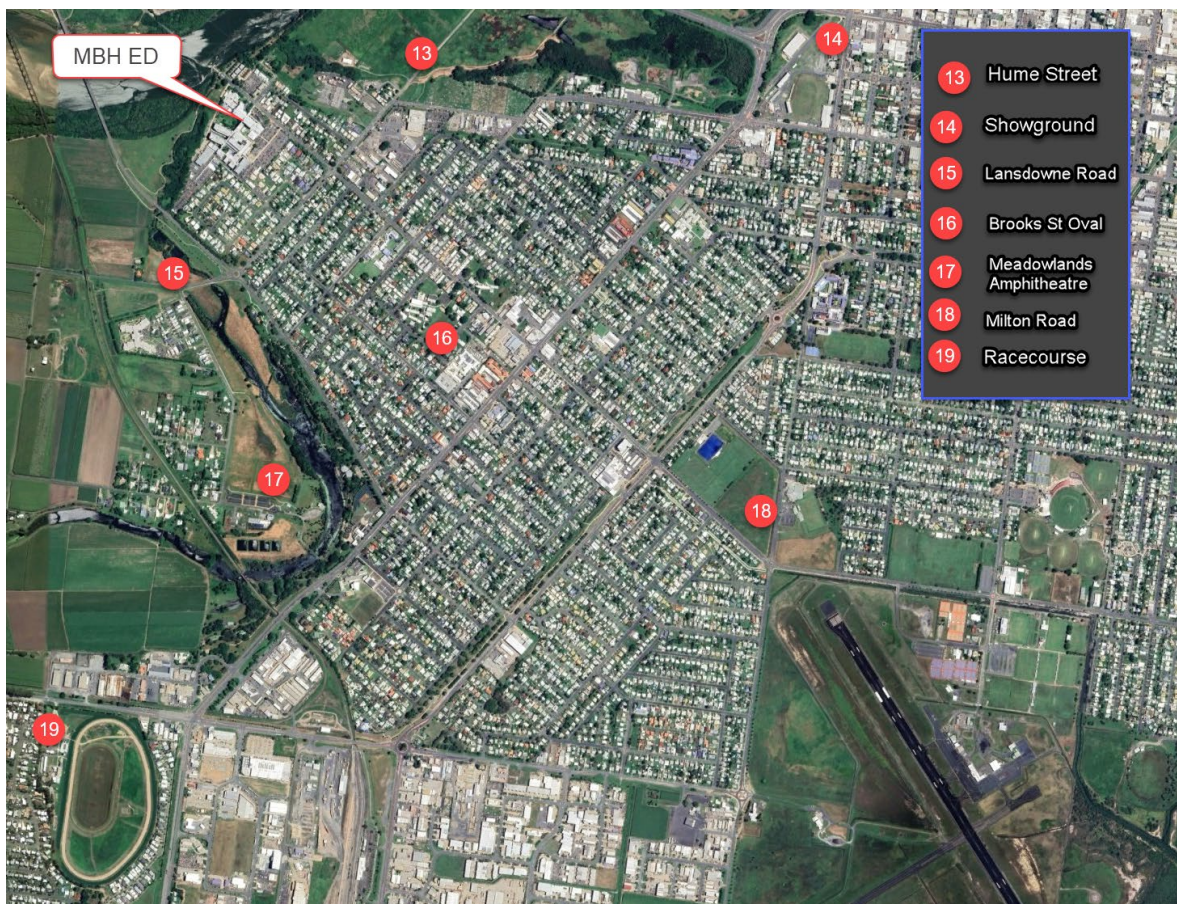
Option 16 refers to the existing oval in Brooks Street Mackay which is 1.4 kilometres from the hospital with an estimated travel time of 4 minutes.

Option 17 refers to the area identified as the Meadowlands Amphitheatre which is 2.3 kilometres from the hospital with an estimated travel time of 5 minutes.

Option 18 refers to the open grassed area off Milton Road which is 3.0 kilometres from the hospital with an indicated travel time between 6 and 10 minutes.

Option 19 refers to the Mackay Racecourse which is 3.7 kilometres from the hospital with a nominated travel time of 6 to 8 minutes.

