Audalia Resources Limited
ABN 49 146 035 690
Level 1, Office F
1139 Hay Street, West Perth
Western Australia 6005
p: +61 8 9321 0715
f: +61 8 9321 0721

TECHNICAL MEMORANDUM

DATE 26 October 2020

Response to EPA Comments on Waste Rock Sampling

a) *Is there sufficient ore and waste rock characteristic sampling that are representative samples that are reflective horizontally and vertically over the pit shell and across lithology types?*

In addressing this query, Audalia has considered the geology of the Medcalf deposit, mine plan and sampling for characterisation work. Audalia notes that the mine has a very low strip ratio (0.15 : 1) and generates very little waste rock material. The majority of the waste rock lies near the surface and is generated through the stripping the hanging wall to access the deeper ore. The lack of waste rock material, combined with the demand for construction materials for TSF and evaporation pond embankments, means that a significant borrow pit is required for construction materials.

The geochemical characterisation is based on 8 holes covering three main waste types. The total quantity of waste is 2,794,500t or 1,278,500 m3. The rock types are consistent and due to the small scale of mining, low strip ratio, and lack of a waste rock dump, the sampling is considered to be representative across the lithology types.

Geology

The Medcalf geology is relatively simple geology and not analogous to gold deposits in the Yilgarn that may have large variability (lithological and alteration) in their width, direction and shape. It is more analogous to the iron ore deposits of the Pilbara, i.e. long (several kilometres) tabular flat deposits that are exposed at the surface (Figure 1a, Figure 1b and Figure 2).

Cube Consulting (2018) completed a resources estimate of the deposit while setting up their kriging parameters and stated the following: "*Based on the observed low nugget values, relatively long ranges, and the generally large thickness of the mineralisation, the search distances were not considered a limiting factor.*"

There are three major rock types within the proposed pit (shown in yellow in Figure 3) which are:

1) Gabbro (dark green)
2) Pyroxenite (red) – where the mineralisation resides (V, Ti, Fe)
3) Ultramafic (purple)

Pyroxenite is dominant within the pit - it is the ore to be mined and processed. The minor quantities of material left are gabbro, the ultramafic and pyroxenite below cut-off grade - which resides within the cover material (Figure 4).

Deep weathering (approximately 50m deep) extends beyond the pit floor. The water table is deeper again – it does not intersect the pit floor. Fresh rock will not be mined – it is shown in green in Figure 3. The pyroxenite (ore) is oxidised and is typical of the weathering profile (saprolites) within the Yilgarn. The pyroxenite consists mainly of haematite, titanium haematite and maghemite. The other component is kaolinite (silica and aluminium).

The average thickness of the regolith and weathered bedrock is 60 to 80 m. The fully developed lateritic weathering profile is divisible into four zones. Starting from the top, they are lateritic residuum, mottled zone, saprolite and saprock. Almost all the vanadium and titanium mineralisation lies in the saprolitic zone (Figure 4 – orange).

The Medcalf ore is somewhat unique to most vanadium deposits in being oxidised, non-sulphide bearing (non-acid forming) and non-magnetic. A conventional processing route is not suitable for this orebody.

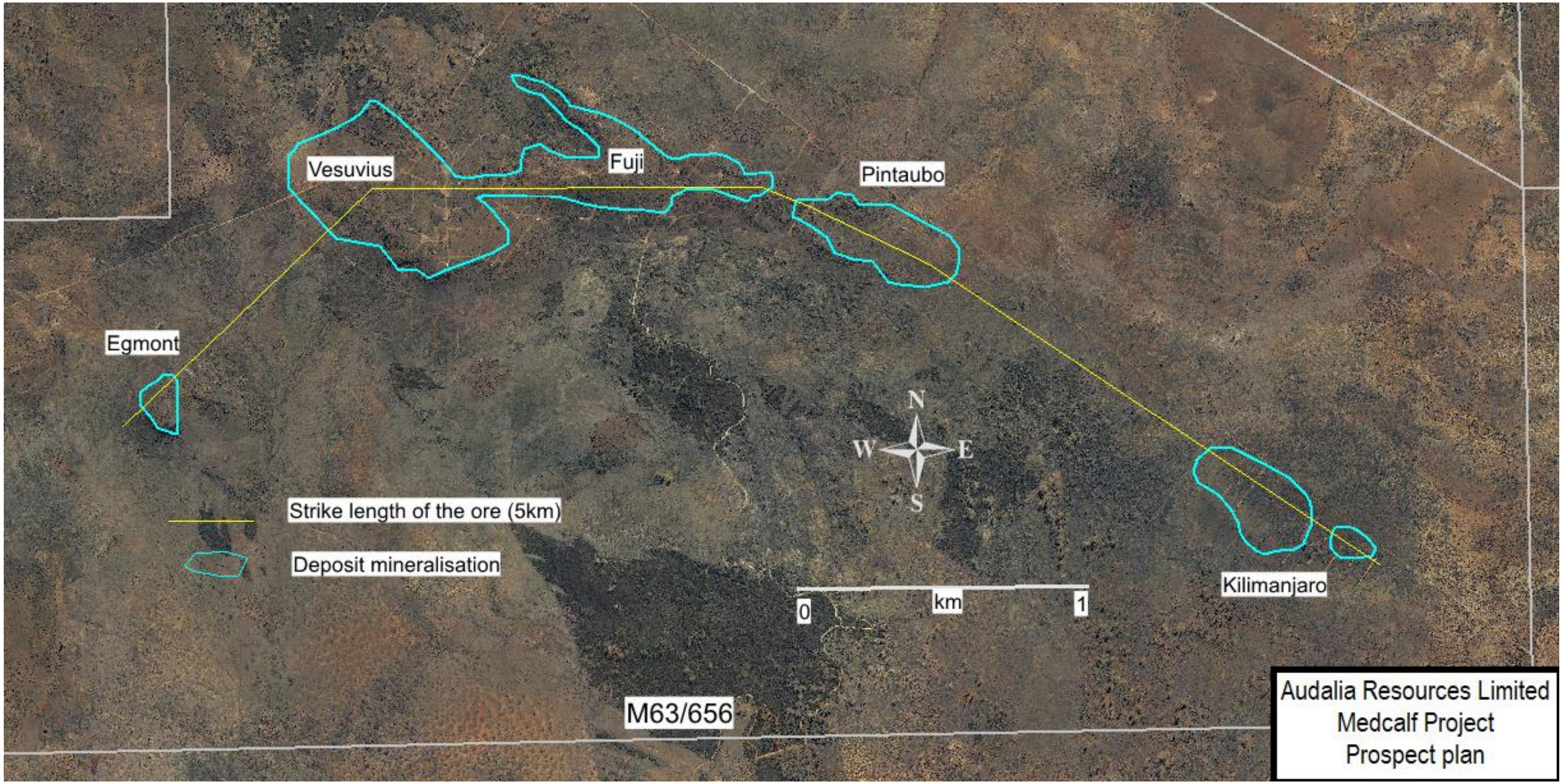


Figure 1a – Prospect plan showing continuous mineralisation over 5km of strike.

