

LOTS 2 AND 3 ANKETELL ROAD, KWINANA

MOSQUITO AND MIDGE MANAGEMENT STRATEGY

Prepared for: Sanctum Holdings Pty Ltd and Turnstone Nominees Pty Ltd
Report Date: 13 March 2017
Version: 2
Report No. 2016-303

The logo for PGV Environmental is located at the bottom of the page. It features the letters 'PGV' in a large, bold, white sans-serif font. Below 'PGV', the word 'ENVIRONMENTAL' is written in a smaller, white, all-caps sans-serif font. The background of the bottom half of the page is a vibrant orange with a subtle, curved white line that sweeps across the width of the page, creating a sense of movement and design.

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1 INTRODUCTION

1.1 Background

Lots 2 and 3 Anketell Road, Anketell (the site) are located approximately 28km south of the Perth Central Business District (Figure 1) in the City of Kwinana. Approximately 4.3ha has been subdivided for development with 3.2ha not being developed and retained as Balance Lots. Currently the site is zoned 'Urban' under the Metropolitan Region Scheme (MRS) and 'Development' under the City of Kwinana Town Planning Scheme No. 2 with a small section in the northern part of the site zoned as 'Rural A' for the future widening of Anketell Road. The site is within the 'Development Contribution Area 9'.

The site is proposed for urban development and has recently been approved for subdivision with conditions from the Western Australian Planning Commission (WAPC) (Appendix 1). Condition 13 states:

*Arrangements being made to the satisfaction of the Western Australian Planning Commission for the preparation and implementation of a Mosquito and Midge Management Strategy.
(Local Government)*

The Mosquito and Midge Management Strategy has been prepared in consultation with the City of Kwinana (Pers Comm – Chris Tanner 23 February 2017) and with information from the Department of Health (Pers Comm email 2 March 2017).

1.2 Management Strategy Objectives

The Mosquito and Midge Management Strategy has been prepared and will be implemented to the satisfaction of the City of Kwinana. The objectives of the Mosquito and Midge Management Strategy are to ensure that:

- The development of the area does not increase the mosquito or midge problem or create additional breeding sites; and
- Mosquitoes and midges in the vicinity of the project area will not adversely affect the health and welfare of future residents.

The points covered in the Mosquito and Midge Management Strategy include:

- A description of the potential sources that can lead to an increase in mosquitoes and midges;
- A description of the potential for mosquitos and midges to impact on residents in the development;
- Management strategies including direct and indirect measures;
- Complaints management; and
- Monitoring.

1.3 Guidance Material

The Environmental Protection Authority (EPA) Guidance Statement 40: *Guidance Statement for Management of Mosquitoes by Land Developers* (EPA, 2000) is no longer current and has been withdrawn. The Department of Planning (DoP) and Department of Health (DoH) are the lead agencies for mosquito management for new and existing land developments. The DoH guides local governments and the Contiguous Local Government Group for a holistic approach to the management of mosquitos and midges. The DoH recommends:

Direct mosquito management interventions include the removal of breeding habitat by:

- *physical modification*
- *introduction of biological controls (for example, predatory fish)*
- *application of pesticides*

Indirect approaches reduce exposure to mosquitoes, for example:

- *utilising planning mechanisms to create adequate buffers around wetlands*
- *educating the public to avoid mosquitoes*

Another important indirect approach is for those responsible for managing mosquitoes to actively liaise and collaborate with other departments and authorities to ensure measures are carried out to minimise the potential for mosquito breeding when undertaking

- *storm water and wastewater management*
- *planting and harvesting of aquatic vegetation*
- *design of roads*
- *prevention of animal and vehicle access*
- *impact of land use (for example, mining, irrigation, farming).*

1.4 Subdivision Plan

The Subdivision Plan for Lots 2 and 3 Anketell Road (Appendix 1) proposes to develop most of the site for residential housing consisting of 92 residential lots, two balance lots and associated roads and infrastructure. There are no permanent drainage basins or constructed waterbodies proposed to be part of the development on the site.

2 SITE DESCRIPTION

2.1 Prevailing Winds

The vectors for mosquitos and midges are influenced by wind direction and strength. Prevailing winds vary with the season and diurnally (Table 1). Table 1 outlines the prevailing wind conditions from 1 April 1983 to 24 September 2013 from the Bureau of Meteorology (BOM) Medina Research Station (BOM Site No. 009194) (BOM, 2017).

Table 1: Prevailing Wind Conditions

Season and Month	Time	Direction wind blowing from	Proportion of time	Mean Wind Speed (km/hr)	Time	Direction wind blowing from	Proportion of time	Mean Wind Speed (km/hr)
Summer – January	9am	South East	25%	12.7	3pm	South West	55%	20.8
		East	25%			South	13%	
		South	17%			West	12%	
		South West	12%			South East	9%	
		North East	11%			East	6%	
		North	4%			North West	2%	
		West	3%			North East	2%	
		North West	2%			North	<0.5%	
		Calm	1%			Calm	<0.5%	
Autumn – April	9am	East	32%	10.9	3pm	South West	32%	14.4
		North East	18%			West	16%	
		South East	18%			East	12%	
		South	10%			South	11%	
		South West	7%			South East	11%	
		North	5%			North West	9%	
		East	4%			North East	5%	
		North West	3%			North	3%	
		Calm	3%			Calm	<0.5%	
Winter – July	9am	North East	22%	9.5	3pm	North West	19%	12.9
		East	19%			South West	18%	
		North	15%			West	15%	
		West	9%			North East	12%	
		South East	8%			North	10%	
		South	8%			East	8%	
		North West	7%			South East	8%	
		South West	7%			South	8%	
		Calm	5%			Calm	1%	
Spring – October	9am	East	19%	13.1	3pm	South West	46%	18.1
		South East	18%			West	20%	
		South West	15%			South	12%	
		South	14%			North West	11%	
		North East	10%			East	4%	
		West	9%			South East	4%	
		North West	7%			North	1%	
		North	6%			North East	1%	
		Calm	2%			Calm	1%	

NOTE: % values in Table 1 are based on estimations from Wind Roses from the Medina Research Station (BOM, 2017) (Appendix 2).

In summer the winds are generally from the south-east and east. In afternoons in summer the prevailing winds are from the south-west and south.

2.2 Topography, Geology and Soils

The site is gently sloping from the south-east down to the west. The highest point in the south-east corner is at 39m Australian Height Datum (AHD) and the lowest point along the western boundary is around 26m AHD (DoW, 2015a).

2.3 Geology and Soils

The site is mapped as part of the Spearwood System, the second oldest of the three dune systems on the Swan Coastal Plain (Bolland, 1998). The Spearwood System contains sand dunes and plains and consists of aeolian sand and limestone over sedimentary rocks (DAFWA, 2015).

The soil on the site has been mapped and described by the Department of Agriculture and Food Western Australia (DAFWA) as Spearwood 2a Phase (211Sp_2a) which are on lower slopes (1-5%) of dune ridge with moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown subsoils and minor limestone outcrops (DAFWA, 2015). The soils are free draining and not wetland soils.

2.4 Hydrology

Groundwater is between approximately 18 and 20m AHD, which is 8-19m below the surface level, and generally flows to the north-west (DoW, 2015b).

There are no surface water features present on the site including no rivers, creek lines or wetlands.

2.5 Wetlands

There are no mapped wetlands on the site. There is a multiple use wetland to the north that is cleared and cropped. The Conservation Category Wetlands to the south and to the west is The Spectacles. There is open water in these areas 880m and 1km from the site respectively (Figure 2). The Spectacles (North) wetland has open water for half the year but dries in summer and autumn, unless seasonal conditions are exceptionally wet. The other wetlands to the south are mostly dry and only contain aboveground water in wet years.

2.6 Flora and Vegetation

The vegetation on the site in the subdivision area will be cleared during Stage 1 works to allow for cut and fill. None of the vegetation types described on the site are typically associated with wetland habitats (PGV, 2013).

3 MOSQUITOS AND MIDGES

3.1 Mosquitos

3.1.1 Distribution and Habitat

Over 90 species of mosquitoes have been recorded in Western Australia with 15 species being identified in the City of Kwinana during their mosquito monitoring program over 16 years (Dobson, 2010). Mosquito surveys conducted to the north by Rankine have identified species such as *Culex australicus*, *Culex annulirostris*, *Culex globocoxitus*, *Culex quinquefasciatus*, *Aedes alboannulatus*, *Aedes camptorhynchus*, *Aedes notoscriptus*, *Aedes vigilax*, *Anopheles annulipes* and *Culiseta atra* (Rankine 2013). Of these *Aedes alboannulatus*, *Aedes camptorhynchus*, *Aedes notoscriptus*, *Aedes vigilax*, *Culex annulirostris* and *Culex quinquefasciatus* are recognised as a major pest or vector species (Russell, 1993).

Mosquitoes utilise water-bodies for breeding habitats and have colonised a vast array of aquatic environments for breeding, including such diverse habitats as floodplains, sewage ponds, saltmarshes, water-filled debris, gutters, irrigation ditches, wheel ruts, and stormwater drains. However, individual mosquito species may be restricted to particular geographic regions or even specific habitats within a region, and most have preferred larval habitats, selected by the adult female when she lays her eggs (Department of Health WA, 2009).

Within a particular habitat other factors such as sunlight or shade, the presence or absence of emergent vegetation and prevailing winds may also be important. Mosquitoes tend to prefer habitats with slow moving water and an abundance of aquatic vegetation. Slow flowing water allows eggs to settle on the surface. The vegetation provides a source of food as well as protection and stability in which to breed. Water-bodies with high organic pollution levels, such as sewage treatment works are often a prolific source of mosquitoes (Department of Health WA, 2009). The life cycle of mosquitos accelerates in warmer temperatures and therefore the highest risk for nuisance numbers is in early summer when water is available and temperatures have increased (City of South Perth, 2010).