Figure 5: Location of identified community sites



Summary of Stakeholder consultation

The identification and analysis of options for an interim HLS to serve Mackay Base Hospital has been undertaken after consultation and input from all identified involved parties including:

- Mackay Hospital and Health Service personnel in the clinical, patient transfer, engineering, financial and project management departments;
- Queensland Ambulance Service;
- Retrieval Services Queensland;
- CQ Rescue;
- QG Air;
- MBH Consumer Advisory Partners; and
- Mackay Airport

The consistent feedback from all discussions was that patient welfare is the paramount consideration and that helicopter air ambulance flights need to be conducted with safety for the aircraft and crew as well as any attendant ground personnel.

The group acknowledged that the airport is currently in use for patient transfers for fixed wing and some rotary wing aircraft and works well in general terms, particularly since the recent arrangements were introduced whereby CQ Rescue has been given access to a road ambulance to support their patient transfers.

The discussions with the stakeholder representatives did identify that improvements to the efficiency of patient transfers at the airport could be achieved with what appears to be relatively simple 'tweaks' to the existing protocols and procedures. It is proposed that these can be investigated with greater detail in the near future but include simplified after-hours access to the apron areas for ambulance vehicles and personnel when the airport safety officer is off-duty.

Enhanced communication protocols between the parties were identified as an enhancement to ensure delays in the availability of road ambulances are minimised, noting the improvements reported by CQ Rescue following the allocation of a road ambulance to their operations.

Part 3: Assessment of identified interim HLS options

The identified options for the establishment of an interim HLS to serve Mackay Base Hospital during the construction period of the P-Block development have been assessed against the criteria presented in Part 1 of this report.

It needs to be noted that any reference to times in the following discussion relates only to the duration of the travel component between each site and the hospital.

The overall travel time for a patient transfer needs to include the addition of shutdown/startup times for the air ambulance helicopter before and after doors are closed.

The overall transfer activity duration needs to include the transfer times for loading and unloading of patients to and from the mobile gurney or road ambulance and the reverse loading unloading activity at each end of the transfer journey.

The helicopter shutdown and startup duration will not change in the future when the rooftop HLS is in use but the loading/unloading and travel times will be significantly less than those associated with the interim arrangements or the existing ground level HLS.

The location of options in the vicinity of the hospital are shown in Figure 3.

Option 1 adjacent to the Glenella Connection Road is located on land owned by the Queensland Transport and Main Roads Department and whilst the HLS could be established at an elevation above predicted flood levels, the adjacent areas and creek are within the identified flooding zones for the Pioneer River. Apart from needing approvals to proceed and the time involved in developing the facility, consideration needs to be given to the question of what facilities are to be used in the event that the site is not accessible due to flooding.

Option 1A utilises the existing pathway with a travel time between helicopter and hospital of 10 minutes calculated at a walking pace of 5 kilometres per hour or 1.4 metres per second for the 950 metres transfer.

Option 1B involves a shorter travel distance than Option 1A but requires the construction of a link bridge over the creek on the western boundary of the hospital site.

Option 1C involves the use of a road ambulance for the patient transfer between the helicopter and the hospital and consideration of how the vehicle connects with the Glenella Connection Road, particularly in heavy traffic loads.

Option 2 is an elevated HLS placed on a purpose-built framework above the Mackay Council land west of the hospital site with a connecting ramp linking to the hospital buildings. The facility would take time to be developed and the utility of the facility once the rooftop HLS on Block-P is available appears to be limited. An interim HLS in this location would involve overflight of the construction site given the prevailing wind direction which would not be acceptable to the helicopter operators or the construction site.

Option 3 on the eastern side of Bridge Road would require the removal of a significant number of carparking positions as well as subjecting people and buildings in the immediate vicinity to the effects of rotorwash and noise. In addition, this location is relatively close to the array of powerlines connecting to the nearby power sub-station and crossing the Pioneer River.

Options 4, 5 and 7 are ground level HLS built on the existing staff or public carpark areas of the hospital with the removal of a minimum 40 to 50 carparking positions for each option, noting that the availability of car parking on the hospital campus is currently very limited. In addition, the

helicopters will fly into the prevailing winds which are from the south-east and result in the residential area east of the hospital campus being subjected to rotorwash winds and helicopter noise. An analysis of the rotorwash wind effects indicates that short duration wind gusts in excess of 60 kph and peaking at 97 kph will occur within 15 metres either side of the helicopter track with lesser wind velocities occurring at greater offset distances from the helicopter track.

Option 6 is an elevated HLS located on a support frame positioned above the existing M-block buildings. As with options 4, 5 and 7, option 6 would involve helicopter overflight of the existing residential area with associated rotorwash and noise exposure. Option 6 was identified as a potential option to serve as the long-term HLS with the potential to develop the levels below the HLS as office and auxiliary uses but the rotorwash and noise exposure for the neighbours as well as the logistics and timing of the development have resulted in the option being discounted.