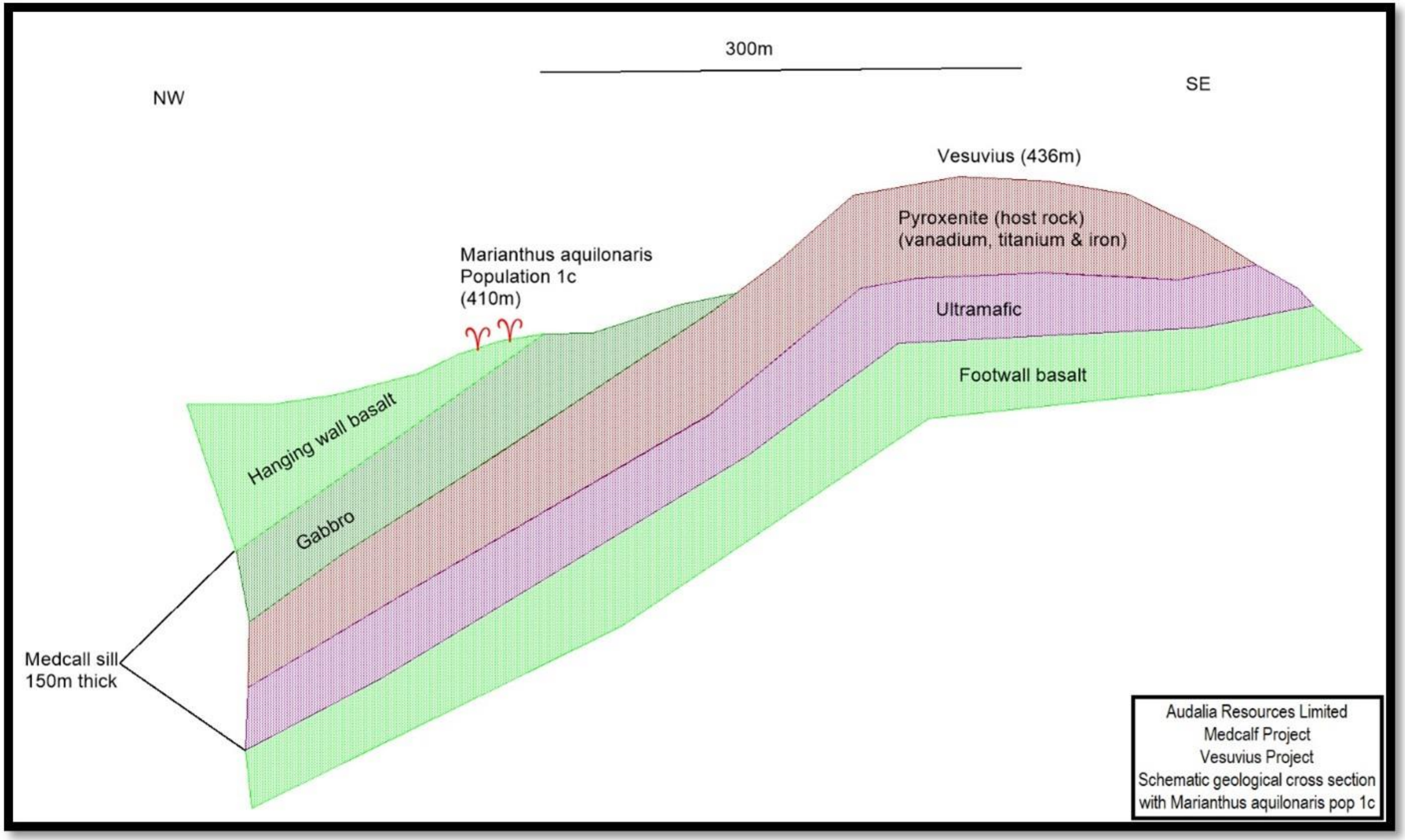


Figure 1b – Schematic cross section of the Medcalf Sill

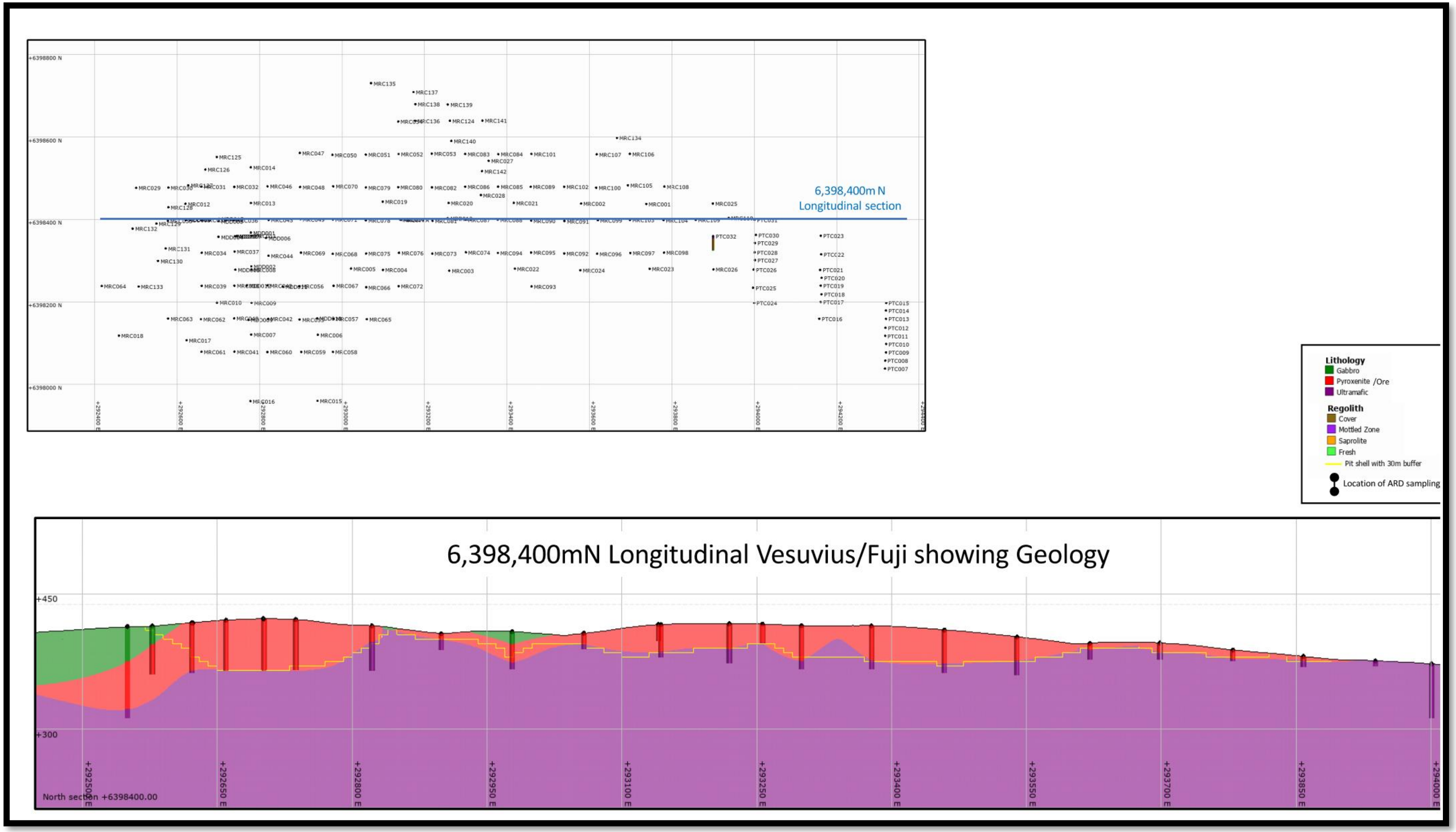


Figure 2 - Long section through the Vesuvius/Fuji deposits showing continuous lateral and vertical extent of the ore

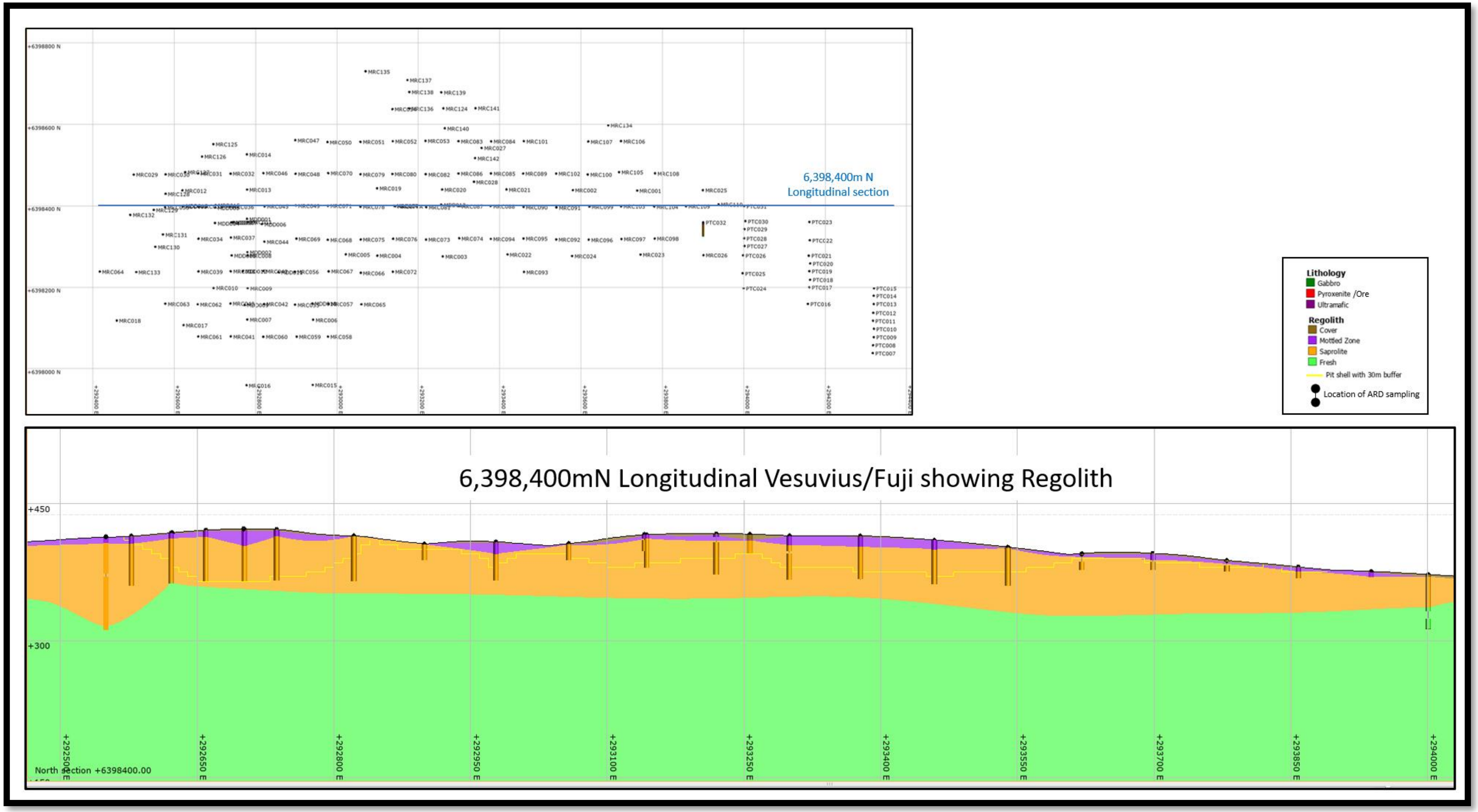


Figure 3 - Long section through the Vesuvius/Fuji deposits showing continuous lateral and vertical extent of the regolith

Each rock type is reviewed below in terms of sampling location to demonstrate that adequate sampling has been completed for the waste characterisation study by GCA (2020).

1) Gabbro

The gabbro is a mafic intrusive greenish grey rock that has a grain size of 2 to 5mm and ranges from massive to moderately foliated. In the mottled and lateritic residuum zones the gabbro's plagioclase and tremolite are replaced by a textureless limonitic clay.

The gabbro has been mapped outside the known extent of the Medcalf Sill, i.e., extending from Egmont through Vesuvius and Fuji to Kilimanjaro (Figure 5). These gabbro outcrops are currently regarded as faulted or folded extensions.