3.1.2 Life cycle

With over 90 species of mosquito found in Western Australia the lifecycle is somewhat varied between species. Eggs are laid one at a time and they float on the surface of the water or they are laid on soil or plants. *Culex*, *Culiseta*, and *Anopheles* lay their eggs on water while *Aedes* lay their eggs on damp soil that will be flooded by water. Most eggs hatch into larvae within 48 hours (City of South Perth, 2010).

The mosquito larva (larvae - plural) live in the water and come to the surface to breathe. They shed their skin four times, growing larger after each molting. Some larvae have siphon tubes for breathing and hang from the water surface while other species do not have a siphon and they lay parallel to the water surface. The larva feed on micro-organisms and organic matter in the water. On the fourth molt the larva changes into a pupa (City of South Perth, 2010).

The pupal stage is a resting, non-feeding stage. It takes about two days for the adult to be fully developed. When development is complete the pupal skin splits and the mosquito emerges as an adult (City of South Perth, 2010).

The newly emerged adult rests on the surface of the water for a short time to allow itself to dry and all its parts to harden. Also, the wings have to spread out and dry properly before it can fly. Carbon dioxide exhaled by humans and animals attracts mosquitoes. Mosquitoes feed at dawn and dusk and can generally become greater nuisances around these times of the day although many species will bite at any time of the day, especially in shaded areas (Department of Health WA, 2009).

3.1.3 Potential Risks

Mosquitoes become particular pests during the warmer summer months when the water temperatures increase, causing their breeding cycle to speed up which can increase their numbers dramatically. Mosquitoes are considered to be a 'nuisance' when the number of mosquitoes caught at a single location in a single carbon dioxide baited insect trap exceeds 50 over a 12-18hr sampling period. If the species caught are ones that are known, or suspected to be vectors of mosquito-borne disease, and the mosquito population is in close proximity to a heavily populated area, then the mosquitoes present a potential health risk (Department of Health WA, 2009).

Mosquitoes are capable of transmitting three types of pathogens: protozoa (malaria), nematodes (filaria) and viruses (arboviruses). The most important and common type of pathogens transmitted by mosquitoes in Australia are the arboviruses. The diseases identified by the Department of Health as being of concern in Western Australia are:

- Ross River virus (RRV) disease;
- Barmah Forest virus (BFV) disease;
- Kunjin virus disease; and
- Murray Valley encephalitis (MVE) (DoH, 2017).

These diseases occur throughout Western Australia when conditions are warm enough for the virus to be active and when it is wet enough for mosquitoes to be active (DoH, 2009). There have been two reported cases of Ross River virus in ten years in the suburb of Anketell, most recently in April 2014 (Department of Health Pers Comm, 2017).

3.2 Midges

3.2.1 Distribution and Habitat

Midges are widely distributed over Western Australia with more than 200 species recorded in Australia. They can reside in water bodies that are three inches to 30 inches deep. Midge populations grow exponentially in water that is high in nutrients and detritus and low in oxygen (DoH, 2016).

3.2.2 Life Cycle

Breeding sites of biting midges are commonly around the edge of water bodies or in decaying vegetable material. During the midge larval stage, they are known as bloodworms and live in sediment, feeding off organic debris (Midge Research Group, 2011). The pupal stage is a resting, non-feeding stage for midges as for mosquitos. The midge can live for days to weeks to months depending on the species and most disperse only a few hundred metres from their breeding sites (DoH, 2016).

Midges are attracted to light and can create a nuisance in large numbers in the evening (Midge Research Group, 2011).

3.2.3 Potential Risks

While midges are not associated with the transfer of disease in humans they can provide a nuisance. At nuisance levels midges are generally found in large numbers in disturbed wetlands with elevated nutrient levels. High levels of nutrients cause blue-green algal blooms in the warmer months and create detritus that is a rich food source for the larval midges living in the sediments (Midge Research Group, 2009).

4 MANAGEMENT STRATEGIES

4.1 Direct Measures

4.1.1 Separation Zones

Separation zones from standing water are useful in creating distance between breeding habitat and residential areas. The larger the distance, the less will be the impact of mosquitoes and midges. The wetland considered to have the greatest potential for mosquito and midge breeding is The Spectacles (North). The subdivision is 1km east of the open water in the Spectacles (North) wetland. Prevailing winds in Summer, the most likely time for mosquito and midge breeding are from the south and south-east, which is not toward the subdivision.

4.1.2 Infrastructure

The subdivision will not have any Public Open Space (POS) but instead funds will be provided under the proposed Amendment 100A to the City of Kwinana Town Planning Scheme No. 2 development contribution plans for shared infrastructure such as roads, drainage and POS in other areas in the City of Kwinana. The design of any landscaping in these areas should consider the following:

- Minimisation of fertilisers to be used;
- Ensuring infrastructure does not hold ponded water;
- No permanent water features; and
- No dense planting at the base of any drainage basins.

Residential houses to be constructed in the development should be undertaken in the following manner:

- All vents and pipes to be screened;
- All water tanks to be screened to prevent breeding;
- Outdoor entertaining areas should be screened to avoid nuisance;
- Screened door entrances;
- Landscaping to avoid hedging, vines and creepers, and be regularly pruned to prevent favourable breeding conditions;
- Screens fitted to windows;
- Draft and pest excluders fitted to entry doors and windows; and
- Eaves to be enclosed/screened to prevent pest infiltration.

4.1.3 Stormwater Management

An Urban Water Management Plan (UWMP) has been prepared for the subdivision by Development Engineering Consultants (DCE, 2017). The stormwater management in the UWMP includes the following:

- 1 in 1 year storm was proposed to be retained on site, within lots in soakwells and in rain gardens for road drainage;
- Rain gardens in verges limit flows downstream in the catchments;

- The ultimate drainage basin is located on a lot outside of the subdivision under different ownership so a temporary basin in Lots 174-177 has been designed to contain the 1 in 10 year storm; and
- Earthworks design will ensure that the 1 in 100 year storm is directed towards the currently undeveloped land to the west of the site where the ultimate drainage basin will be constructed.

Specifically, to manage stormwater to minimise the risk of providing additional mosquito and midge breeding areas the UWMP (Section 5.6) includes the following:

- The stormwater management system has been designed to ensure that detained immobile stormwater is fully infiltrated or discharged in a time period not exceeding 96 hours.
- The surface water management criteria will ensure that Lots will retain 1 year 1 hour flows within soakwells and garden areas.

4.1.4 Constructed Open Water Bodies

No permanent water bodies are proposed to be constructed in the development area.

4.2 Indirect Management Methods

4.2.1 Public Education

The owners of new lots in the subdivision area will be provided with information on mosquitos and midges. This will include the information about:

- Mosquitos breeding in standing water in the backyard;
- Landscape design such as avoiding dense shrubbery next to the house to avoid providing harbourage;
- Reduction of vegetable matter such as the removal of grass clippings in the back yard;
- The impact of nutrients on mosquito and midge populations and information on minimising the use of fertilisers and the use of slow release fertilisers.

Information regarding the health impacts of mosquitos will also be included such as:

- Health risks and symptoms of common diseases transmitted by mosquitos,
- Protocols for reporting nuisance numbers; and
- Protocols for reporting a diagnosis of a mosquito borne disease.

Material will be provided outlining personal preventative measures that can be used to avoid being bitten by mosquitoes including:

- Trying to avoid being outside during dawn and dusk when mosquitoes are most active;
- Ensuring insect screens on houses are installed;
- Wearing long, light-coloured, loose-fitting protective clothing when outdoors in mosquito-prone areas;
- Applying personal repellents containing DEET or picaridin to all areas of exposed skin;
- In outdoor entertainment areas using products such as mosquito coils and citronella to repel mosquitoes;

- Recognising and avoiding areas of mosquito activity; and
- Turning off house lights to reduce mosquitoes that are attracted to light.

The City of Kwinana has information regarding mosquito borne diseases and residents will be advised of links to material available online of the Department of Health and the City of Kwinana websites and through this the link to the Department of Health.

Additional copies of pamphlets and information on material available on the internet and from the City of Kwinana, Western Australian Department of Health and other sources will be available at the Sales Office for the development for the duration of the selling period. The links will also be available on the development sales website.

4.2.2 Chemical and Biological Control

Chemical and biological control for the site is not likely to be required as there are no wetlands or open water on the site or to be constructed as part of subdivisional works. The stormwater drainage system will be monitored and if numbers appear to be increasing to unacceptably high levels, resulting in regular complaints, the infested areas will be treated by an approved pesticide of low toxicity by the developer until the drainage infrastructure is handed to the City. All pesticide application will be in accordance with Health Department Standards and Regulations.

4.3 Subdivision Contribution

The City of Kwinana has a fee payable on all new lots at subdivision to cover the cost of mosquito management research and control to protect the community against mosquito borne diseases such as Ross River and Barmah Forest Viruses. This fee will be paid by the developer. Funds allocation and programs are run by the City of Kwinana and it is anticipated funds raised from the development will be allocated to mosquito areas in proximity to the subdivision.

4.4 Complaints Management

The developer will refer any complaints regarding mosquitos and midges to the City of Kwinana Environmental Health Officer. Contact information will be made available at the sales office while it is operational for the duration of development.

4.5 Monitoring

Trapping and monitoring of mosquitoes is not proposed for the subdivision as the area to be subdivided is less than 5ha which is the threshold at which monitoring is required (City of Kwinana Pers Comm, 2017). Monitoring of the drainage system to ensure its effectiveness for the infiltration of water and minimising the provision of habitat for mosquitos and midges will be undertaken by the Developer for 2 years. This will include:

- Ensuring that drainage infrastructure is kept free from debris;
- Insect numbers will be monitored and if numbers appear to be increasing to unacceptably high levels, resulting in regular complaints; and
- Monitoring the infiltration of large rainfall events to ensure standing water is not present in drainage infrastructure for more than 96 hours after the event.

5 CONCLUSION

The Mosquito and Midge Management Strategy for the subdivision on Lots 2 and 3 Anketell Road, Anketell is within two kilometres of a wetland that can have open water. Therefore, the Strategy has been prepared to ensure no breeding habitat for these species is created in the development and that future residents are made aware of measures to avoid mosquitos and midges.