The locations of the on-airport options are shown in Figure 4.

Option 8, the airport Rescue and Fire Fighting Service (RFFS) base using Gate 23, is the closest on-airport option to the hospital and the proximity equates to around 3 to 4 minutes less travel time compared to the other on-airport options. Option 8 would require the development of facilities adjacent to Gate 23 as well as an assessment of the suitability of having helicopter activity in the vicinity of the RFFS base.

Option 9 (East apron) and **Option 11** (CQ Rescue, west apron) are the existing on-airport areas where patient transfers already occur with established protocols and procedures available and in use. As such, both options are available without delay and the efficiency of the current operations can be enhanced by considering the suggested ‘tweaks’ to protocols and procedures identified in the stakeholder consultation.

Option 10, the existing helicopter stands, have the potential for expanded use but it is noted that the road access requires travel through the public roadway network serving the airline passenger terminal which adds an additional 3 to 4 minutes travel time to the hospital compared to other on-airport options.

Option 12, the western apron, is currently undeveloped and an access gate with a link to Mike Jones Street as well as amenities for patient reception and attendants’ welfare would need to be constructed. The options for such development will need to be considered further by the airport as well as the potential users of the facility if the decision is taken to develop a dedicated aero-medical transfer facility which could potentially support fixed wing and rotary wing services.

The locations of off-airport non-hospital options are shown in Figure 5.

Option 13, Hume Street, is an undeveloped site with proximity to power lines running parallel to Hume Street which are not compatible with safe helicopter operations. This option does not offer any significant advantages over other options under consideration with the travel distances being similar to other options.

Option 14, the Mackay Showground, has open areas that could potentially be used as an interim HLS but those locations would not be available when functions occur at the showground site raising the question of alternate sites to the interim site with the airport being default location. The travel time to the hospital is not significantly different to any of the other options under consideration.

Option 15, Lansdowne Road is an undeveloped open area west of the Glenella Connection Road which would require the planning, design and construction of suitable facilities before being able to be commissioned as the interim HLS. The travel time to the hospital is not significantly different to any of the other options under consideration.

Option 16, the Brooks Street oval, is located in relative proximity to the hospital but is in a residential area and has an existing function as a community asset, again raising the question of where does the helicopter land when the oval area is in use. The use of option 6 would expose the adjacent residential area to rotorwash and noise effects that currently does not happen.

Option 17, the Meadowlands Amphitheatre site, is undeveloped and would require planning, design and construction activities before it could be commissioned as an interim HLS. The naming of this site indicates it has an existing role to play in the community, again raising the question of what is the alternate site in the event the Amphitheatre is in use.

Option 18, Milton Street, is an open grassed area that would need to be developed before being suitable for use as an interim HLS. It is noted however that the site lies directly below the landing and takeoff airspace for Runway 14/32 at Mackay Airport and would generate an operational risk for both operations. The travel distances from this location are not significantly different to those estimated for the on-airport sites.

Option 19, the Mackay Racecourse, was identified as a potential option in early discussions. Subsequent assessment of the site indicates there is insufficient ground area available to establish an HLS. The open central area inside the track is not available as it would require ambulance vehicles to cross the track and the question of availability when racing events occur is a common question for all the non-airport options.

Conclusion of interim HLS options analysis

A summary of the nominated sites and commentary against the identified criteria is presented in Table 1.

The analysis of identified options for the establishment of an interim HLS to serve Mackay Hospital during the construction phase of the new P-Block development indicates that the continued use of the existing facilities, protocols and procedures for patient transfers at Mackay Airport (Option 9 and Option 11 in Figure 4) represents the best overall solution for an interim HLS facility.

It is recommended that the enhancements to the current arrangements for on-airport patient transfers identified in stakeholder consultations be developed in greater detail and implemented as soon as possible.

It is acknowledged that road ambulance transport between the airport and the hospital is a journey that is likely to be longer than ten minutes and is dependent on road traffic at the time. The duration of the transfer is not significantly different to that associated with other road ambulance options considered and similar to the ground transport variants for the Option 1 site.

It is noted that the road ambulance transfer options provide the best patient care as the patient is stationary inside the moving vehicle and can be given maximum attention by the attendant medical crew that travels with the patient.