The gabbro is located in the hangingwall (Figure 1b) of the Vesuvius (Figure 6) and Pinatubo (Figure 8) pits and Fuji (Figure 5). The Egmont pit does not contain gabbro.

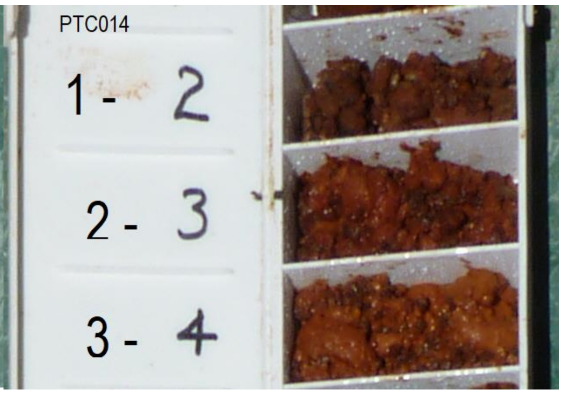
The gabbro accounts for 25% of the total waste volume and will not be used for construction material. The gabbro instead will be used to backfill the borrow pit from where basalt will be mined for additional construction material for the Tailings Storage Facility and the Evaporation ponds.

The composition of the gabbro is very consistent over the deposits, with the two main regolith types being the mottled zone and the saprolite zone.

Drillhole MRC127 was sampled (Figure 6) as part of the GCA (2020) work on waste rock characterisation (i.e. gabbro mottled zone from interval 0-3m depth). The geological logging of the mottled zone of the Vesuvius gabbro (Figure 7) and the Pinatubo gabbro (Figure 9) mirrors each other. This is reflected in the photos of the drill cuttings from each area below in Plate 1. Refer to Figures 6 & 8 for the drillhole locations.

Plate 1

Vesuvius drillhole MRC127 gabbro mottled zone drill cuttings from 0 - 3m



Pinatubo drillhole PTC014 gabbro mottled zone from 1 – 4m depth

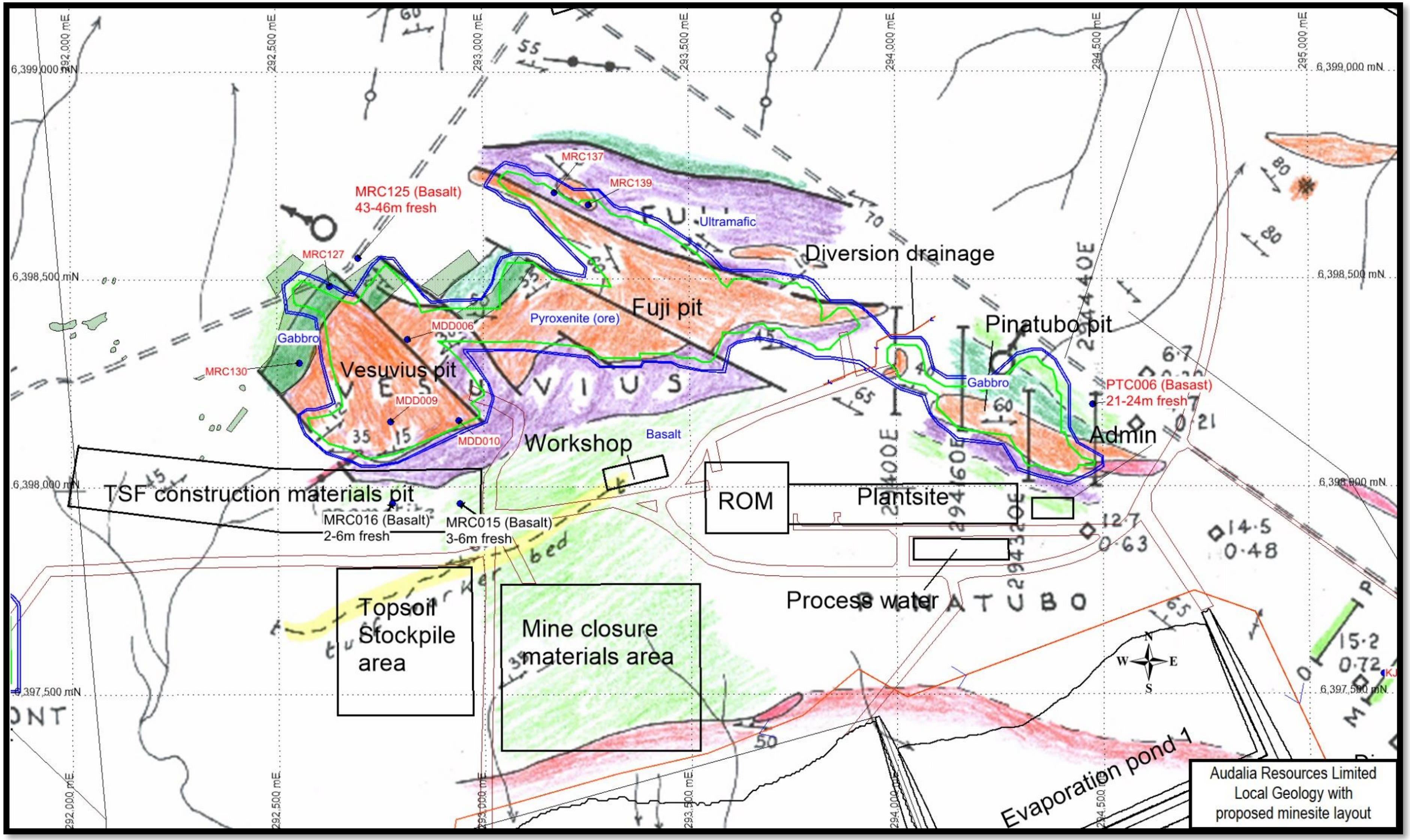


Figure 5 – Geological plan showing ARD holes and proposed minesite layout

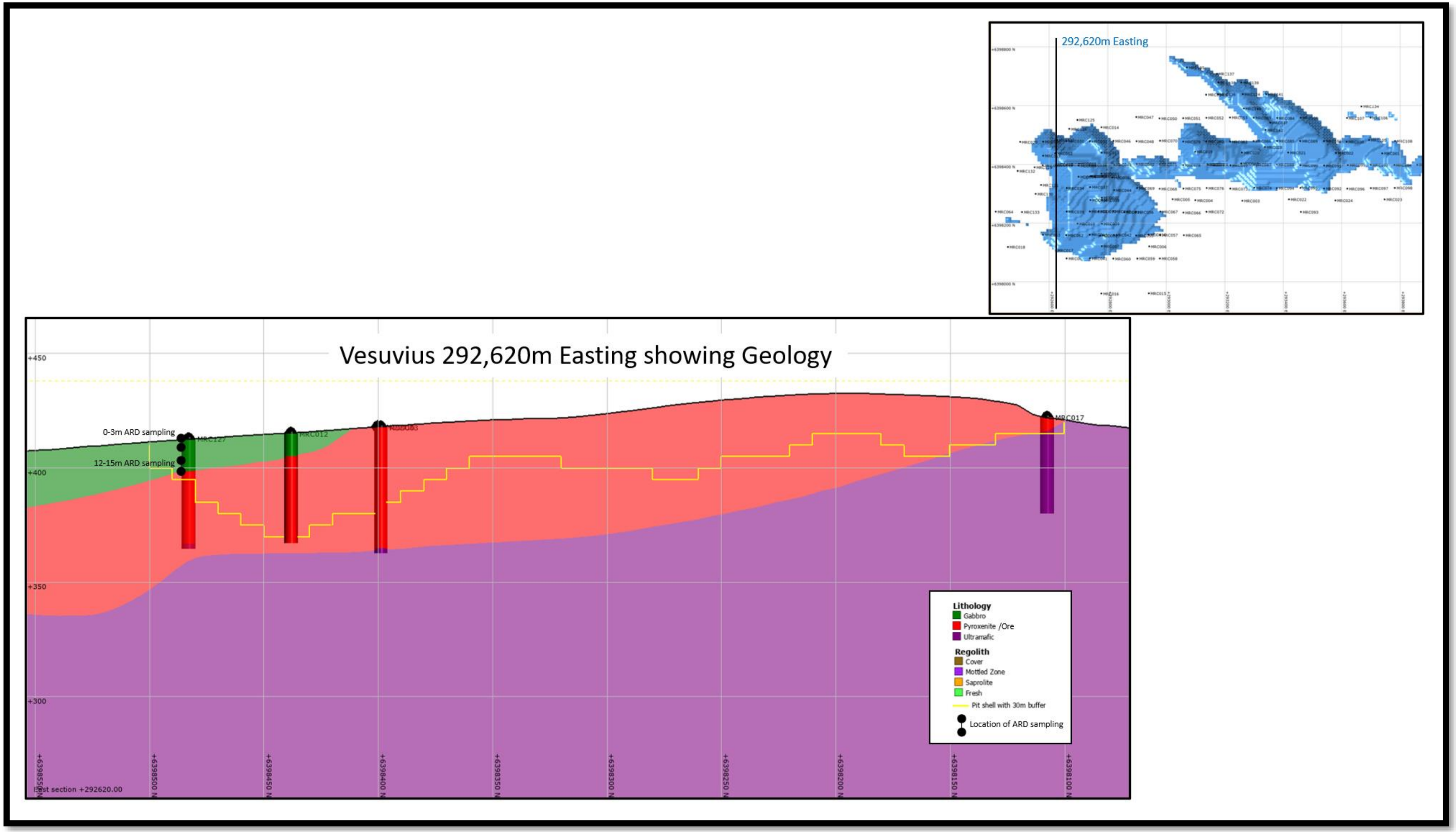


Figure 6 – Vesuvius Cross section showing where the gabbro waste is located in the pit and the ARD hole sampled.