Management includes:

- Not including open water bodies in the subdivision;
- Ensuring landscaping in verges minimises the use of fertilisers;
- Ensuring any public art or amenity does not create pooling or ponding water;
- Builders in the subdivision will be encouraged to ensure flyscreens on windows, doors, tanks and eaves are included in dwellings in the development;
- Stormwater management has been designed to ensure no water remains in drainage infrastructure for a period greater than 96 hrs;
- Public education on personal protection and risk minimisation;
- Complaints management to ensure if there is an increase in mosquito or midge activity the City of Kwinana is notified;
- Pesticide application if stormwater drainage infrastructure results in mosquito or midge breeding to nuisance levels;
- Contribution to the management efforts being conducted by the City of Kwinana; and
- Monitoring of stormwater infrastructure for a period of two years once installed to ensure stormwater is not creating habitat.

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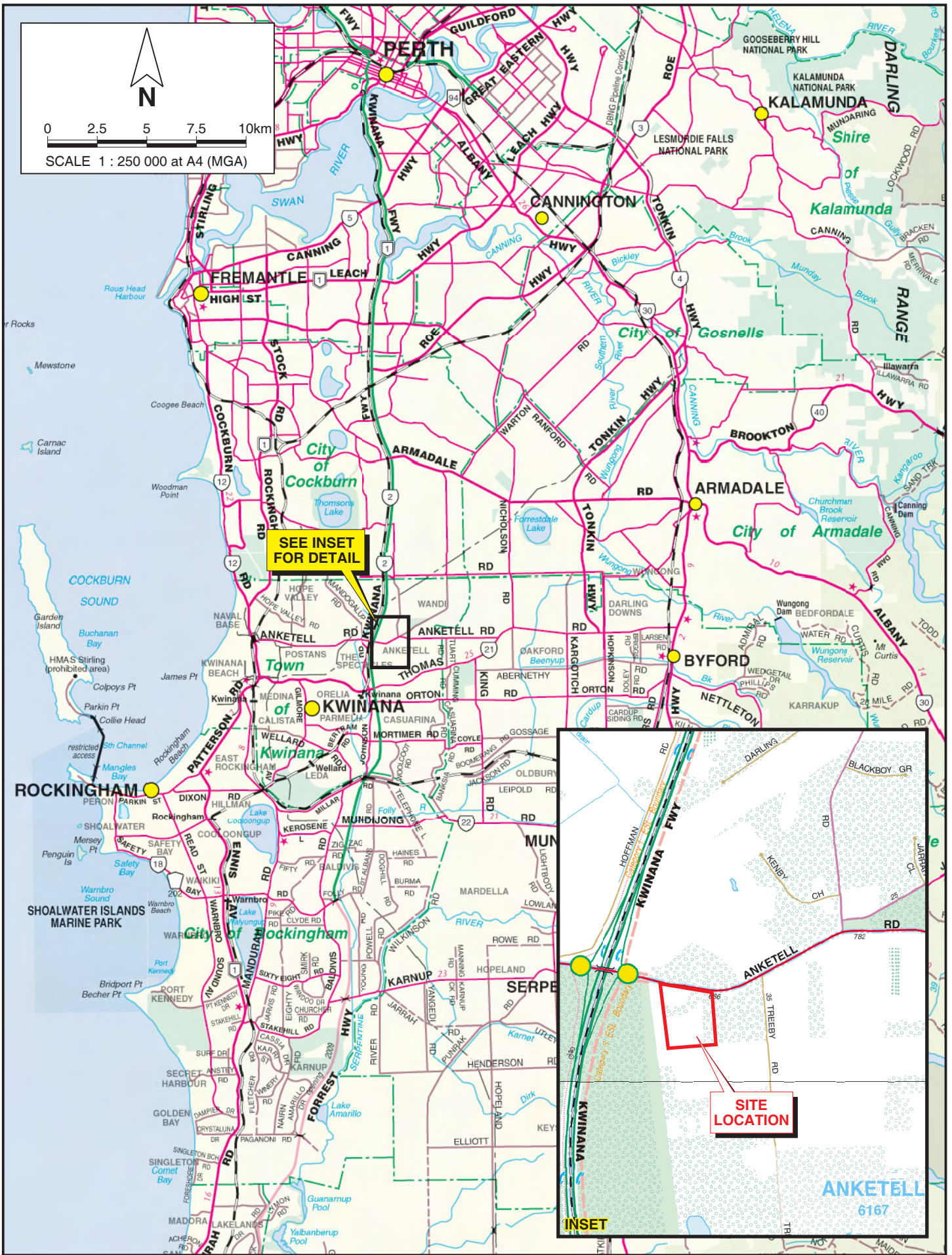
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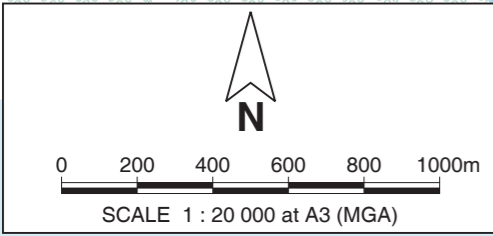
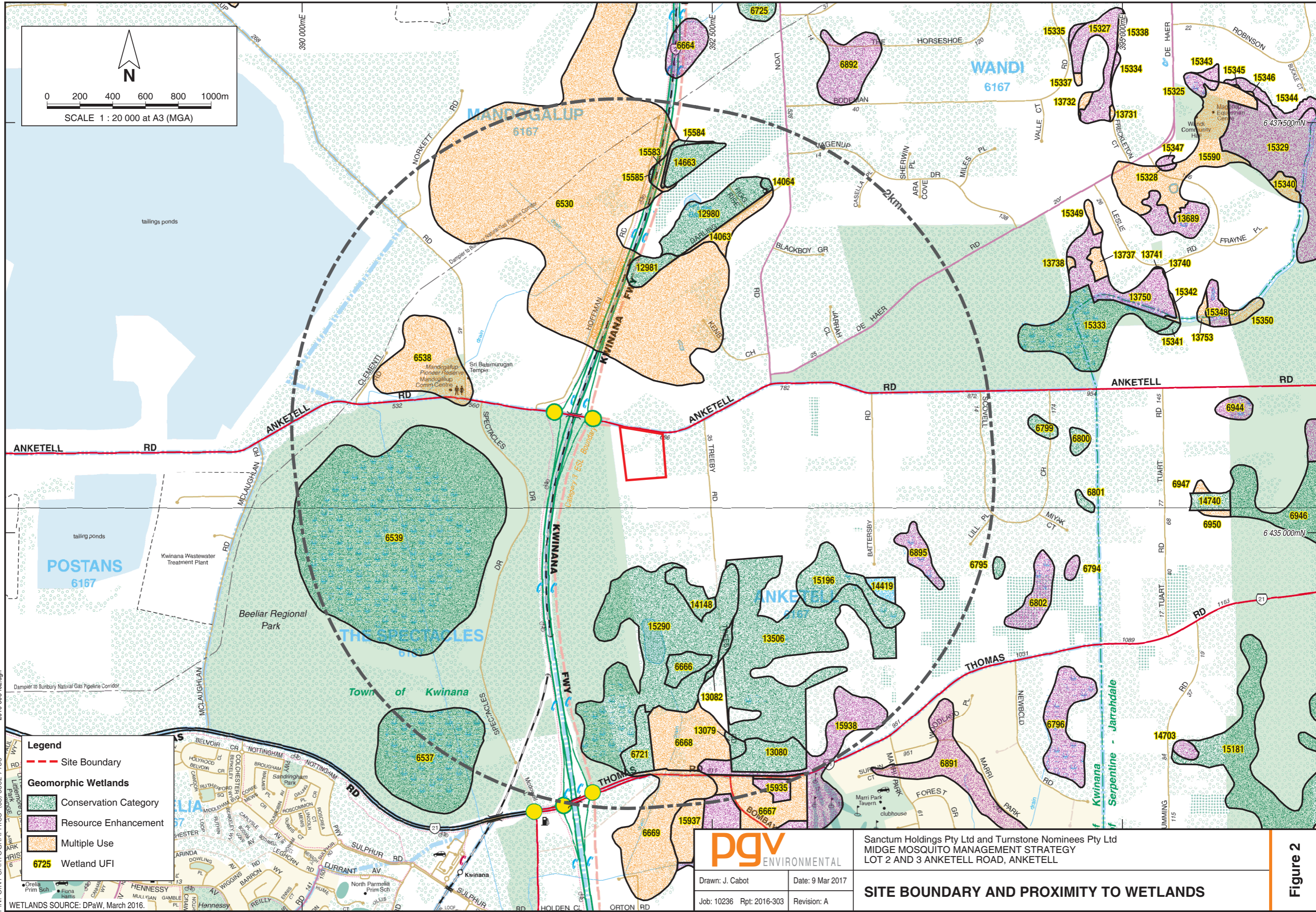
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FIGURES



2016-303-401.dgm
 PINPOINT CARTOGRAPHICS (08) 9562 7136

		Sanctum Holdings Pty Ltd and Turnstone Nominees Pty Ltd MIDGE MOSQUITO MANAGEMENT STRATEGY LOT 2 AND 3 ANKETELL ROAD, ANKETELL		Figure 1
Drawn: J. Cabot	Date: 9 Mar 2017	SITE LOCATION		
Job: 10236 Rpt: 2016-303	Revision: A			



- Legend**
- Site Boundary
 - Geomorphic Wetlands**
 - Conservation Category
 - Resource Enhancement
 - Multiple Use
 - 6725 Wetland UFI

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Drawn: J. Cabot Date: 9 Mar 2017
 Job: 10236 Rpt: 2016-303 Revision: A

Sanctum Holdings Pty Ltd and Turnstone Nominees Pty Ltd
 MIDGE MOSQUITO MANAGEMENT STRATEGY
 LOT 2 AND 3 ANKETELL ROAD, ANKETELL

SITE BOUNDARY AND PROXIMITY TO WETLANDS

Figure 2

PINPOINT CARTOGRAPHICS (08) 9562 7136

WETLANDS SOURCE: DPaW, March 2016.