One key advantage of the on-airport options is that they currently exist and the identified enhancements can be implemented with minimum delay and at a nominal cost, significantly less than would be involved in any alternate development requiring capital expenditure.

The on-airport options provide the safety security and privacy identified as key criteria and the facilities and procedures will remain available in the longer term following the commissioning of the rooftop HLS above the new P-Block development.

Table 1: Summary of sites and characteristics

Option	Transfer travel time Excludes load/unload times	Transfer Modality	Infrastructure requirements	Environmental impacts	Impacts to Neighbours	Security	Time to deliver solution	Impacts to general community
Airport	Requires transfer to Ambulance. 8-12 min car drive (Google Maps) no consideration for lights and sirens in this calculation. Babcock reported a 6min ambulance drive off peak.	Ambulance	Currently Westside used by CQ Rescue and Eastside used by QG Air, Capricorn Rescue (and RFDS) for patient transfers	Nil additional	Nil additional	Airports Security and Privacy for patients in place.	Nil time required as current arrangements are operational. Opportunity exists to review current procedures and protocols to enhance existing arrangements Currently used for CQ rescue landings.	Minimal. Currently used for all fixed wing transfers and default landing site for helicopters.
Glenella Connection Road using NewBridge	Requires transfer to Ambulance or Modified Buggy.	Ambulance or Modified Buggy	Helipad Lighting/communication Shelter Bridge crossing creek	Clearing of trees and impacting on a natural water source	Nil additional	Area not monitored by security. Media access – privacy concerns.	Building a bridge will take additional time for designs, approvals and construction.	Minimal interaction, hospital access through carpark areas

Option	Transfer travel time Excludes load/unload times	Transfer Modality	Infrastructure requirements	Environmental impacts	Impacts to Neighbours	Security	Time to deliver solution	Impacts to general community
Glenella Connection Road using Existing pathways	Requires transfer to modified buggy. Approximately 10 minutes travel time	Modified Buggy	Helipad Lighting/communication Foot traffic management Shelter	Wildlife impacts on footpaths	Neighbours who use the pathways for exercise may be impacted.	Area not monitored by security. Media access – privacy concerns.		Risk to people who use the current footpaths.
Glenella Connection Road using Existing Road network	Requires transfer to ambulance. 3min ambulance drive	Ambulance	Helipad Lighting/communication Foot traffic management Shelter	Nil additional	Nil additional.	Area not monitored by security. Media access – privacy concerns.		Impacts to traffic flow on connection road
M Block Helipad	Requires ambulant transfer to ED through existing corridors and lifts	Stretcher	Elevated helipad structure Connection bridge into Q link	Nil additional	Helicopter flightpaths overlie adjacent residential area	Ensured – patient movement within existing hospital areas	Potentially significant. Requires design and approval as well as decanting Block M activities during construction phase	Impacts on existing Block-M activities and access to staff carparks around the construction site.

Option	Transfer travel time Excludes load/unload times	Transfer Modality	Infrastructure requirements	Environmental impacts	Impacts to Neighbours	Security	Time to deliver solution	Impacts to general community
MBH Carpark	Requires transfer to stretcher or modified buggy. 3.6min to 4.8min movement time	Stretcher Modified Buggy	Conversion of carparks Secure adjacent infrastructure (fences, neighbour items etc.) Clear trees	Proximity to water streams and mangroves. Rotorwash and noise impacts to adjacent carpark users and residential areas	Potential significant impact to neighbours with rotor wash and noise during overflight.	Proximity to carpark and people. Privacy concerns for patient.	Construction time after design and approvals phases	Reduction of carpark availability at the Base Hospital. 41 to 54 carparks lost in direct exclusion area. other carparks and residential area overflowed
Other areas within Mackay community	Requires transfer to ambulance. Transfer time to ambulance significant due to lack of appropriate infrastructure.	Ambulance	Required infrastructure at each location may not be compatible with existing use of location	Rotorwash and noise exposure to adjacent areas	Potential exposure to rotorwash and noise as well as modified utility of location	Difficult to secure and clear areas for incoming helicopter – no security on site	Time required for design approval and construction	Significant impact on users of these areas when the helicopter needs to land.
Current Helipad	Requires foot transfer to ED. Approximately 3-minute walk.	Stretcher	Already in place but of minimum dimensional characteristics for size of EMS helicopters	Nil additional	Noise for neighbours on Bridge Road	Requires multiple security personnel when landing and take-off.	Not feasible after Jan 2024 due to P Block construction.	Privacy from media not sufficient.