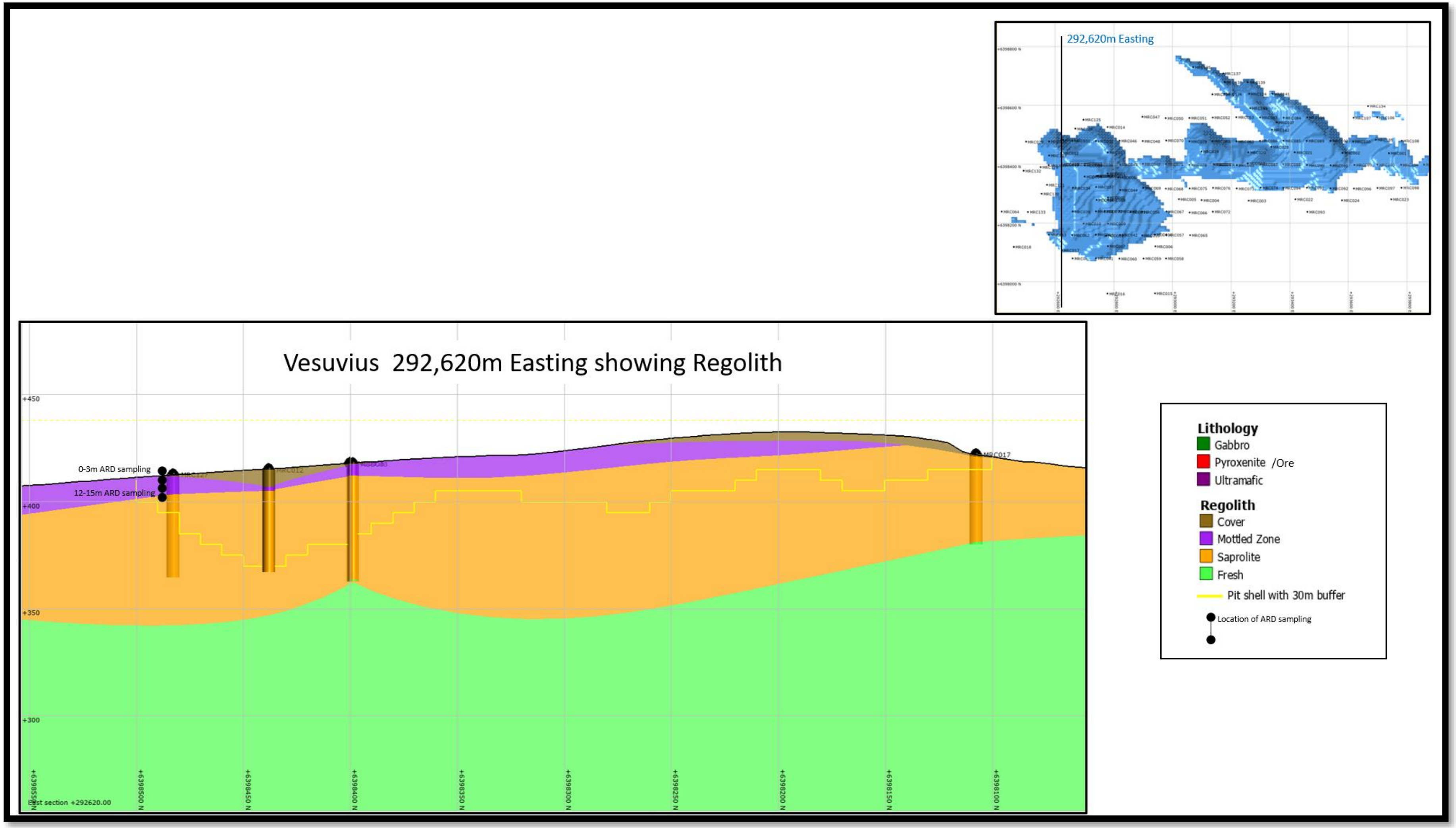


Figure 7 – Vesuvius Cross section showing where the two regolith types for gabbro that have been sampled (black dots downhole) in the mottled zone (purple) & the saprolite (orange).

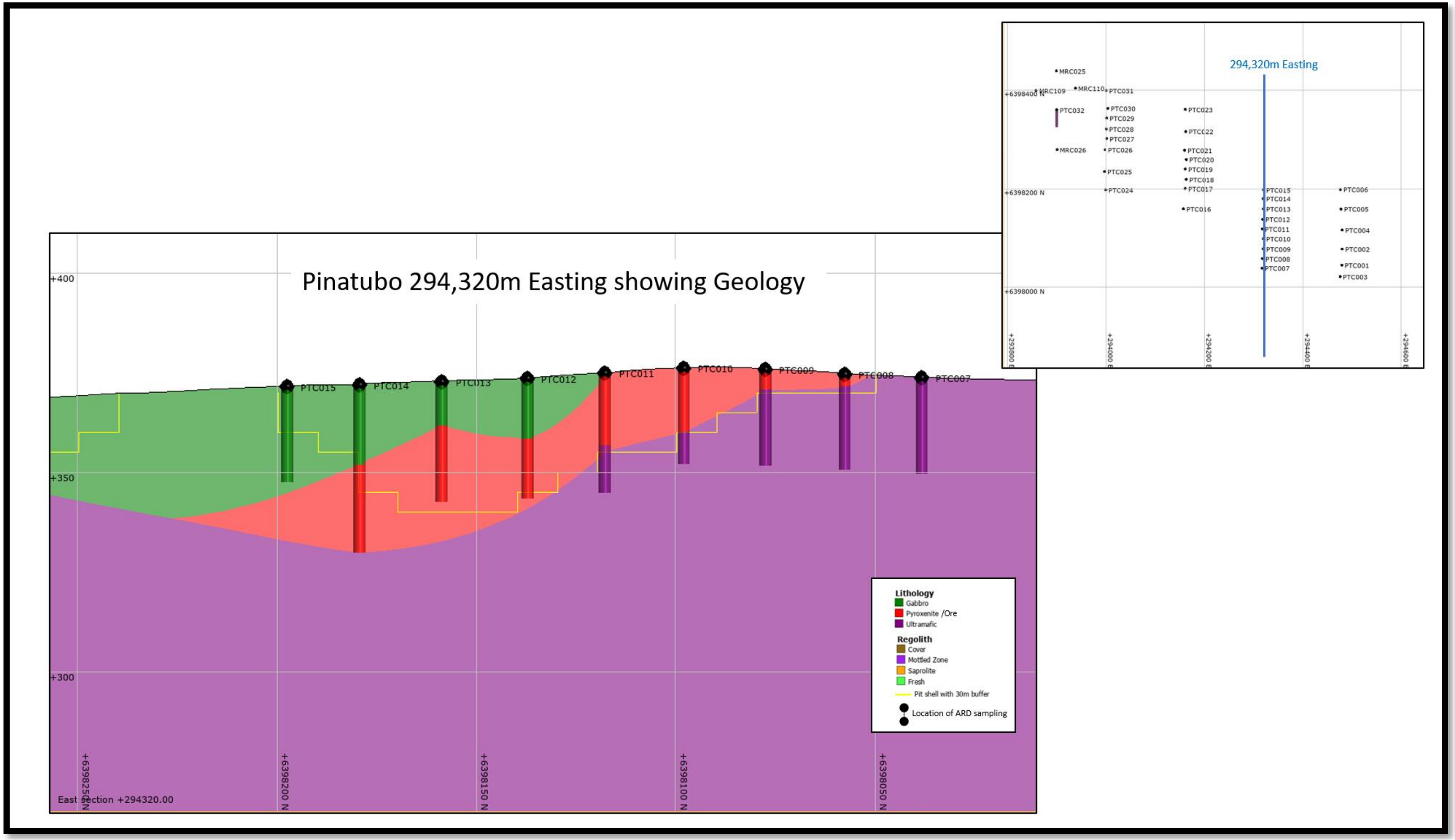


Figure 8 – Pinatubo Cross section showing where the gabbro waste is located in the pit.