APPENDIX 1

Subdivision Approval



Your Ref :
Enquiries : Regan Douglas (Ph 6551 9289)

Whelans Australia Pty Ltd
P O Box 99
MOUNT HAWTHORN WA 6915

Approval Subject To Condition(s) Freehold (Green Title) Subdivision

Application No : 153398

Planning and Development Act 2005

Applicant	:	Whelans Australia Pty Ltd P O Box 99 MOUNT HAWTHORN WA 6915
Owner	:	Turnstone Nominees Pty Ltd & Sanctum Holdings Pty Ltd 52 Kishorn Road APPLECROSS WA 6153
Application Receipt	:	18 March 2016

Lot Number	:	2 & 3
Diagram / Plan	:	Plan 4746
Location	:	-
C/T Volume/Folio	:	1024/607, 1235/346
Street Address	:	Anketell Road, Anketell
Local Government	:	City of Kwinana

The Western Australian Planning Commission has considered the application referred to and is prepared to endorse a deposited plan in accordance with the plan date-stamped 18 March 2016 once the condition(s) set out have been fulfilled.

This decision is valid for four years from the date of this advice, which includes the lodgement of the deposited plan within this period.

The deposited plan for this approval and all required written advice confirming that the requirement(s) outlined in the condition(s) have been fulfilled must be submitted by 22 July 2020 or this approval no longer will remain valid.

Reconsideration - 28 days

Under section 151(1) of the *Planning and Development Act 2005*, the applicant/owner may, within 28 days from the date of this decision, make a written request to the WAPC to reconsider any condition(s) imposed in its decision. One of the matters to which the WAPC will have regard in reconsideration of its decision is whether there is compelling evidence by way of additional information or justification from the applicant/owner to warrant a reconsideration of the decision. A request for reconsideration is to be submitted to the WAPC on a Form 3A with appropriate fees. An application for reconsideration may be submitted to the WAPC prior to submission of an application for review. Form 3A and a schedule of fees are available on the WAPC website: <http://www.planning.wa.gov.au>

Right to apply for a review - 28 days

Should the applicant/owner be aggrieved by this decision, there is a right to apply for a review under Part 14 of the *Planning and Development Act 2005*. The application for review must be submitted in accordance with part 2 of the *State Administrative Tribunal Rules 2004* and should be lodged within 28 days of the date of this decision to: the State Administrative Tribunal, Level 6, State Administrative Tribunal Building, 565 Hay Street, PERTH, WA 6000. It is recommended that you contact the tribunal for further details: telephone 9219 3111 or go to its website: <http://www.sat.justice.wa.gov.au>

Deposited plan

The deposited plan is to be submitted to the Western Australian Land Information Authority (Landgate) for certification. Once certified, Landgate will forward it to the WAPC. In addition, the applicant/owner is responsible for submission of a Form 1C with appropriate fees to the WAPC requesting endorsement of the deposited plan. A copy of the deposited plan with confirmation of submission to Landgate is to be submitted with all required written advice confirming compliance with any condition(s) from the nominated agency/authority or local government. Form 1C and a schedule of fees are available on the WAPC website: <http://www.planning.wa.gov.au>

Condition(s)

The WAPC is prepared to endorse a deposited plan in accordance with the plan submitted once the condition(s) set out have been fulfilled.

The condition(s) of this approval are to be fulfilled to the satisfaction of the WAPC.

The condition(s) must be fulfilled before submission of a copy of the deposited plan for endorsement.

The agency/authority or local government noted in brackets at the end of the condition(s) identify the body responsible for providing written advice confirming that the WAPC's requirement(s) outlined in the condition(s) have been fulfilled. The written advice of the agency/authority or local government is to be obtained by the applicant/owner. When the written advice of each identified agency/authority or local government has been obtained, it should be submitted to the WAPC with a Form 1C and appropriate fees and a copy of the deposited plan.

If there is no agency/authority or local government noted in brackets at the end of the condition(s), a written request for confirmation that the requirement(s) outlined in the condition(s) have been fulfilled should be submitted to the WAPC, prior to lodgement of the deposited plan for endorsement.

Prior to the commencement of any subdivision works or the implementation of any condition(s) in any other way, the applicant/owner is to liaise with the nominated agency/authority or local government on the requirement(s) it considers necessary to fulfil the condition(s).

The applicant/owner is to make reasonable enquiry to the nominated agency/authority or local government to obtain confirmation that the requirement(s) of the condition(s) have been fulfilled. This may include the provision of supplementary information. In the event that the nominated agency/authority or local government will not provide its written confirmation following reasonable enquiry, the applicant/owner then may approach the WAPC for confirmation that the condition(s) have been fulfilled.

In approaching the WAPC, the applicant/owner is to provide all necessary information, including proof of reasonable enquiry to the nominated agency/authority or local government.

The condition(s) of this approval, with accompanying advice, are:

CONDITIONS:

1. The subdivision layout and lot size to be consistent with the attached plan date stamped 12 July 2016. (Local Government)

Administrative

2. Prior to the Western Australian Planning Commission's endorsement of a diagram or plan of survey (deposited plan) for the creation of Lots 81 - 92 and 29 proposed by this application (as per the subdivision layout required by Condition 1), the road the subject of WAPC 153400 being created on a separate diagram or plan of survey (deposited plan) and the plan being endorsed by the Western Australian Planning Commission. (Western Australian Planning Commission)
3. Arrangements being made with the City of Kwinana to the satisfaction of the Western Australian Planning Commission for the landowner/applicant to contribute towards the costs of providing community and/or common infrastructure as established through amendment 100A (when gazetted) to the City of Kwinana Town Planning Scheme No. 2. (Local Government)
4. The landowner/applicant contributing towards development infrastructure provisions pursuant to the City of Kwinana Town Planning Scheme No. 2. (Local Government)

Buildings and use

5. Other than buildings, outbuildings and/or structures shown on the approved plan for retention, all buildings, outbuildings and/or structures present on the proposed lots at the time of subdivision approval being demolished and materials removed from the lots. (Local Government)

Drainage

6. Engineering drawings and specifications are to be submitted, approved, and works undertaken in accordance with the approved engineering drawings, specifications and approved plan of subdivision, for grading and/or stabilisation of the site to ensure that:
 - a) lots can accommodate their intended use; and
 - b) finished ground levels at the boundaries of the lots the subject of this approval match or otherwise coordinate with the existing and/or proposed finished ground levels of the land abutting.(Local Government)
7. Engineering drawings and specifications are to be submitted and approved, and works undertaken in accordance with the approved engineering drawings and specifications and approved plan of subdivision, for the filling and/or draining of the land, including ensuring that stormwater is contained on-site, or appropriately treated and connected to the local drainage system. Engineering drawings and specifications are to be in accordance with an approved urban water management plan for the site to the satisfaction of the Western Australian Planning Commission. (Local Government)
8. Suitable arrangements being made with the Water Corporation for the drainage of the land either directly or indirectly into a drain under the control of that body. (Water Corporation)
9. Prior to the commencement of subdivisional works, the landowner/applicant is to provide a pre-works geotechnical report certifying that the land is physically capable of development or advising how the land is to be remediated and compacted to ensure it is capable of development and in the event that remediation works are required, the landowner/applicant is to provide a post geotechnical report certifying that all subdivisional works have been carried out in accordance with the pre-works geotechnical report. (Local Government)
10. Prior to the commencement of subdivisional works, an urban water management plan is to be prepared and approved in consultation with the Department of Water consistent with any approved Local Water Management Strategy. (Local Government)

Electricity

11. Arrangements being made to the satisfaction of the Western Australian Planning Commission and to the specification of Western Power for the provision of an underground electricity supply to the lots shown on the approved plan of subdivision. (Western Power)
12. The transfer of land as a Crown reserve free of cost to Western Power for the provision of electricity supply infrastructure. (Western Power)

Environment

13. Arrangements being made to the satisfaction of the Western Australian Planning Commission for the preparation and implementation of a Mosquito and Midge Management Strategy. (Local Government)
14. Measures being taken to ensure the identification and protection of any vegetation on the site worthy of retention that is not impacted by subdivisional works, prior to commencement of subdivisional works. (Local Government)

Fire and emergency

15. The 'developer's responsibilities' as referenced in the *Fire Management Plan - Anketell North Local Structure Plan Area* by Fireplan dated February 2014 (as amended) are to be implemented during subdivisional works to the satisfaction of the Western Australian Planning Commission. (Local Government)
16. A Notification, pursuant to Section 165 of the *Planning and Development Act 2005* is to be placed on the certificate(s) of title of the proposed lot(s) with a Bushfire Attack Level (BAL) rating of 12.5 or above, advising of the existence of a hazard or other factor. Notice of this notification is to be included on the diagram or plan of survey (deposited plan).

The notification is to state as follows:

'This lot is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and is subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land'

(Western Australian Planning Commission)

Lot design

17. Local Development Plans being prepared and approved for lots with attributes as specified in the Anketell North Local Structure Plan as shown on the plan dated 12 July 2016 that address the following:

- a) orientation of housing/development;
- b) type of fencing;
- c) location of carports/garages
- d) surveillance;
- e) road crossing(s);
- f) access;
- g) setback variations;
- h) solar orientation;
- i) any requirement for dwelling construction compliant with a Bushfire Attack Level (BAL) as cited in the *Fire Management Plan – Anketell North Structure Plan* by Fireplan dated February 2014 (as amended) and the resultant building construction standards as cited in the Australian Standard 3959 - Construction of buildings in bushfire-prone areas; and
- j) Quiet House Design for proposed lots beyond the target prescribed in *State Planning Policy 5.1 - Road and Rail Transport Noise and Freight Considerations in Land Use Planning*

to the satisfaction of the Western Australian Planning Commission.

(Local Government)

18. The landowner/applicant shall make arrangements to ensure that prospective purchasers of lots subject of a Local Development Plan are advised in writing that Local Development Plan provisions apply. (Local Government)

Reserves

19. An area of land at least 4,178m² in area, in a position to be agreed with the Western Australian Planning Commission, being shown on the diagram or plan of survey (deposited plan) as a reserve for recreation and vested in the Crown under Section 152 of the *Planning and Development Act 2005*, such land to be ceded free of cost and without any payment of compensation by the Crown. (Local Government)

School sites

20. The landowner/applicant making a pro-rata contribution towards the cost of the acquisition of the primary school site identified in the subdivision locality. (Department of Education)

Transport

21. The land required for the widening of Anketell Road is to be set aside as a separate lot for acquisition pending future road widening requirements. An easement is to be provided over all of the lot to be set aside for the benefit of the remaining lot(s) for the purpose of providing right of footway, water, sewer, drainage, gas, electricity, television, telecommunications and other necessary service infrastructure, pending construction of the future road widening. (Western Australian Planning Commission)

22. Redundant vehicle crossover(s) to be removed and the kerbing, verge, and footpath (where relevant) reinstated with grass or landscaping to the satisfaction of the Western Australian Planning Commission and to the specifications of the local government. (Local Government)
23. Pursuant to Section 150 of the *Planning and Development Act 2005* and Division 3 of the *Planning and Development Regulations 2009* a covenant preventing vehicular access onto Anketell Road being lodged on the certificate(s) of title of the proposed balance lots 9000 and 9001 at the full expense of the landowner/applicant. The covenant is to prevent access, to the benefit of Main Roads Western Australia, in accordance with the plan dated 12 July 2016 (attached) and the covenant is to specify:

"No vehicular access is permitted to or from Anketell Road."

(Main Roads Western Australia)

24. Engineering drawings and specifications are to be submitted, approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications, to ensure that those lots not fronting an existing road are provided with frontage to a constructed road(s) connected by a constructed road(s) to the local road system and such road(s) are constructed and drained at the landowner/applicant's cost.

As an alternative, and subject to the agreement of the Local Government the Western Australian Planning Commission (WAPC) is prepared to accept the landowner/applicant paying to the local government the cost of such road works as estimated by the local government and the local government providing formal assurance to the WAPC confirming that the works will be completed within a reasonable period as agreed by the WAPC.

(Local Government)

25. Engineering drawings and specifications are to be submitted and approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications to ensure that:
- a) street lighting is installed on all new subdivisional roads to the standards of the relevant licensed service provider;
 - b) roads that have been designed to connect with existing or proposed roads abutting the subject land are coordinated so the road reserve location and width connect seamlessly; and
 - c) temporary turning areas are provided to those subdivisional roads that are subject to future extension.

(Local Government)

26. Engineering drawings and specifications are to be submitted, approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications, for the provision of shared paths through and connecting to the application area in accordance with the approved Anketell North Local Structure Plan. The approved shared paths are to be constructed by the landowner/applicant. (Local Government)
27. All local streets within the subdivision being truncated in accordance with the Western Australian Planning Commission's *Liveable Neighbourhoods* policy. (Local Government)
28. A Transport Noise Assessment is to be prepared, approved and implemented as part of the subdivision works to the satisfaction of the Western Australian Planning Commission. (Local Government)
29. A notification, pursuant to Section 70A of the *Transfer of Land Act 1893* is to be placed on the certificates of title of proposed lots exceeding the Noise Target as per *State Planning Policy 5.4 - Road and Rail Transport Noise and Freight Considerations in Land Use Planning*. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows:

'The lot is situated in the vicinity of a transport corridor and is currently affected, or may in the future be affected by transport noise.'

(Local Government)

Water and sewer

30. Arrangements being made with the Water Corporation so that provision of a suitable water supply service will be available to the lots shown on the approved plan of subdivision. (Water Corporation)
31. Arrangements being made with the Water Corporation so that provision of a sewerage service will be available to the lots shown on the approved plan of subdivision. (Water Corporation)

ADVICE:

1. In regard to Condition 11, Western Power provides only one underground point of electricity supply per freehold lot.
2. In regard to Condition 19, the Western Australian Planning Commission hereby approves of a cash-in-lieu contribution in accordance with Section 153 of the *Planning and Development Act 2005*.
3. Main Roads Western Australia advises the landowner/applicant with regard to the Anketell Road reserve that:

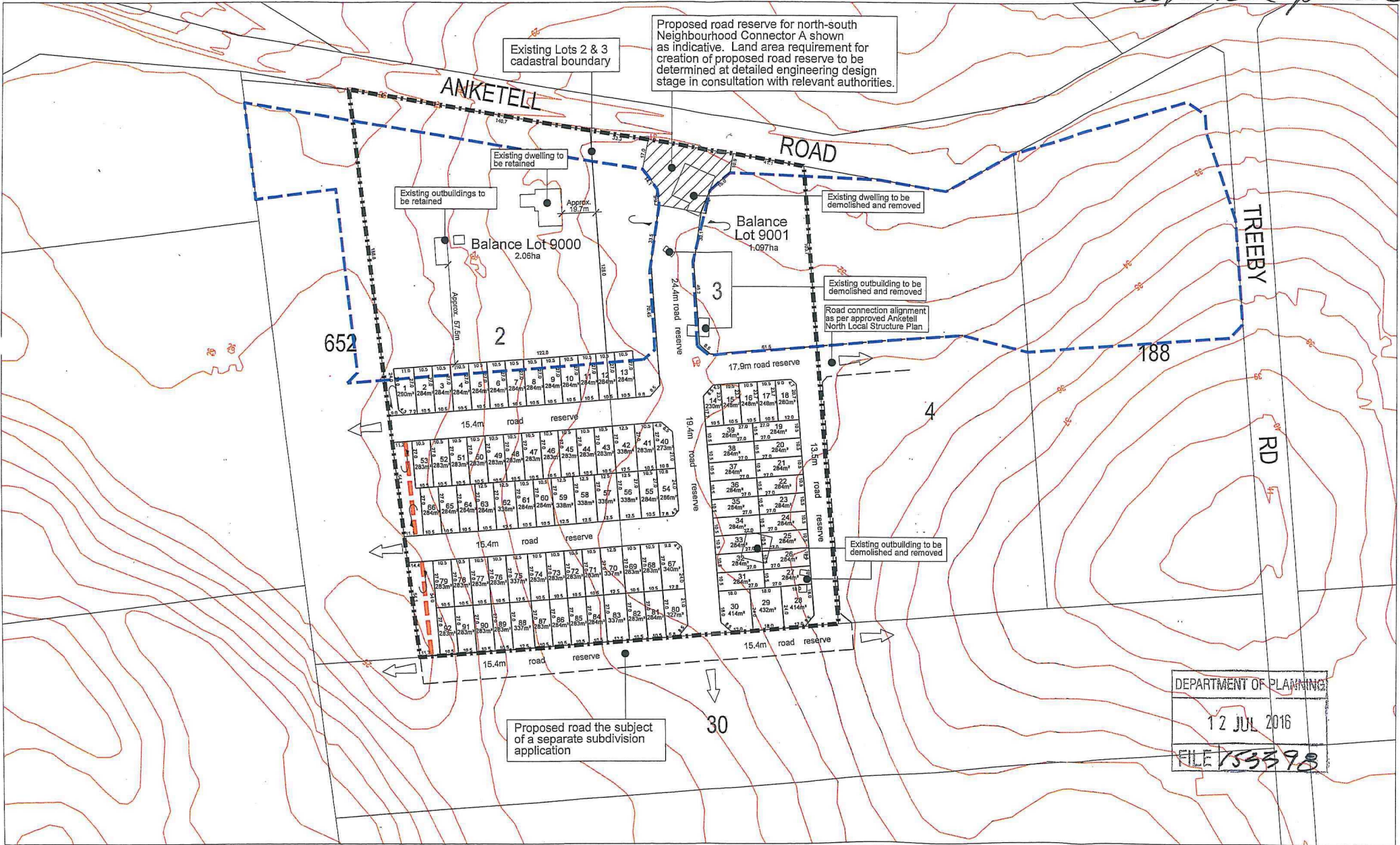
- a) no earthworks are to encroach onto the road reserve;
 - b) no stormwater drainage is to be discharged onto the road reserve; and
 - c) the landowner/applicant shall make good any damage to the existing verge vegetation within the road reserve.
4. In regard to Conditions 30 and 31, the landowner/applicant shall make arrangements with the Water Corporation for the provision of the necessary services. On receipt of a request from the landowner/applicant, a Land Development Agreement under Section 83 of the *Water Services Act 2012* will be prepared by the Water Corporation to document the specific requirements for the proposed subdivision.
5. The Commission notes that the plan of subdivision is not entirely consistent with the approved Anketell North Local Structure Plan (LSP). With regard to this matter, the Commission was prepared to approve the plan of subdivision (as modified by Condition 1) given the general consistency of the proposal with the intent of the approved LSP, as well as, the contemplated amendment to the LSP. The Commission, nevertheless, may not endorse a deposited plan for proposed Lots 1-13 prior to the determination of the contemplated amendment to the LSP.



Kerrine Blenkinsop
Secretary
Western Australian Planning Commission

22 July 2016

attached plan



Existing Lots 2 & 3 cadastral boundary

Proposed road reserve for north-south Neighbourhood Connector A shown as indicative. Land area requirement for creation of proposed road reserve to be determined at detailed engineering design stage in consultation with relevant authorities.

Existing dwelling to be retained

Existing outbuildings to be retained

Balance Lot 9000
2.06ha

Balance Lot 9001
1.097ha

Existing dwelling to be demolished and removed

Existing outbuilding to be demolished and removed

Road connection alignment as per approved Anketell North Local Structure Plan

Existing outbuilding to be demolished and removed

Proposed road the subject of a separate subdivision application

DEPARTMENT OF PLANNING
12 JUL 2016
FILE 153398

Plan No. : 20932-3
Revision : REV.7
Scale : 1:2000@A3



This plan must not be approved without the permission of the Department of Planning and Infrastructure. A condition of use is subject to a survey.