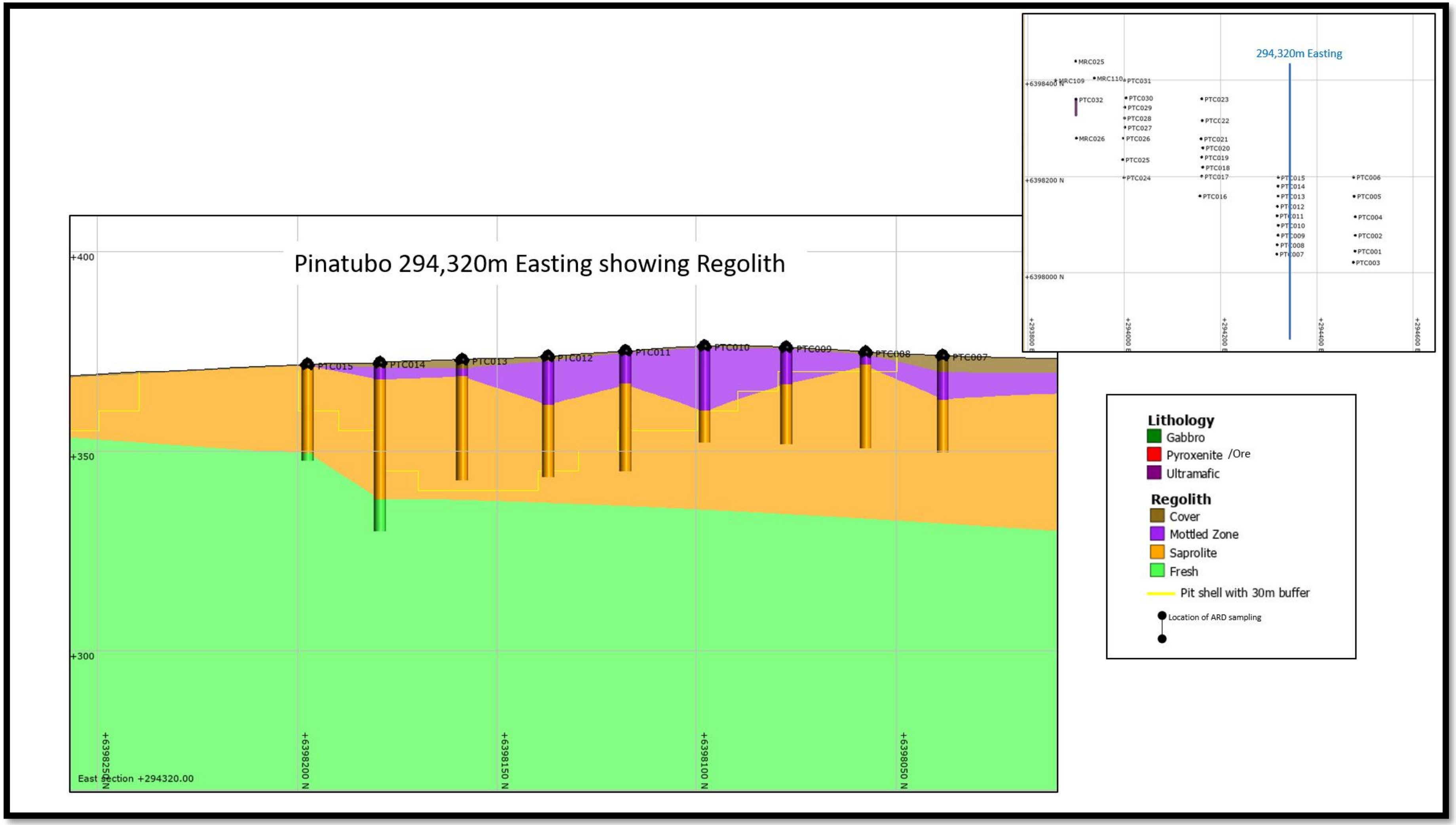
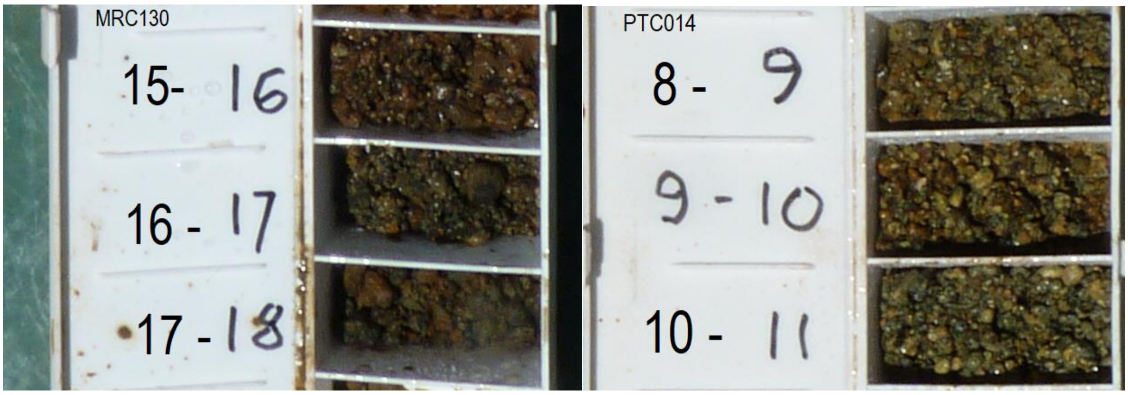


Figure 9 – Pinatubo Cross section showing two regolith types for the gabbro, the mottled zone (purple) and the saprolite zone (orange).

Drillhole MRC130 was sampled (Figure 5 for location) in the GCA (2020) work to characterise the gabbro saprolite zone from interval 15-18m depth. The geological logging of the saprolite zone of the Vesuvius gabbro (Figure 7) and the Pinatubo gabbro (Figure 9) mirrors each other. This is reflected in the photos of the drill cuttings from each area below in Plate 2.



Vesuvius drillhole MRC130 gabbro saprolite zone drill cuttings from 15 - 18m

Pinatubo drillhole PTC014 gabbro saprolite zone from 8 – 11m depth

Plate 2

In conclusion, the Gabbro is morphologically similar across the deposit. It represents 25% of the waste. The two Vesuvius drillholes MRC127 and MRC130 adequately represent the gabbro in terms of geochemical characteristics. As illustrated, the gabbro:

a) lies at shallow depths;
b) is oxidised;
c) contains no sulphides;
d) is not used for construction;
e) is not used for a waste rock landform; and
f) is only used as backfill in the borrow pit.

2) Ultramafic

The ultramafic zone is variously represented by talcose tremolite chlorite schist, medium-grained tremolite rock and pale orange jasper. Talc is stable through the weathering profile and can still be identified in iron-rich or clay-rich material otherwise lacking diagnostic features.

The ultramafic zone consists of brown to pale grey-green clay with subordinate orange chert. Relic textures in the grey green clay were restricted to disseminated 1 to 10%, 0.5mm black opaques. The orange chert is a weathering product and forms thin veinlets in saprolitic ultramafic. The chert contains disseminated 0.5mm black opaques similar to those in surrounding saprolite.

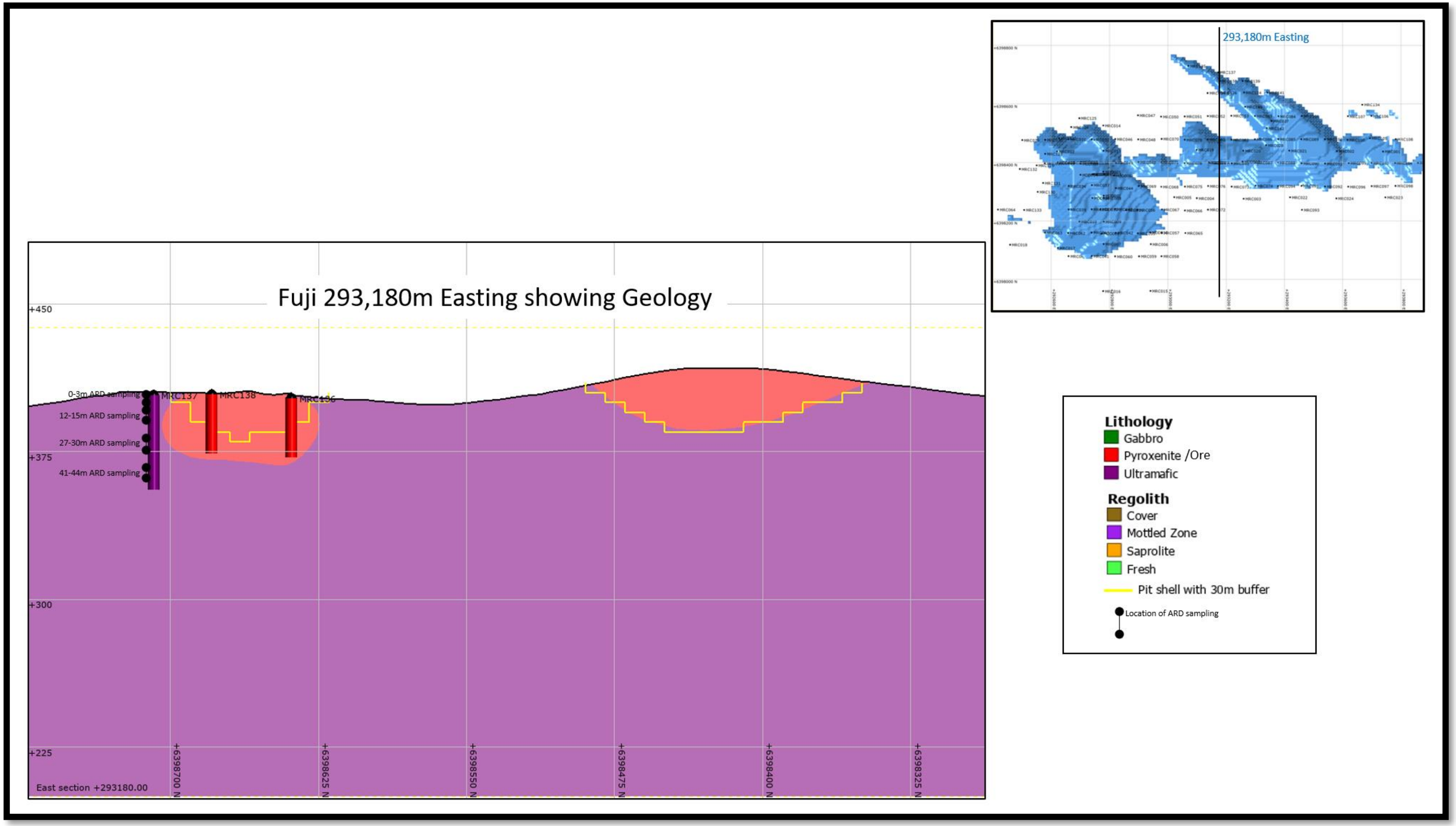


Figure 10 – Fuji Cross section showing where the ultramafic zone is located in the pit showing ARD hole MRC139's location

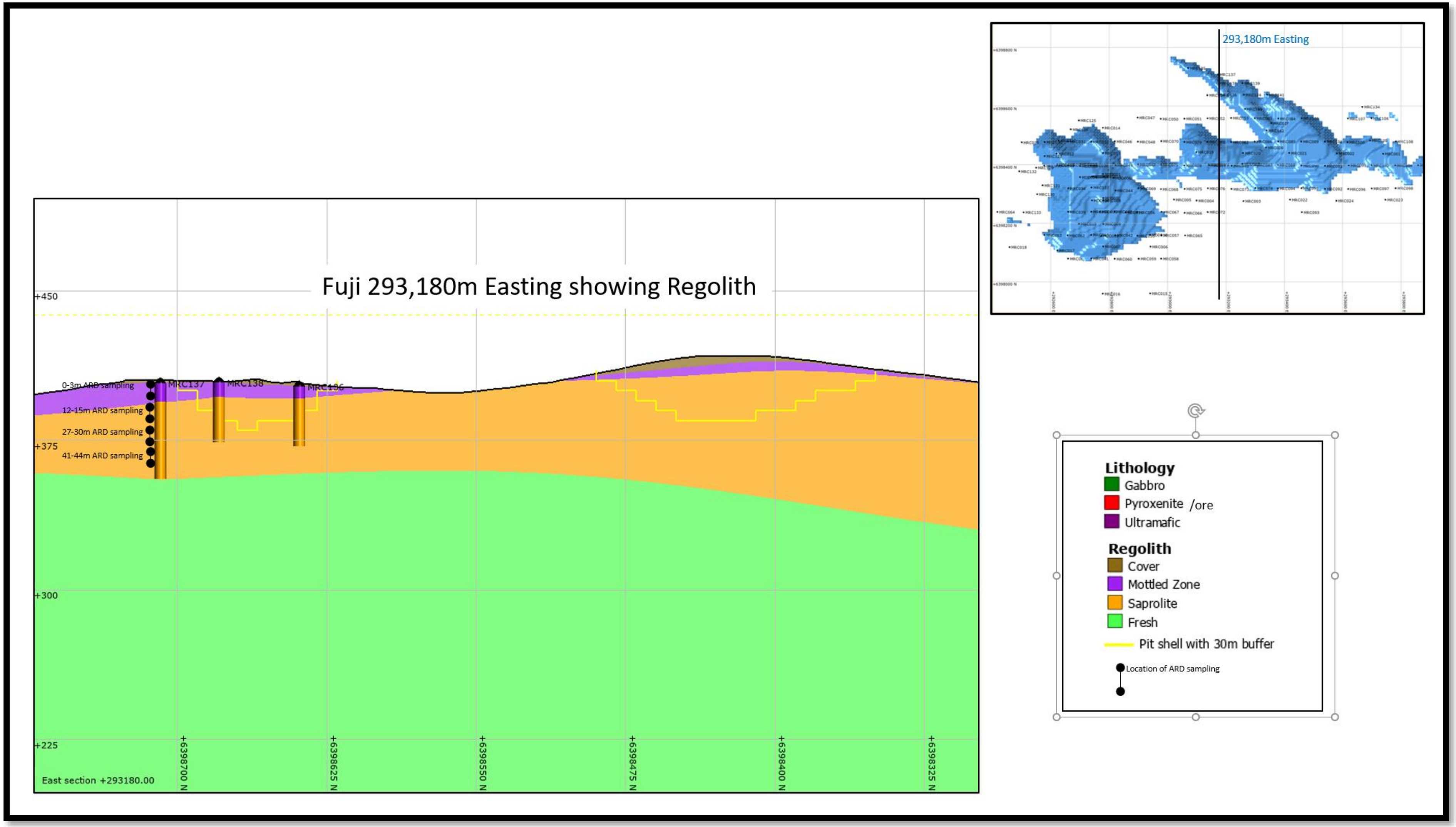


Figure 11 – Fuji Cross section showing all the regolith types which ARD hole MRC139 has sampled,

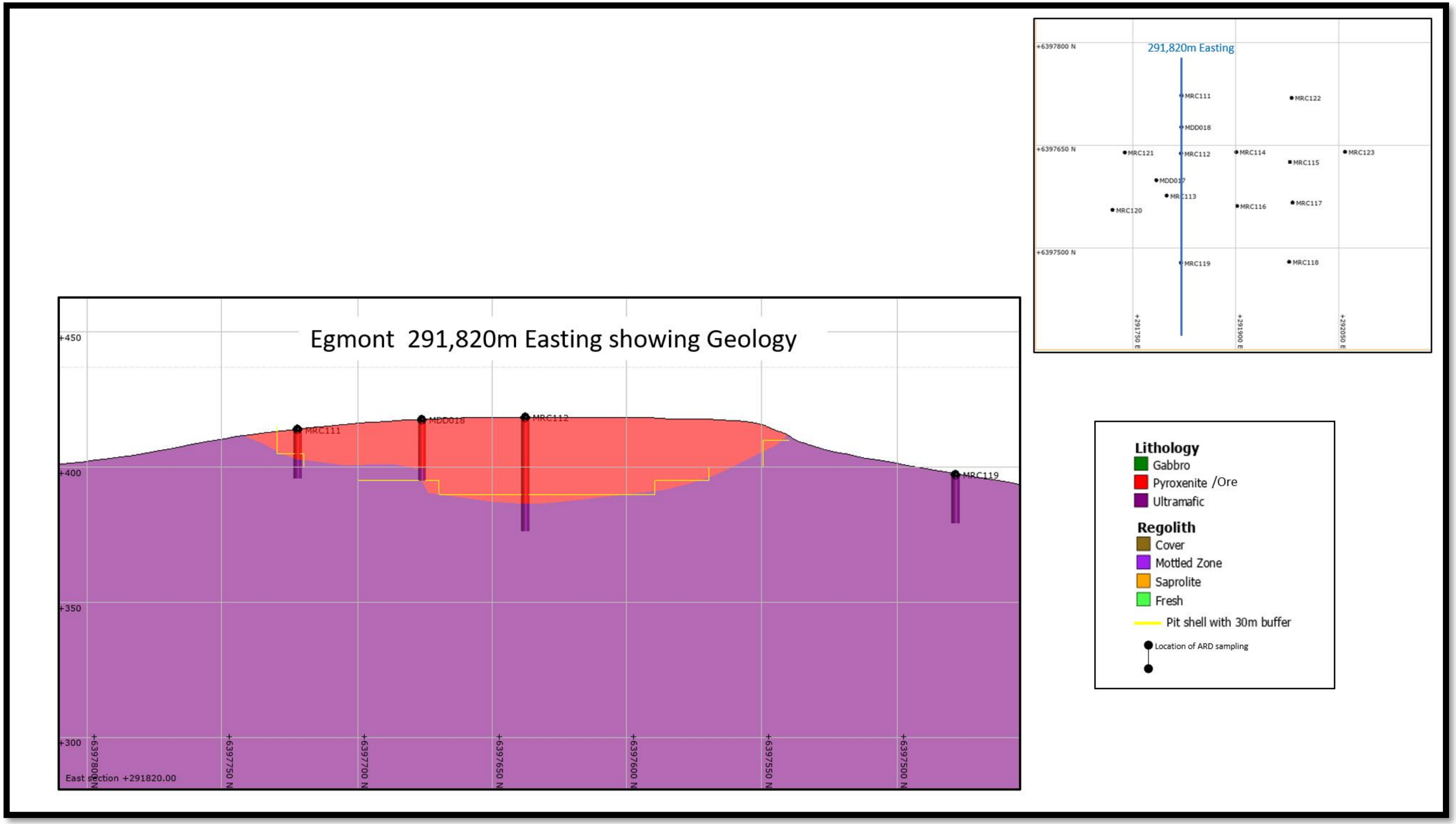


Figure 12 – Egmont Cross section showing where the ultramafic zone is located in the pit.