LEGEND

- 135 Contours
- Subject Site
- Proposed lots the subject of this application
- Potential future road connections
- Potential temporary access for vehicles and waste services
- LSP Investigation Area No.1 (Area subject to noise assessment)

SUBDIVISION PLAN
LOTS 2 & 3 ANKETELL ROAD
ANKETELL

DATE DRAWN: 12/07/2016
DRAWN BY: C&L
CHECKED BY: JP
FILE: 160308 subdivision Lots 2,3 Anketell.jpg
V DATUM: AHD
H DATUM: MGA84 (50)



Suite 4 First Floor 40 Haster Road Osborne Park WA 6017 www.whelans.com.au

APPENDIX 2

Wind Roses

Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

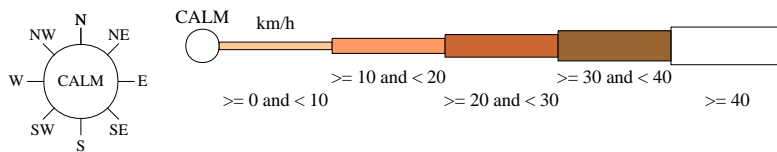
Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

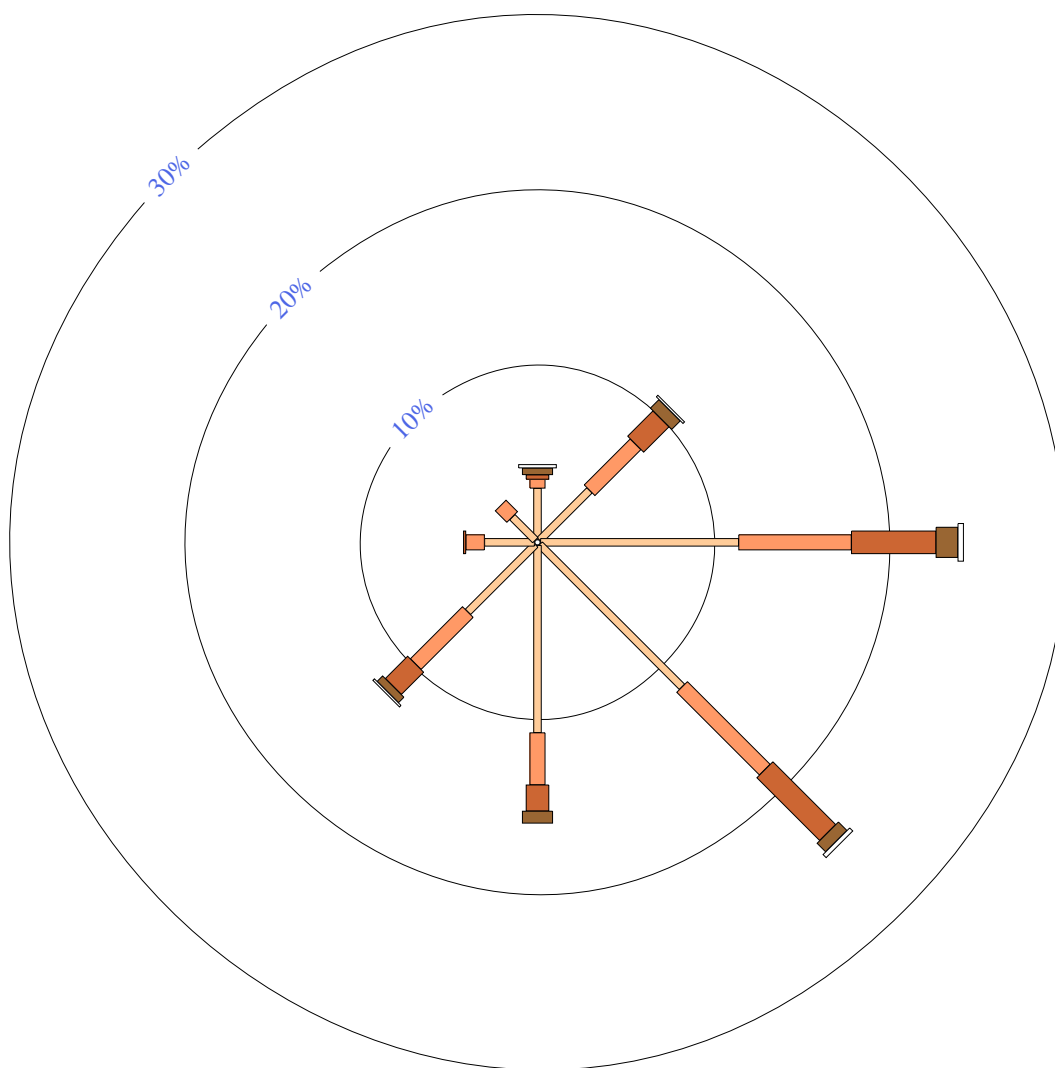
An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



9 am Jan
796 Total Observations

Calm 1%



Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

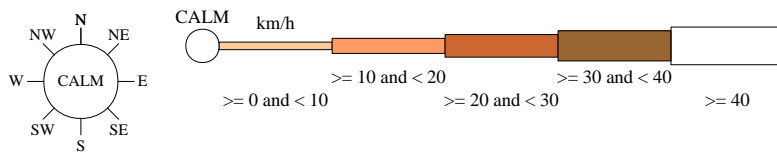
Custom times selected, refer to attached note for details

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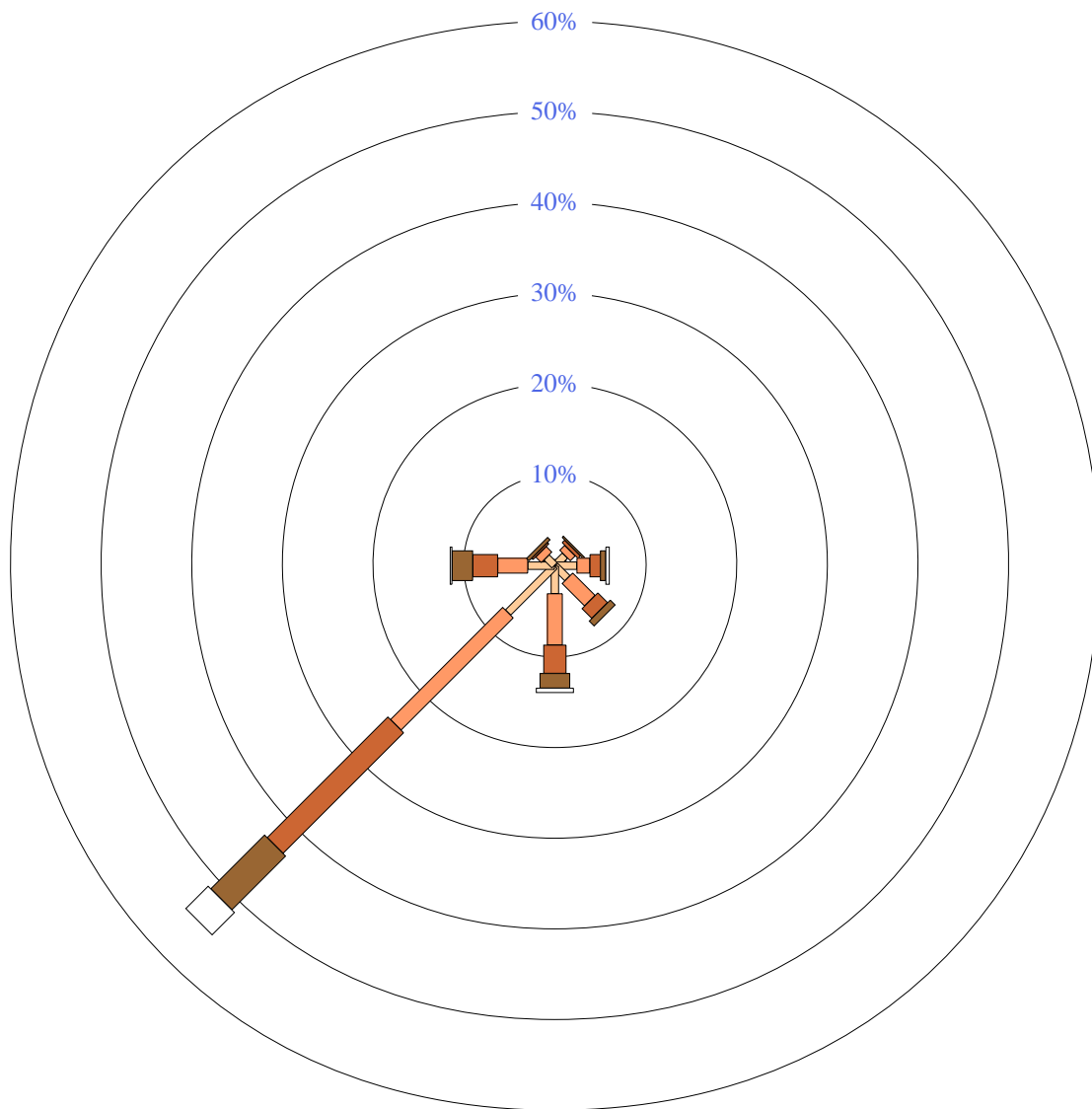
An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



3 pm Jan
532 Total Observations

Calm *



Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

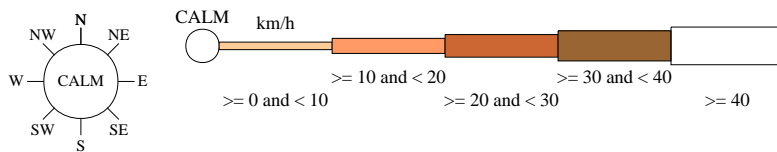
Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