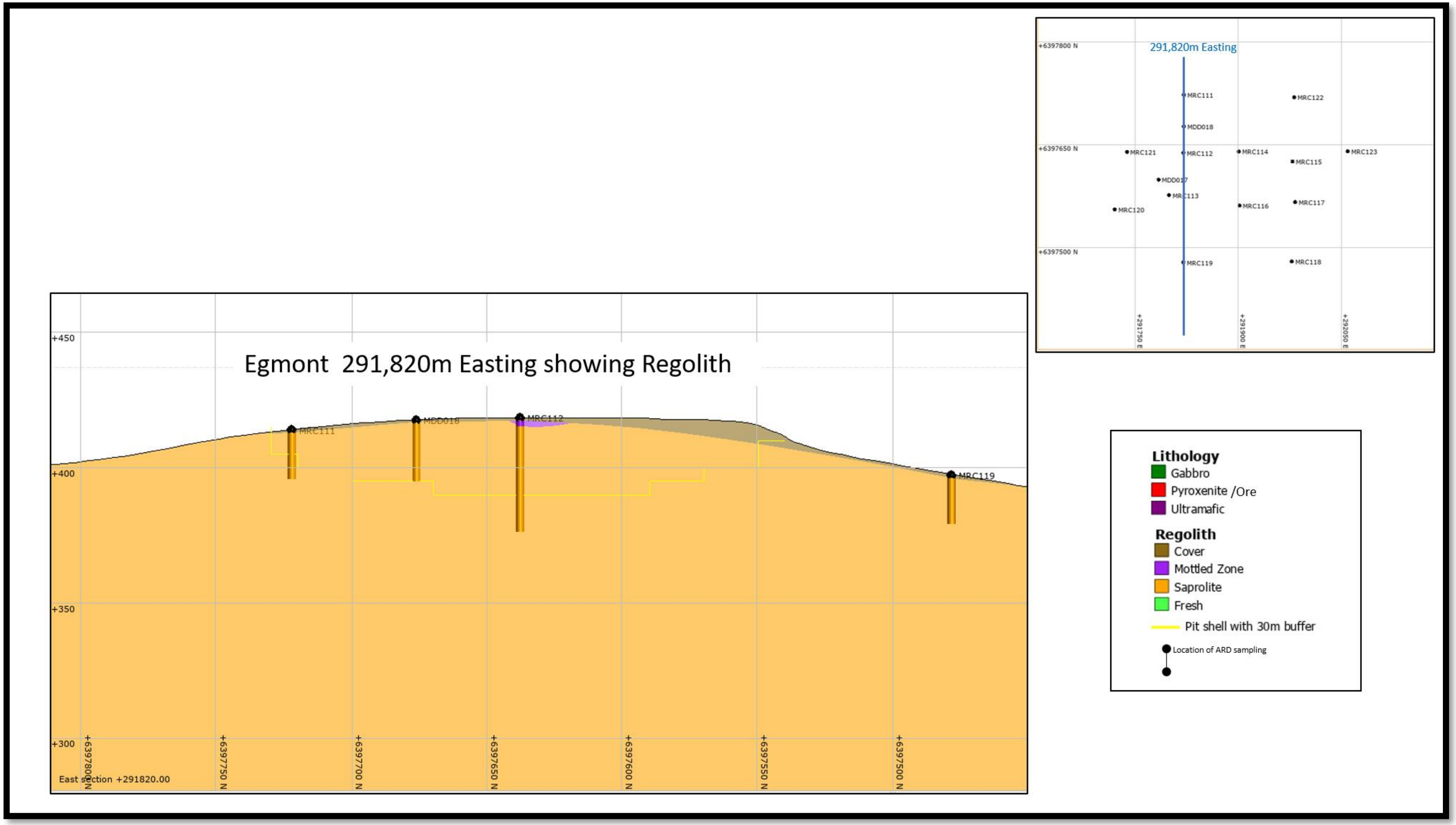


Figure 13 – Egmont Cross section showing all the regolith types which is mainly saprolite

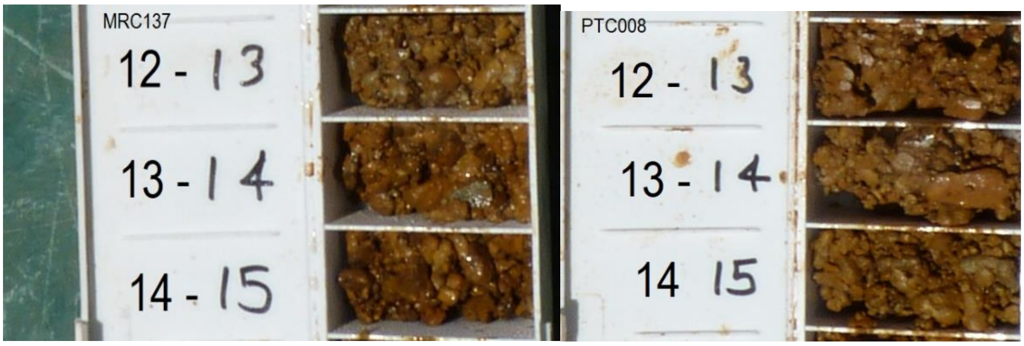
The ultramafic zone is mainly located in the footwall (Figure 1b) of all the pits (Figure 5 and Figure 12 for Egmont)

The ultramafic accounts for 30% of the waste volume and will not be used for construction material and not formed part of any waste rock landform. The ultramafic will be used as backfill in the construction materials borrow pit.

The composition of the ultramafic zone is very consistent over the deposits, with two main regolith types the mottled zone and the saprolite zone.

Drillhole MRC137 was sampled (Figure 10 & 11) as part of the GCA (2020) work with the following samples collected for testing: ultramafic cover zone (0-1m), mottled zone (1-3m) and saprolite zone (12-15m), (27-30m) and (41-44m).

The geological logging of the saprolite zone of the Fuji ultramafic (Figure 10) and the Pinatubo ultramafic (Figure 9) mirrors each other. This is reflected in the photos of the drill cuttings from each area below in Plate 3.



Fuji drillhole MRC137 ultramafic zone drill cuttings from 12 - 15m depth.	**Pinatubo drillhole PTC008 ultramafic zone from 12 – 15m depth**

Plate 3

This saprolite zone extends across to Egmont as well (Figure 13) and plate 4 below shows the Egmont ultramafic similar to all the other pit areas at a depth of 35-36m.

Plate 4 - MDD017 drill core from 35-36m

In conclusion, the ultramafics are morphologically similar across the deposit. It represents 30% of the waste. The two Vesuvius drillholes MDDD006 and MDD009 and the two Fuji drillholes MRC137 and MRC139 adequately represent the gabbro the ultramafic zones in terms of geochemical characteristics. As illustrated, the ultramafic:

a) lies at mostly at the base of the pit (footwall);
b) is oxidised;
c) contains no sulphides;
d) is not used for construction;
e) is not used for a waste rock landform; and
f) is used as backfill in the borrow pit.

3) Pyroxenite (below cut-off grade) – Cover (Construction material)

The pyroxenite is a coarse-grained 2 to 5mm tremolite igneous rock with black opaques, ranging from about 10% up to 90%.

The pyroxenite contains the mineralisation of vanadium titanium and iron and the mineralisation varies across the deposits as seen in Figure 2.

Not all of the pyroxenite will be mined due to low content of mineralisation that makes the pyroxenite uneconomic hence this reports to as mineralised waste. This threshold is where the iron content falls below 25.7%.

The pyroxenite cover (Figure 14) waste accounts for 85% of the volume and is exposed at the surface on topographic highs (Figure 15) as laterite zones and conglomerates (Plate 5). This material is heavily leached and blocky (Plate 6 & 7), making it well suited for construction. Note the low sulphur and phosphorus content from MDD013 interval 0-1m.

Plate 5 – The cover consisting lateritic pyroxenite

Plate 6 – MDD013 (Fuji) showing blocky pyroxenite cover from 0 to 1.6m deep.

Hole	From	To	TiO2	V2O5	Fe2O3	SiO2	Al2O3	MnO	CaO	P
MDD013	0	1	3.41	0.38	53.07	17.83	15.59	0.09	0.06	0.01
	S	**MgO**	**K2O**	**Na2O**	**Zn**	**Cu**	**Cr2O3**	**Ni**	**Cl**	**Co**
	0.06	0.14	0.02	0.22	0.01	0.02	0.11	0.01	0.19	<0.005

Plate 7 – MDD003 (Vesuvius) showing blocky pyroxenite cover from 0 to 1.3m deep.

The same blocky material (Plate 8) occurs at depth in the saprolite zone where MRC130 was sampled for waste rock characterisation at a depth of 92 -95m.

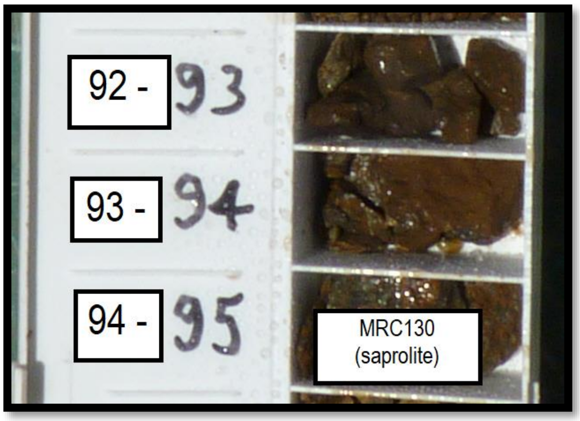


Plate 8 – MRC130 pyroxenite saprolite (92-95m)

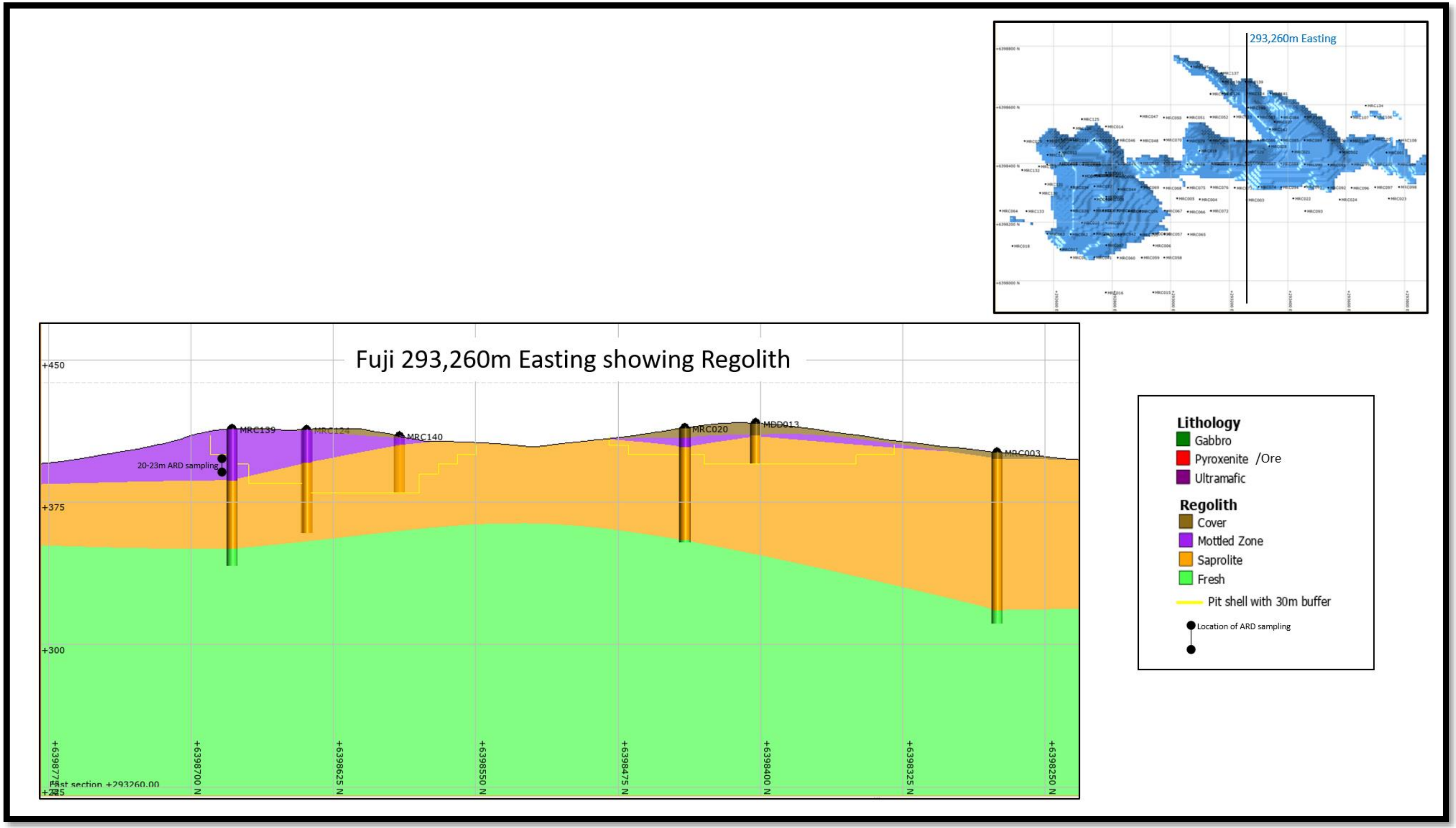


Figure 14 – Fuji Cross section showing all the regolith types with MDD013 drilled in cover

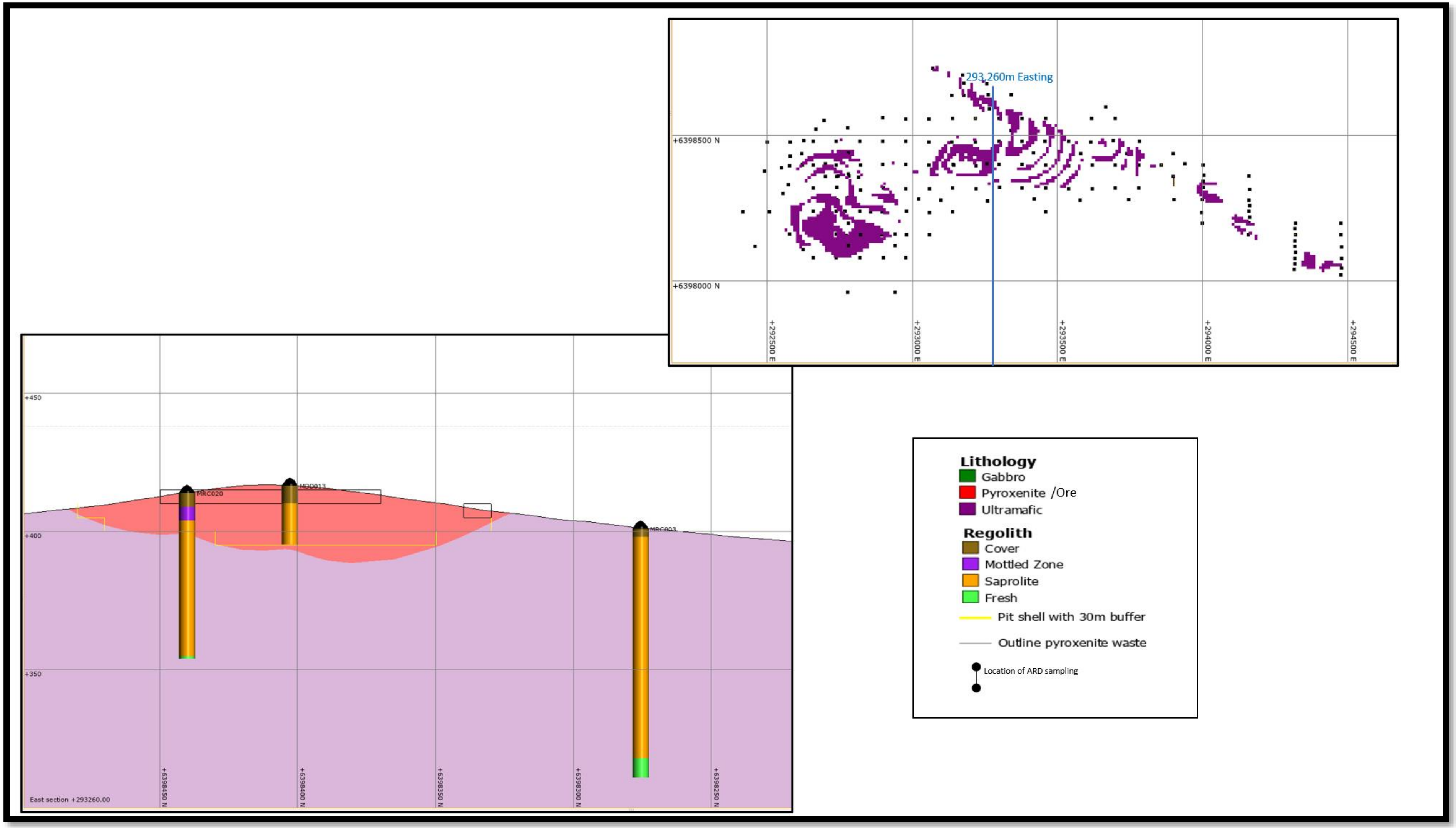


Figure 15 – Plan (dark purple) and section view (black rectangles). of the location of the cover

In conclusion, the pyroxenite waste, represents 45% of the waste. It is morphologically similar across the deposit and:

a) lies at surface on topographic highs (Figure 15);
b) is heavily leached over billions of years to leave residual iron;
c) contains no sulphides;
d) perfect construction due to its blocky nature.

It has been tested in the GCA (2020) study and shown to be geochemically benign.

Materials Balance

a) Construction

There are 4 construction items to service with suitable building material for a total volume of 2,780,680 as shown below in Table 1.

Table 1 – Total volume of suitable building material

Bund wall volumes			
Pit	**Bund length (m)**	**Bund section (m2)**	**Volume (m3)**
Egmont	670		
Vesuivus-Fuji-Pinatubo	6,200		
TSF borrow pit	2,410		
Total	**9,280**	**6**	**55,680**
TSF and Evaporation pond volumes			
Facility			**Volume (m3)**
TSF			1,550,000
Eavporation pond 1			585,000
Eavporation pond 1			590,000
Total			**2,725,000**
Total			**2,780,680**

Due to the low strip ratio, there is not enough waste suitable construction material ie available through mining the pits (Table 2). The pyroxenite waste only contribute to 21% of the construction materials.

To fulfil the shortfall, fresh basalt will be mined from a borrow pit immediately south of the Vesuvius pit where 2,938,000m^3 of construction material is available (Table 3).

This give the flexibility of having 3,533,000m^3 of construction material available. An oversupply of 21%.

Table 2 – Pit waste volumes

Regolith	Code	Rock type	Volume (m3)	Use
Cover	Cover	Gabbro	72,000	Backfill
		Pyroxenite	595,000	Construction
		Ultramafic	29,000	Backfill
Oxide	Mottled zone	Gabbro	115,500	Backfill
		Pyroxenite	0	
		Ultramafic	106,500	
Transitional	Saprolite	Gabbro	115,500	Backfill
		Pyroxenite	9,500	Backfill
		Ultramafic	235,500	Backfill
Total			**1,278,500**	

Table 3 – Construction materials from borrow pit.

Waste Volumes from TSF borrow pit				
Regolith	**Code**	**Rock type**	**Volume (m3)**	**Use**
Fresh	Fresh	Basalt	2,938,000	Construction
Total			**2,938,000**	

b) Rehabilitation

Topsoil from surface to 20cm depth is available from the pit and borrow pit areas as surplus plus topsoil will be generated from the TSF and Evaporation ponds for their rehabilitation (Table 4). There is no waste rock landform to rehabilitate as the waste generated from the pits will be backfill for the borrow pit reducing the borrow pit volume by 23% (Table 5).

Table 4 – Topsoil volumes

Topsoil volumes			
Item	**Area *(m2)**	**Depth (m)**	**Volume m3**
Tailings Evap pond	1,452,000	0.20	290,400
Vesuvius- Egmont, Pinatubo	510,500	0.20	102,100
Egmont	31,240	0.20	6,248
TSF borrow pit	147,600	0.20	29,520
Total			**428,268**

Table 5 - Waste rock generated from pits to use a backfill

Backfill volume for TSF borrow pit			
		Rock type	**Volume (m3)**
		Gabbro	303,000
		Ultramafic	371,000
		Pyroxenite SP	9,500
Total backfill			**683,500**

References

Cube Consulting 2019. Medcalf Mining Engineering Scoping Study – Technical Report, September 2019.

Taylor, T. 2015. Annual Report Medcalf Project. Exploration Licences 63/1133 & 63/1134 Prospecting Licences 63/1528, 63/1560 & 63/1561. Western Australia. Combined Reporting No C192/2012. Period 09 January 2014 to 08 January 2015 Audalia Resources Ltd.

Brent Butler

Geologist