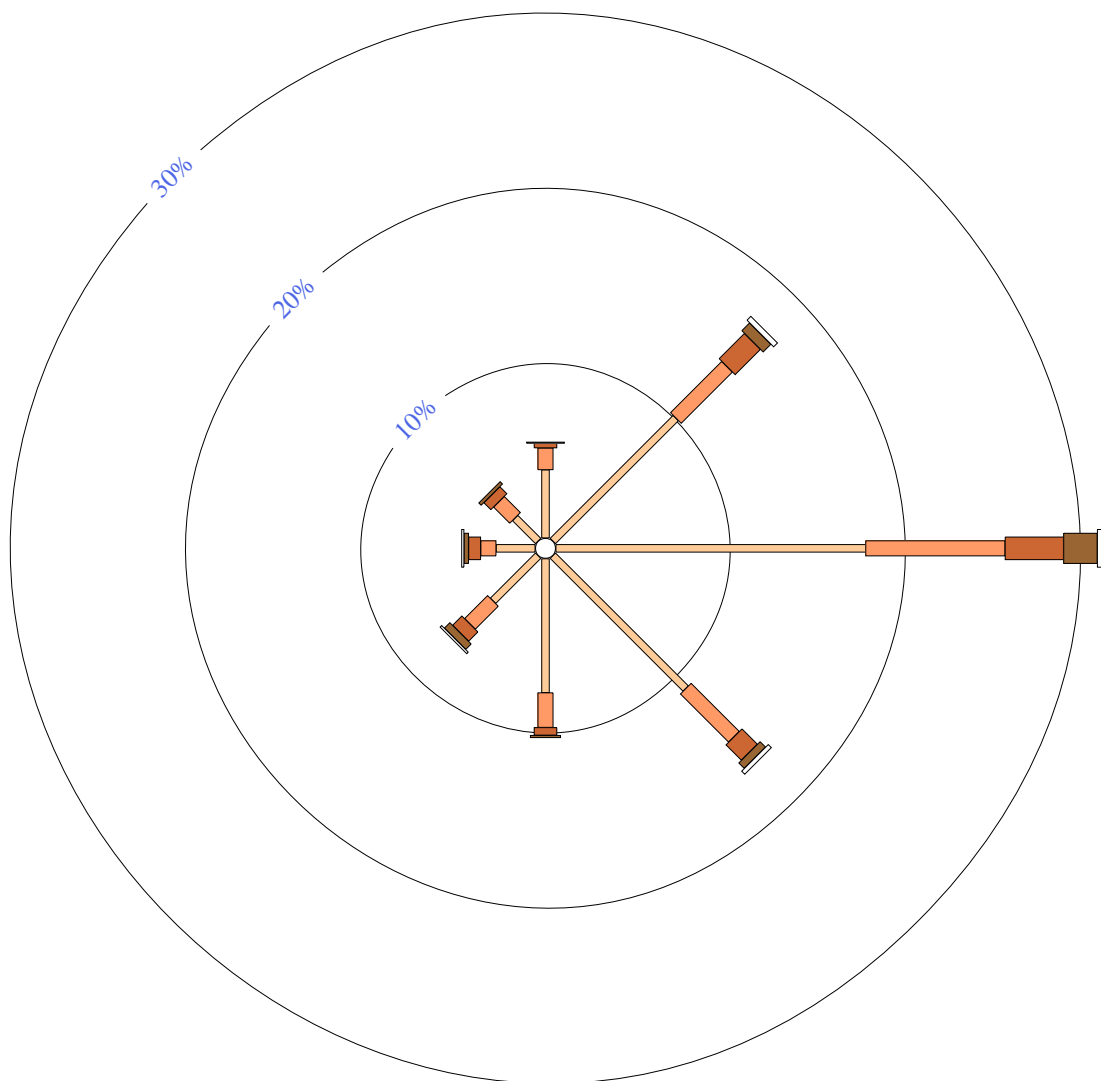
An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



9 am Apr
798 Total Observations

Calm 3%



Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

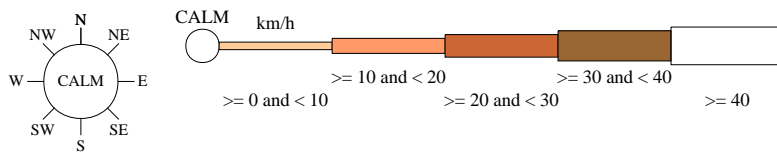
Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

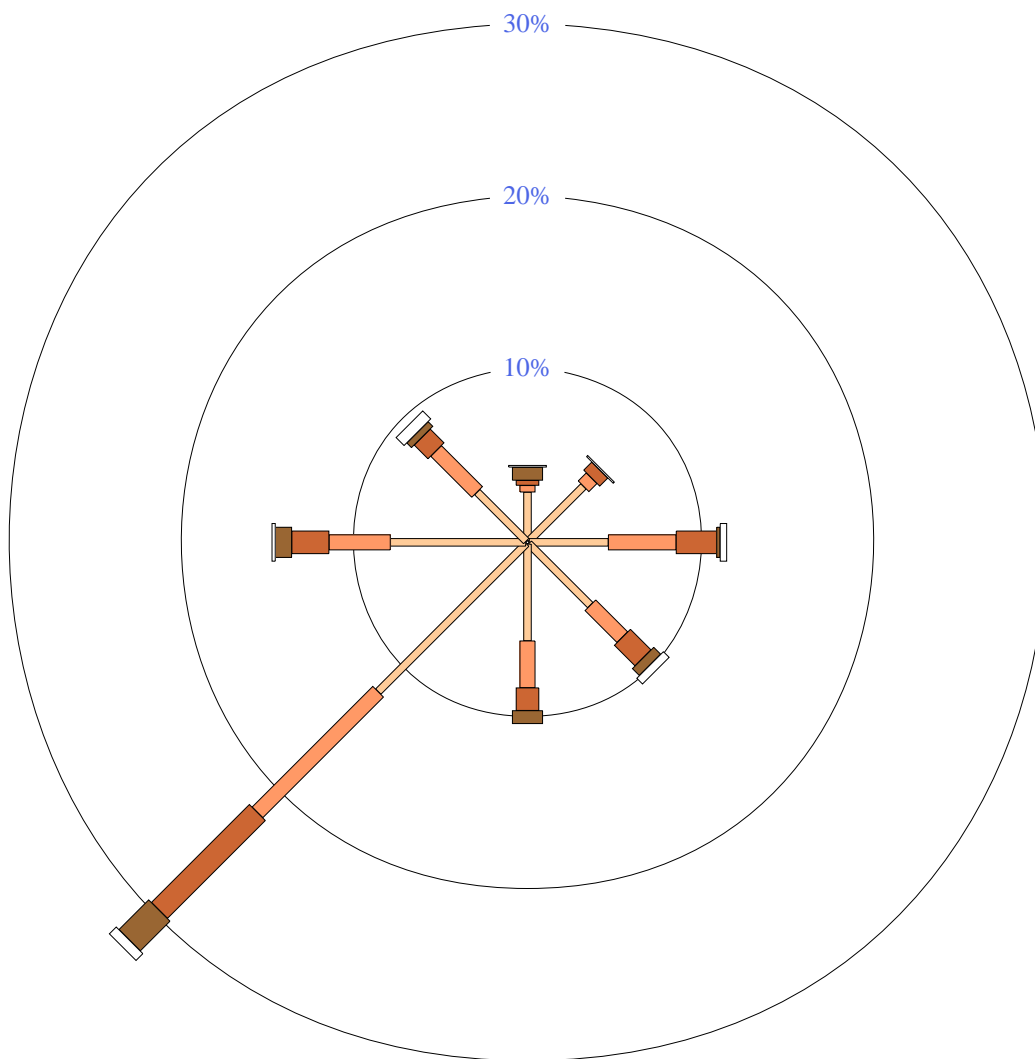
An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



3 pm Apr
535 Total Observations

Calm *



Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

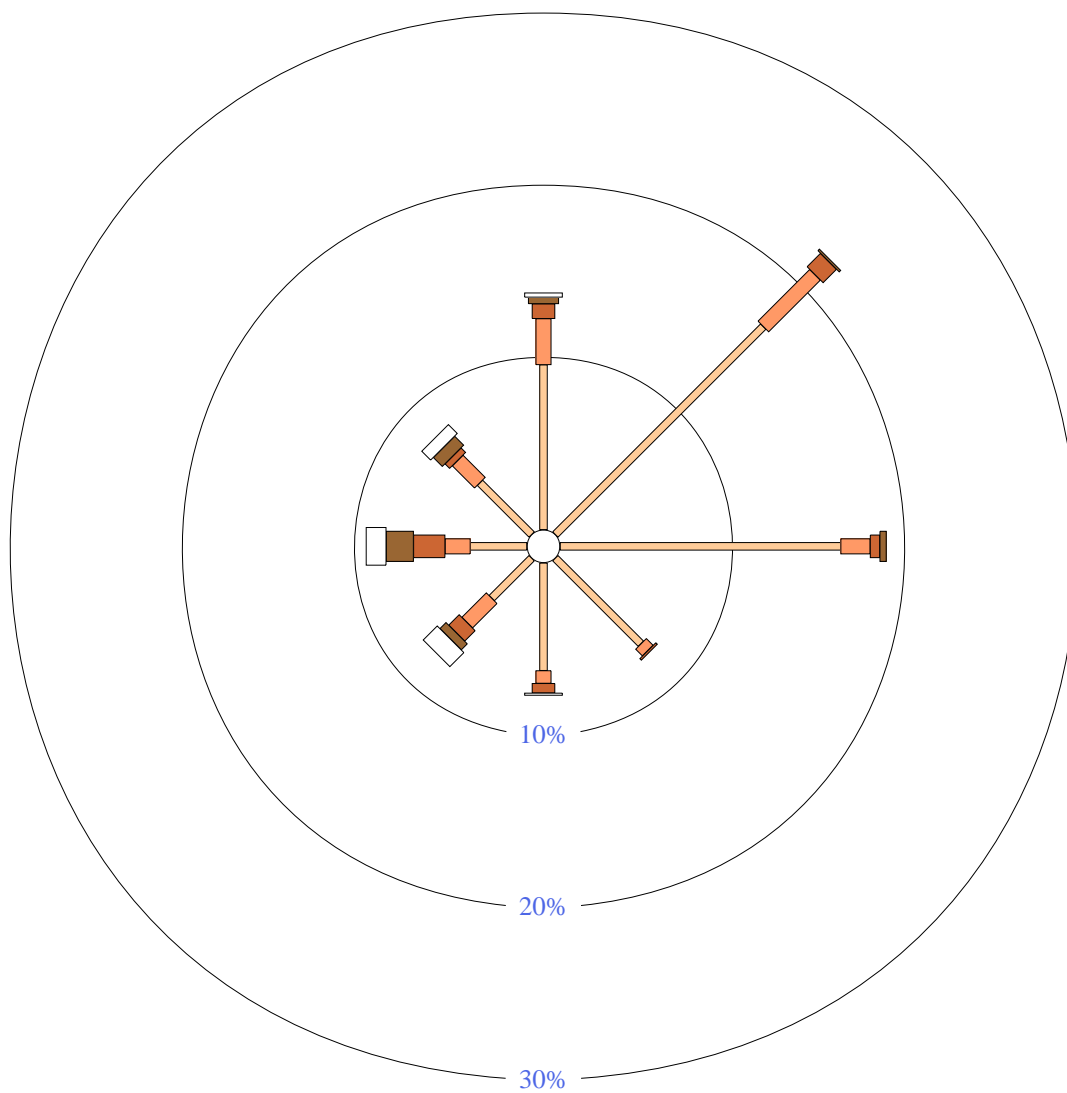
An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



9 am Jul
826 Total Observations

Calm 5%



Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

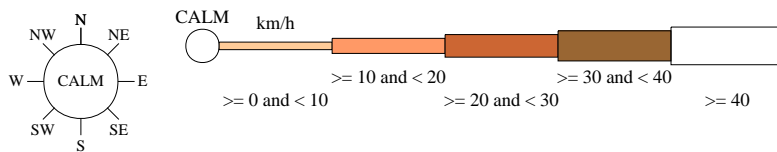
Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

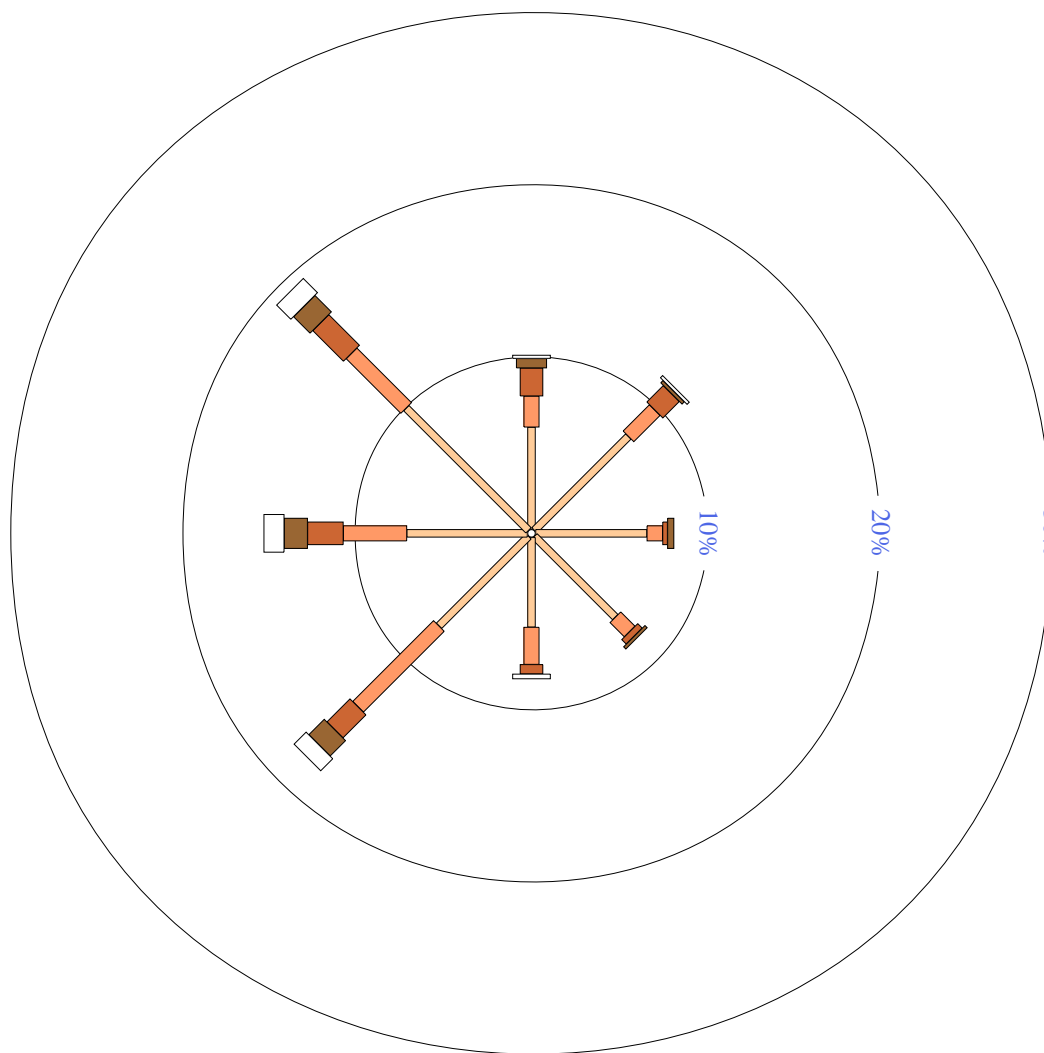
An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



3 pm Jul
558 Total Observations

Calm 1%



Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

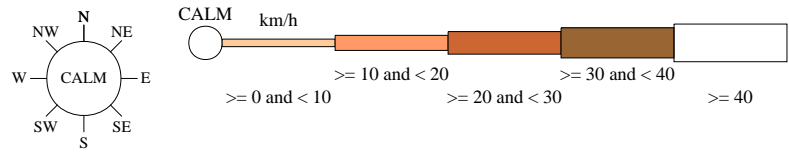
Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

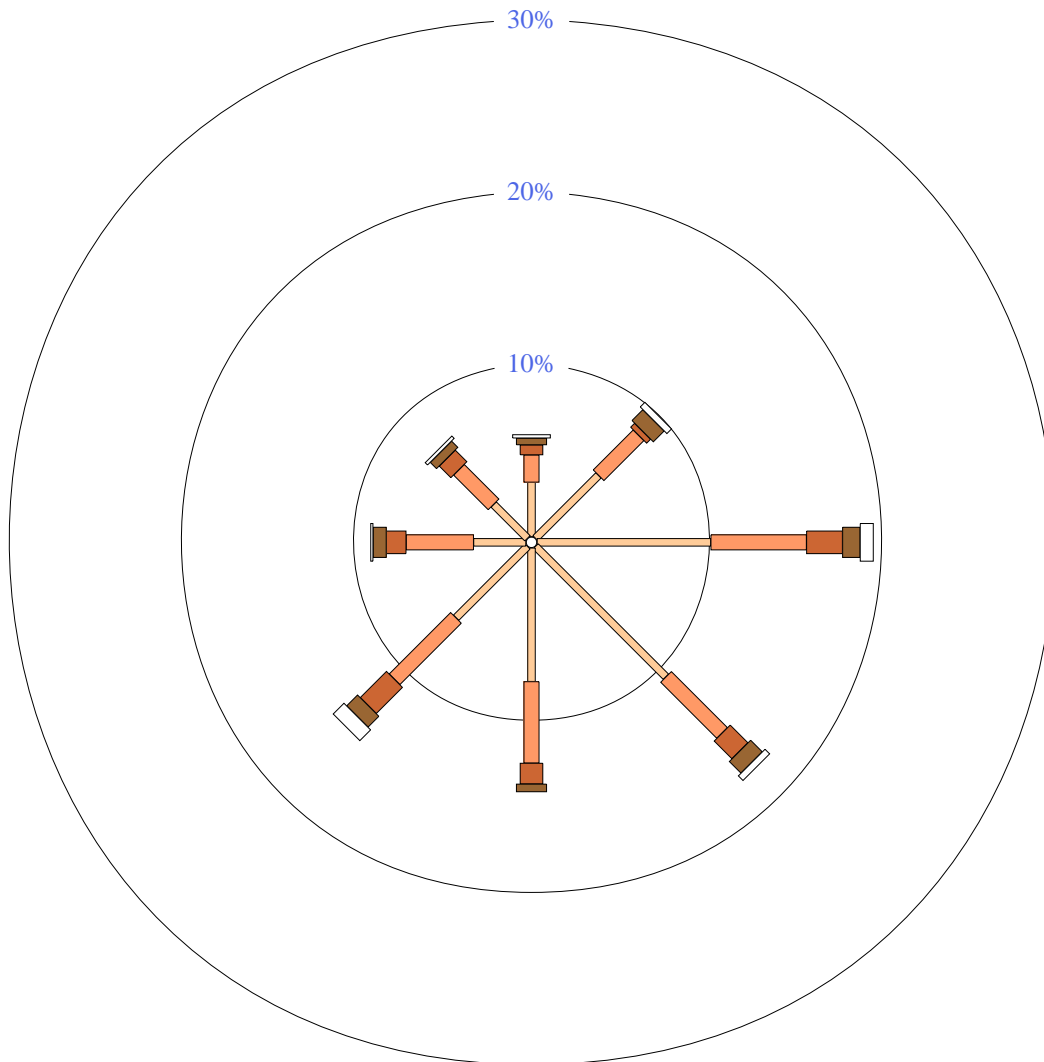
An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



9 am Oct
794 Total Observations

Calm 2%



Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

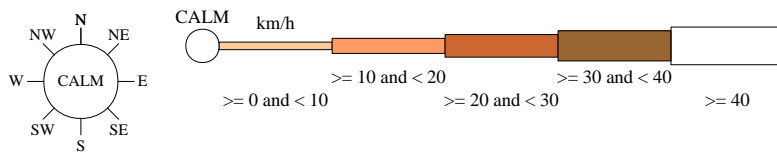
Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



3 pm Oct
540 Total Observations

Calm 1%

